THE LOUISIANA ENGINEER

Published February, April, June, August, October, December, by the Louisiana Engineering Society, under the auspices of the Committee on Publication

CHESTER A. PEYRONNIN, JR., Editor

Subscription, $3.00 per annum Single copy, 50 cents

Address all editorial communications to
CHESTER A. PEYRONNIN, JR., Editor, Tulane University
New Orleans 18, La.
and all business communications to
JOHN P. FRENANDEZ, Secretary-Treasurer, 522 Crystal St.,
New Orleans 24, La.

Second Class mail privileges authorized at New Orleans, Louisiana

Acceptance for mailing as special rate of postage provided for in section 1105 Act of October 3, 1917, authorized August 1, 1918

LOUISIANA ENGINEERING SOCIETY

404 Baronne St.

OFFICERS OF THE SOCIETY

ERNEST M. FREEMAN, *President,* 1103 Henry C. Beck Building, Shreveport

ROY T. SESSUMS, *First Vice-President,* P. O. Box 1520, New Orleans 5

EDWARD A. McLELLAN, Second Vice-President, P. O. Box 238, New Orleans 3

JOHN P. FERNANDEZ, Secretary-Treasurer, 522 Crystal Street, New Orleans 24

BOARD OF DIRECTION OF THE SOCIETY

BEN T. BOGARD, 36 University Drive, Ruston

JAMES S. JANSSEN, 317 Baronne Street, New Orleans 9

WALDEMOR S. NELSON, 1200 St. Charles Avenue, New Orleans 13

WALTER H. SCALES, 1822 Valence Street, New Orleans 15

FRANCIS M. TAYLOR, Tulane University, P. O. Station 20, New Orleans

OFFICERS OF STATE SECTIONS

Alexandria Section:

ANDREW M. MOORE, President, 1423 Donahue Ferry Road, Pineville

DALLAS C. ROBERTS, Secretary-Treasurer, 825 Murray St., Alexandria

Baton Rouge Section:

WALTER L. SUTTON, President, 9653 Molly Lea Drive, Baton Rouge

HAROLD F. LEIENDECKER, Secretary-Treasurer, 657 Carol Marie Drive, Baton Rouge

Lafayette Section:

ROLAND J. CAMBRE, President, P. O. Box 898, S.L.I., Lafayette

GERALD R. DYSON, Secretary-Treasurer, P. O. Box 723, Lafayette

Lake Charles Section:

GLENDON L. SMITH, President, 39 Horseshoe Lane, Maplewood

MARION D. GARRISON, Secretary-Treasurer, 1709 Kirkman St., Lake Charles

Monroe Section:

FARRELL W. ADAMS, President, Box 2867, Monroe

DAN D. McDUFF, Secretary-Treasurer, 602 Balboa St., Monroe

Shreveport Section:

JOHN S. MALAHY, JR., President, 330 E. Kings Highway, Shreveport

ORVILLE T. ICE, JR., Secretary-Treasurer, 522 Egan Street, Shreveport

STUDENT CHAPTER NO. 1 SOUTHWESTERN LOUISIANA INSTITUTE

CHARLES R. BAKER, President, Box 119, S.L.I., Lafayette

JAMES M. McCLANAHAN, Secretary, Gen. Delivery, S.L.I., Lafayette

BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS

Room 233, Civil Engineering Bldg., Tulane University

Donald Derickson, Chairman
B. T. Bogard, Vice-Chairman
Jesse Coates, Secretary
A. D. Jackson, Member
Leo M. Odom, Member
E. E. Taylor, Member
F. W. zur Burg, Member

WOMAN'S AUXILIARY OFFICERS FOR 1957-58

MRS. CHARLES E. CASSAGNE, JR., *President*
MRS. ALBERT J. FRANSEN, *President-Elect*
MRS. LEE H. JOHNSON, *Vice-President*
MRS. RALPH EARL, *Honorary Vice-President*
MRS. FRANK C. FROMHERZ, Recording Secretary
MRS. JOHN F. VOGT, JR., *Corresponding Secretary*
MRS. HERBERT L. WILLIAMS, *Financial Secretary*
MRS. WALDEMAR S. NELSON, *Treasurer*

OFFICERS OF WOMAN'S AUXILIARY, BATON ROUGE CHAPTER

MRS. FLOYD D. RICHARDS, *President*
MRS. WILLIAM J. METRAILER, *Vice-President*
MRS. RICHARD H. HUDSON, JR., Recording Secretary
MRS. THOMAS E. ALEXANDER, *Corresponding Secretary*
MRS. CALVIN T. WATTS, *Financial Secretary*
MRS. E. RAY FELTON, *Treasurer*

OFFICERS OF WOMAN'S AUXILIARY, ALEXANDRIA CHAPTER

MRS. EARL CRYAR, *President*
MRS. LOUIS J. DAIGRE, JR., *President-Elect*
MRS. WILLIAM E. FLOWERS, *Vice-President*
MRS. CHARLES W. COOK, *Recording Secretary*
MRS. ERNEST M. FURBY *Corresponding-Secretary*
MRS. CLAUDE W. BOUTTE, JR., *Financial Secretary*
MRS. L. H. BOSSIER, *Treasurer*

OFFICERS OF WOMAN'S AUXILIARY, SHREVEPORT CHAPTER

MRS. E. M. GILLEN, *President*
MRS. CHRIS DEMOPULOS, *President-Elect*
MRS. WILLIAM G. MAYER, *Secretary*
MRS. JOE R. SMITH, *Treasurer*

MEMBER ORGANIZATIONS OF LOUISIANA COUNCIL OF ENGINEERS

New Orleans Section, American Institute of Chemical Engineers:
O. F. Weideman, Chairman, 125 Levee View Drive, New Orleans 23
E. S. Gaiennie, Secty., 277 Wainwright Drive, New Orleans 23

New Orleans Section, Society of Plastics Engineers, Inc.
H. A. Levey, President, 311 Audubon Blvd., New Orleans, La.
Paul F. Oswald, Sec.-Treas., 3031 Coliseum St., New Orleans.

American Institute of Electrical Engineers, New Orleans Section
Daniel H. Vliet, Chairman, P. O. Station 20, New Orleans 18
Stanley G. Dinkel, Sec.-Treas., 1004 Richards Bldg., New Orleans 12

Delta Section, American Institute of Mining & Metallurgical Engineers:
W. D. Clift, Chairman, 909 S. Jeff. Davis Pkwy., New Orleans
E. A. Colle, Jr., Secretary, 451 National Bank of Commerce, New Orleans

Louisiana Section, American Society of Civil Engineers:
C. T. Watts, President, 506 Centenary Drive, Baton Rouge
Frank C. Fromherz, Sec.-Treas., 816 Howard Ave., New Orleans 12.

American Public Works Association, New Orleans Chapter
Salvador DiBenedetto, President, 526 Carondelet St., New Orleans.
George F. Stevenson, Sec. Treas., P. O. Box 37, Marrero, La.

American Society of Heating & Air-Conditioning Engineers, Delta Chapter:
Henry Stahl, President, 840 Baronne St.
Raymond K. Goode, Secretary, 3613 Pine St., New Orleans 25

American Society of Mechanical Engineers, N. O. Section:
Allen W. Betz, Chairman, 1719 Toledano St., New Orleans 15, La.
E. Landry Murphy, Sec.-Treas., 400 Balter Bldg., New Orleans 12, La.

American Society of Refrigerating Engineers, N. O. Section:
Fred Dupre, Chairman, 300 Dauphine St., New Orleans
Al Lusch, Secretary, 2502 Poydras, New Orleans

American Society of Safety Engineers, New Orleans Section:
F. O. Cornay, Chairman, 7613 Freret St., New Orleans
O. P. Villarrueia, Sec. Treas.,5840 Catina, New Orleans

Illuminating Engineering Society, New Orleans Chapter:
S. Conrad Berdon, Chairman, P. O. Box 340, New Orleans 9
Charles C. Kleinschmidt, Sec. Treas., P. O. Box 843, New Orleans

Society of American Military Engineers, Louisiana Post:
Roy T. Sessums, Chairman, 125 Magnolia Drive, Metairie

Louisiana Agricultural Engineers Association'
Harold T. Barr, Chairman, Agricultural Engineering Dept., L.S.U., Baton Rouge
Joe C. Colvin, Sec.-Treas., Room G-1, Court House Bldg., Shreveport

Louisiana Highway Engineers' Association:
Edwin H. Goodloe, President, 732 North 5th St., Baton Rouge
A. J. Landry, Secretary,Louisiana Dept. of Highways, Baton Rouge

Gulf Institute of Consulting Engineers
Louis N. Goodman, President, 405 Audubon Bldg., New Orleans 16
George A. Heft, Secretary, 820 Union St., New Orleans

NOTE—Please advise editor of any changes in officers.

THE LOUISIANA ENGINEER

Vol. 44 FEBRUARY, 1958 No. 1

CONTENTS

ERNEST MAYNARD FREEMAN
President 1958

ERNEST MAYNARD FREEMAN

President 1958

Mr. Ernest Maynard (Jiggs) Freeman, new President of the Louisiana Engineering Society, is a Civil Engineer of long experience and heads the organization of E. M. Freeman and Associates in Shreveport, Louisiana.

He was born on 1 October 1900 in Dallas, Texas and attended the public schools in Marshall, Texas. In 1922 he graduated from the Agricultural and Mechanical College of Texas with the degree of Bachelor of Science in Civil Engineering.

The Mosher Steel Company of Dallas employed him in 1922 for structural design and detail work. In 1925 he moved to Shreveport, La., for a short association with the Bain-Beaird Company and later Edward F. Nield, Architect.

In 1930 he began the private practice of Civil Engineering and has since been associated with many of the major projects in the region around Shreveport. Numbered among them were the Downtown Shreveport Municipal Airport, in 1941, the new Commercial Bank Building in Shreveport in 1939, the United Gas Line Company Building in Shreveport in 1938 and the Annex to it in 1953, the St. Vincents Infirmary in 1950 in Little Rock, Arkansas, and the State Department of Highways Office Building in Baton Rouge, La., in 1956.

He has designed many airports including the Greater Shreveport Muncipal Airport; the Harrison County Airport in Marshall, Texas; the Jasper County Airport in Jasper, Texas, the DeSoto Parish Airport in Mansfield, La., expansion of the Barksdale Field; and the Little Rock Air Force Base in Arkansas.

In more recent years he has been associated with the Common Street Extension in Shreveport, the England Air Force Base Housing project, the Henry C. Beck Building in Shreveport, and various projects at Barksdale Air Force Base.

He is affiliated with many professional organizations and has held high offices in several. He is a Past President of the Louisiana Section of the American Society of Civil Engineers, Louisiana State Institute of Civil Engineers, and the Gulf Institute of Consulting Engineers, and was a Director of the Louisiana Engineering Society in 1956. He is also a member of the National Society of Professional Engineers, American Concrete Institute, American Water Works Association, Society of Military Engineers, and Tau Beta Pi.

Mr. Freeman has been active in many civic and fraternal organizations, including the Shreveport Rotary, Chamber of Commerce, American Camellia Society, Scottish Rite Masons, Mithra Grotto, A.A.O.N.M.S. (El Karubah Temple), Joppa Lodge F & A M, Broadmoor Lodge F & A M, and the Norwela Council of the Boy Scouts of America. In addition he belongs to many Philatelic organizations.

His family consists of his wife Mildred; two sons, Eugene Gordon and Paul Maynard of Compton, California; and a daughter, Mildred Patricia (Mrs. E. B. Jamison) of Houston, Texas. He and his wife now reside in Marshall, Texas where they are active members of the Trinity Episcopal Church.

PRESIDENT'S MESSAGE

Your President wishes to use this means to express appreciation to the entire membership of the Louisiana Engineering Society for his promotion to the office of the Presidency of our Society.

I consider this office a very special and fine honor and humbly accept the obligations and responsibilities contingent thereto.

Our Society should conclude the work initiated by my predecessor's administration.

We must conclude the mandate of the membership relating to affiliation with the National Society of Professional Engineers and the Engineers Joint Council. All appropriate Constitution and By-Law changes have been formerly concluded, which were necessary to effect such affiliation. Formal petitions have been transmitted to appropriate authorities of these organizations. It is hoped that the acceptance of our Society into these National groups will be effected some time in March 1958.

The Society should continue to encourage embryonic scientists, technologists and engineers such as the sponsorship of JET (Junior Engineer-in-Training) Clubs and similar clubs throughout the State. Our Vocational Guidance Committee is in charge of this effort and the incumbents will continue activity until the end of the current school semester. A vigorous program will be conducted in this field of the Society's activities.

We will continue the effort to improve our "Louisiana Engineer" publication. The committee headed by Mr. Allen W. Betz is complimented for its splendid work in 1957.

The Section Coordination Committee rendered yeoman's service in 1957. The Section Coordination Committee activities will be continued. Another State Section Conference will occur in March in Alexandria this year.

Our major objective for the year will be the improvement of our Professional licensing law and the engineering profession in our State. The Legislative Committee which served in 1957 will continue the direction and consideration of this matter in 1958.

Another major objective for 1958 will be the conduct of an intensive membership-increase campaign.

Your President is ready and willing to serve the Louisiana Engineering Society and each of you to the best of his ability during 1958.

ERNEST M. FREEMAN

REPORT OF THE RETIRING PRESIDENT

It is customary for the President of the Louisiana Engineering Society to report on its activities during the past year. The duty is a pleasant one, for participation in the Society's business is always most rewarding, and this year unusual activities have been involved, which have been extremely interesting.

Our program this year involved consideration of two major questions and promotion of the Society's activities along four major lines of endeavor. All of these objects have been accomplished to some extent, some more successfully than others, and two major results have developed which should be of long term benefit to the Society.

The primary issue before the Society this year has been whether or not to affiliate with a national organization and if such affiliation appeared desirable whether this organization should be the National Society of Professional Engineers or Engineers Joint Council or both. This matter was thoroughly investigated as reported elsewhere in these proceedings, with the result that the membership has voted to affiliate with both the National Society of Professional Engineers and Engineers Joint Council, our Constitution having been amended accordingly by due process.

The second major question faced by the Society was the extent of amendment advisable in the Louisiana state law for the registration of professional engineers. A committee under the able chairmanship of Louis Duclos has arrived at a minimum amendment considered advisable at this time and steps are being taken to accomplish this legislation.

A major effort was directed towards making the Society more truly a statewide organization. With the increase in membership and the growth of sections throughout the State, it has become increasingly evident that better communication was needed between the parent organization and the sections. To this end the Section Coordination Committee was reorganized with Z. L. Loflin of Lafayette as Chairman. This committee, with the inspired effort of Mr. O. E. Barron and hard work of the entire Alexandria Section, conducted the first statewide Section Coordination Conference in Alexandria November 1 and 2. This meeting was most effective in informing officers and key members of the various sections on the Society's functions and activities, and promises to become a most effective annual event.

To further unite the Society on a statewide basis, meetings of the Board of Direction were held in Baton Rouge, Lafayette, and Shreveport, as well as the customary meetings in New Orleans and

an informal Board discussion was held in Alexandria in connection with the Section Coordination Conference.

To enable the Society's officers to become further acquainted with the Section officers and members, the President and Secretary, accompained on occasion by the Vice-Presidents, attended three section meetings in Baton Rouge, two in Lafayette, two in Alexandria, one in Lake Charles, one in Monroe and one in Shreveport, in addition to ten in New Orleans. The friends made through these meetings and the insight gained into section affairs have been most satisfactory.

A second field of endeavor was to increase the membership of the Society. Growth in this respect, although larger than in recent years, was not as great as we had hoped and it is apparent that continuous vigorous promotion by a membership committee is needed.

The Society's publication of its proceedings "The Louisiana Engineer" was increased from four issues to six issues a year and the format of the magazine and in particular the cover was revised under the skillful hand of the Editor, Chester Peyronnin. Further improvement is needed in the mechanics of publishing and in the development of the advertising account and work along this line is actively underway. Good technical articles by the Society members or speakers at the various Society and section meetings are needed for publication. The Secretary of every section is urged to secure copies of such material whenever a good talk is presented, forwarding the copy with appropriate illustrations to the Editor of the proceedings.

Work of the Vocational Guidance Committee under the Chairmanship of Joe Mooney continued vigorously with the formation of several new JETS clubs in the State and the conducting of a work shop session on vocational guidance at the Section Coordination Conference.

The various committees of the Society have been faithful and active in the performance of their duties. The committee on general arrangements for this Annual Meeting is to be particularly commended for a fine job and we know you can look forward to enjoying the convention primarily because of their efforts in arranging it. It has been a privilege and a deep personal pleasure to serve the Society this year as your President and I wish it the best of success in years to come.

Waldemar S. Nelson, Past President

ENGINEERING BRIEFS

Chemical Camera Shutter—A chemical camera shutter that will permit exposures as short as five billionth of a second is being developed. The shutter has no moving parts; uses instead, a chemical that can be pulsed electronically. —*Product Engineer*

Elastic Paper—The next unusual new material for industry will be elastic paper. The paper is not creped; the elasticity is built right into the fiber construction. This treatment will increase the paper's strength and improve other properties, as well as make it stretchable. —*Product Engineering*

Radio Beeps From The Intestine—A radio sounding device, so small that it passes through the gastro-intestinal tract, has been developed to help doctors tell a patient's internal temperature during diagnosis. Called an endoradiosonde, the transmitter that is swallowed, measures only 0.9 centimeters in diameter and 2.8 centimeters in length. —*Electronics*

Bombarded Foods—More than 100 irradiated food items have been cleared by the Surgeon General of the U. S. Army for human taste testing, reports Food Engineering, McGraw-Hill publication. Some of the most promising are bacon, green beans, and peaches, which have withstood one year of 72 F. storage.

Tiny Lamps Illuminate Night—Twelve tiny lamps, each smaller than a kingsize cigarette, have been developed to emit a light source equal to 36 million candlepower for night aerial photography. The lamps, housed in special reflectors, were tested recently in a patrol bomber flying at 20,000 feet. They provided enough illumination at night to cover 16 square miles, enabling someone on the ground to read a newspaper. —*Product Engineering*

Plastic-Coated Steel Pipes—Steel pipes in various sizes, coated with plastic to prevent corrosion, are nearing full scale production. A pipe is first covered with an elastic adhesive undercoating applied hot. A controlled thickness of polyethylene is then extruded over this. The adhesive, it is said, does not become hard or brittle, allowing the pipe to be flexed or bent without destroying the bond. The undercoating is unaffected by extreme seasonal temperatures and never loses its ability to seal cuts or abrasions.

—*Engineering News-Record*

The Age of Space is Here

Dr. Gilford G. Quarles*

Since the launching of Sputnik on October 4th, the realities of space exploration and travel have become almost household words. Although this launching came as a definite shock to the American public, there was a small but significant segment of the technical personnel of the country who realized the imminence of of such a breakthrough. This group consisted of the scientists and engineers associated with our missile and space programs.

Since this time, the missile and satellite programs have been very much in the news. Essentially all aspects of the satellite program have been thoroughly covered in the daily newspapers and in magazines such as LIFE, TIME, etc. Although there has been much fancy intermixed with the facts, I believe that the subject of satellites per se has been covered to such an extent that I can hardly hope to add anything to what is readily available. The dictates of security preclude anythong more than a very meagre discussion of military missiles. I would like, therefore, to discuss some implications of the satellite program and present some of the thinking of our leading space scientists on the technological potential for actual space travel by man.

The basic value of the early earth satellites is much more than merely demonstrating the launching capabilities. In its more refined form, the satellite is first of all a research vehicle to give necessary data on the environmental conditions of outer space; that is, information as to the temperatures, the effects of ultraviolet and cosmic rays, the seriousness of meteoric showers, etc. The Sputnik II also carried a small dog to give data on animal reactions. Such information is essential to space travel and cannot be obtained over sufficiently long periods of time by rockets alone.

An essential requirement for space travel is to achieve a sufficient velocity to get away from the earth's gravitational field—to reach the so-called escape velocity of about seven miles per second. This involves propulsion through the earth's atmosphere and through the empty space beyond. The only hope of achieving both of these has been through the use of some form of rocket propulsion.

**Dr. Quarles is the Technical Consultant to the Commanding General of Army Ballistic Missile Agency, Redstone Arsenal, Alabama.*

In accordance with Newton's laws of motion, the only way to propel a vehicle is to exert a force upon it and a reaction force upon some other other mass. Within the earth's atmosphere we have air to provide this reacting force. Outside the earth's atmosphere the second mass must be carried aboard the vehicle and ejected from it to provide the necessary thrust.

Although rockets were invented shortly after the invention of gunpowder about 1200 A. D. and were used militarily through the centuries, the early one all suffered from two serious disadvantages which limited their military usefulness; namely, inaccuracy and the inability to transport a payload of significant size. Despite these shortcomings, some farseeing individuals, who were dubbed crackpots for their trouble, devoted continuing effort to rocket development. Notable among them was our own Professor Goddard, the German Professor Oberth and the Russian Professor Ziolkovsky. These three pioneers were stimulated primarily by the prospect of interplanetary travel.

The real breakthrough in rocket development as a possible means of space transportation came with the liquid rocket work at Pennemunde during World War II. As I think probably most of you know, a group of German scientists headed by Dr. Walter Dernberger successfully concluded the development of the first long-range controlled rocket in the form of the V-2 missile. On completion of the first successful experimental flight of this missile in October, 1942, Dr. Dornberger stated to his scientific colleagues: " . . . we have invaded space with our rocket . . . we have proved rocket propulsion practicable for space travel . . . This third day of October, 1942 is the first of a new era in transportation, that of space travel . . . "

About The Author

Gilford G. Quarles graduated from the University of Virginia with a B.S. in Electrical Engineering in 1930, and M.S. in Physics in 1933, and a Ph.D. in Physics in 1934.

He taught physics at the University of Alabama and Furman University until 1944 when he joined the staff of the Harvard Underwater Sound Laboratory as a research associate. At the end of the war, he moved to The Pennsylvania State University as project engineer in the newly established Ordnance Research Laboratory, and became assistant director in 1947 and director in 1952 He is currently on a two-year leave from Penn State to serve as Scientific and Technical Consultant to the Commanding General of the Army Ballistic Missile Agency.

Now 15 years and one day later the second major step has been accomplished. There is no doubt that the Russians utilized their intercontinental ballistic missile as the basic element, or booster, for getting the Sputnik through the denser atmosphere.

For a satellite launching, it is necessary to achieve a much higher velocity than is economical with a single large rocket. This is done by using a multistage system. This merely uses the large rocket to boost a smaller rocket through the denser atmosphere. The booster stage is then separated and the second stage is fired at high altitude. This second stage may in turn carry a third, or even a fourth. To place a satellite in an orbit it is necessary to achive not only a very high predetermined speed, but in a predetermined direction and at a predetermined altitude. This requires an extremely precise guidance system.

For a long time, there has been no question in the minds of the senior missile and aircraft experts of the world that travel beyond the confines of the earth and its atmosphere is technologically possible. There seems to be little question that a rocket could be designed and built now to land a small payload on the surface of the Moon. The problem of designing and building one of sufficient size to carry a manned vehicle to the Moon or around the Moon is a somewhat larger undertaking. There is wide disagreement as to whether the first space ship should be directed toward the Moon or toward Mars.

A space ship of almost prohibitive size would be required to take of from the surface of the earth, overcome the atmospheric drag and gravity and cover the long distance between the earth and Mars and still be prepared and equipped to make the return trip. However, this difficulty can be overcome by dividing the trip into several stages. The first stage would be the establishment of a space station or manned satellite traveling around the earth in an orbit at an altitude of about 1,000 miles. The travel between the earth and this satellite stage might be accomplished with large three-stage rockets having a winged nose section as a fourth stage to be used for the return trip to the earth. The space ship proper would take off from the satellite stage, make the trip to Mars and enter an orbit about 600 miles above the surface. A winged landing craft would then be detached from the orbiting ship and used for the trip to the surface and return.

There have been several rather thorough studies made of possible techniques for establishing a manned satellite and for commuting between the earth and it. One excellent example is the study performed by the Astronautics Section of the Goodyear Aircraft Company under the direction of Dr. Darrell C. Romick.

This study has consisted of two phases. The first was called METEOR (Manned Earth-satellite Terminal evolving from Earth to Orbit ferry Rockets). The second phase caller METEOR, Jr. considered a minimum-sized version of METEOR. This minimum-sized earth-to-orbit vehicle is primarily a three-stage rocket so arranged that both the first and second stages after separation convert to piloted gliding aircraft vehicles that can maneuver to somewhat conventional landings. After landing, each is converted to an airplane by the addition of quick-attaching turbojet engine pods, tail fittings, and other parts for flight back to the launching sight for reuse. There the added parts are removed and transported back to the landing sight while the vehicles themselves are inspected, serviced, and made ready for another launching. The final stage goes on into the orbit and later returns to the earth by aerodynamic braking, landing at the original launching sight. This vehicle recovery method obviates one of the major items of expense in our large missile programs—the fact that the various stages of the missile are jettisoned after the fuel supply is exhausted and are not recovered.

The final stage, which reaches a maximum velocity of 18,000 mph, has somewhat different requirements from the first two. The nose must be designed and arranged to withstand greater reentry heat efforts and at the same time serve as a housing for the basic instrumentation.

The initial take-off weight of the METEOR, Jr., would be about 600 tons with a final payload of approximately 2½ tons. Many useful combinations of payload might be obtained despite the rather limited total weight. In addition to the basic crew of three men, the vehicle might carry into the orbit on round-trip missions:

(1) Adequate supplies for a stay of two months ore more,

(2) Four passengers with supplies for a limited stay of about a week,

(3) One half to ¾ ton of supplies, or

(4) About 1200 pounds of instrumentation along with supplies for several days.

The original METEOR (the somewhat larger version of this system) was designed to form the basis for the actual construction of a permanent satellite space station. This would serve as a permanent satellite space station. This would serve as a permanent space laboratory or as the take-off point for exploratory missions into outer space.

Exploratory trips farther into space, possibly including landings on the Moon, might be made from this space terminal by using additional rockets on the final stage. Payload for such missions is approximately the same as for a round trip from the earth to orbit.

For actual flight into outer space, the generation of the rocket thrust by heat generated from chemical reactions is very uneconomical. There are three other methods that have been considered. In the first of these, a gas is accelerated by heat energy from nuclear reactors, from electric arcs, or from the Sun. In the second, the propellent is converted to ions which are accelerated by electrical fields. In the third, photons are emitted creating thrust because of the momentum imparted to the ship on emission.

In the first method of propulsion, involving acceleration of propellants by heat energy from a separate source, a weight penalty is paid as compared with chemical propulsion. This can be compensated only by higher exhaust velocities. The velocity achievable is limited by the heat resistance of existing structural material. Nuclear reactor heating would be superior to chemical systems only for ships whose take-off weight is several hundred tons.

The second method of propulsion, ejection of electrically accelerated ions, was first proposed as early as 1923 by Professor Oberth. Much higher exhaust velocities can be achieved by electrical than by thermal acceleration and much more energy can be imparted to a given mass electrically than chemically. Also, the exhaust particles would be so directed that they would not strike the thrust chamber walls and hence the heating problem would be less severe.

The last system of propulsion is the only one of the three that cannot be built with techniques known today. This system would emit a unidirectional beam of photons having a momentum equal to E/C (the energy divided by the velocity of light.) It is assumed that the photons would be created by direct, total and controlled conversion of matter into radiation energy according to the Einstein equation E equals MC^2. This process has been observed in the annihilation of an electron and a positron to form a pair of gamma quanta, but it has not yet been demonstrated on an engineering scale. The energy content of matter is 10^{10} time higher than the chemical energy of conventional propellants.

Dr. Ernst Stuhlinger of the Army Ballistic Missile Agency has made a detained study of the feasibility of an electrical propulsion system for a space ship. This study has proved that an electrical

system is feasible and that a space ship so propelled would be much ligher than a chemically propelled one. This system, however, is definitely limited to vehicles traveling between satellite orbits because the thrust would be so small that it could never lift the vehicle from the surface of a planet against gravity forces.

As a basis for this design, Dr. Stuhlinger assumed a payload of 150 tons. This payload, of course, would include the crew with their necessary equipment and supplies of oxygen, water, food, living quarters, scientific instruments and landing craft with necessary equipment for the crew to subsist on Mars.

A nuclear reactor was chosen for a primary power source. The reactor would be located at a point about 250 feet from the living quarters. It would be shielded by a thick layer beryllium and a sheet of boron so that the strong neutron and gamma radiation would be kept away from the living quarters. Reactor heat would be absorbed by a system employing sodium-potassium as a coolant from which the heat energy would be transferred to a working fluid (silicons oil) in the heat exchanged. Steam produced in the heat exchanger would drive a turbo-generator. The steam leaving the turbine would enter a large radiation cooler where it would condense again and be pumped back to the heat exchanged.

An alkaline metal, such as rubidium or cesium, would be best suited for the propellant, since it can be ionized easily and has a high yield. The atoms of these metals are ionized with almost 100% efficiency when they strike a hot surface of platinum foil. A temperature of about 200 degree C is enough to produce a sufficient vapor pressure of the alkaline element. The vapor enters an ionization chamber containing hot platinum grids and the ions are extracted from the chamber by an electric field. This field accelerates the ions in the thrust chamber to a velocity of about 50 miles per second. They leave the propulsion system in a steady flow constituting an electric current. The electric power, determined by this current and the potential difference through which the ions must pass in the thrust chamber, must be provided by the electric generator.

Each of these thrust chambers would have a diameter of about one inch and many thousands of them would be needed to produce the thrust required for the space ship. The chambers would be tightly packed so that the neutralization of the ions occurs at a distance of about one inch behind the thrust chambers.

The following data were determined for the ship to carry a payload of 150 tons:

Total initial mass	730 tons
Propellant mass	365 tons
Total electric power	23 megawatts
Accelerating voltage	4880 volts
Exhaust velocity	50 miles per second
Total thrust	110 pounds

Because of the relatively low thrust of the electrical ship, its trajectory will be decidedly different from that of a chemically powered rocket. The trajectory followed by the electrical ship is as follows. At first, the ship spirals around the earth gaining speed very slowly. After two hours, it would be hardly more than 20 miles from the satellite station. After 100 days of steady spiralling, its distance from the earth would be only 100,000 miles and it would have completed 376 revolutions around the earth. However, in a very few days its speed would have increased enough to allow the ship to escape from the earth's gravitational field. Its trajectory will flatten out making a transition to a large spiral around the Sun. After 195 days the thrust unit will be rotated through 180 degrees and the ship will start to decelerate for capture by the gravitational field of Mars. On the two hundred and seventy-sixth day, the thrust would be reversed again to bring the ship gently into the Martian ellipse on the three hunderd and forty-seventh day. If the timing is correct, the ship will reach a point in the Martain orbit simultaneously with the planet. Any errors in timing can be corrected by changing the direction of the thrust vector of the ship.

As the ship approaches the orbit of Mars, a few thrust maneuvers will bring it into a spiral around the planet. Otherwise, it would either crash on the surface or pass the planet in a hyperbolic trajectory. After the ship reaches the gravitational field of Mars, it must spiral around the planet several times to decrease its distance from the surface gradually. By the four hundred and second day, the ship will have descended to an altitude of 600 miles above the surface. At this point, the motor would be shut off and the process of exploration of the planet would begin. The proper time for starting the return trip would still be 472 days later. This would give the crew ample time to observe the surface closely by telescope and by rocket reconnaissance and to descend to its surface with a winged landing craft for exploration in a reasonable leisurely manner.

The trip back to earth will be quite similar to the outward trip. It would begin with 42 days of spiralling around Mars followed by a decelerating period to put the ship into an inward spiral around the Sun. Subsequent acceleration adapts this spiral to the earth's ellipse and a few adjustments would be made to bring the ship into the satellite orbit after 331 days. After a total of 3¼ years, the crew would again arrive in the orbit of the satellite station. A shuttle trip would take them to the earth.

Navigation of such a ship is a relatively simple problem. The ship would, of course, keep a constant watch on the earth, Mars, Venus, Jupiter and the Sun. The directions of these bodies with respect to the direction of one or more of the fixed stars would be continually measured and recorded on automatic star trackers. The actual positions of the Sun and the planets in a coordinate system fixed to the stars are accurately known from the Astronomical Almanac. The ship's coordinates would be continuously computed from the star tracker readings and compared with the expected coordinates. If any deviation should occur, corrective measures could be taken immediately by changing the direction of the ship's thrust.

There are a number of questions remaining that must be answered before such a trip is undertaken. It is expected that answers to some of these questions will be obtained, at least in part, from the satellite programs currently under way.

Small meteors, which are frequent, can be eliminated by an absorbing meteor bumper consisting of a thin sheet of metal around the ship. Large meteors are sufficiently rare as to cause no real concern. If a ship should be punctured, the doors of the damaged compartment would close automatically and in most cases the damage could be repaired before a real disaster should develop. If a ship should be completely disabled, the crew would abandon that ship and board one of the several other ships traveling with it. The probability that a man might be hit is not appreciably different from the probability of an accidental death on earth.

We still have little information about the real dangers of cosmic radiation in outer space. We do know that these dangers are much smaller than had previously been assumed and we are certainly confident that ways and means of efficient protection will be available before the first space trip begins. The satellite programs will provide telemetered information concerning cosmic radiation.

There are also some biophysical and physiological problems that must be taken into consideration. The problem of maintain-

ing the necessary artificial atmosphere so that men can exist in the living quarters, and can work in the space suits necessary for the assembly of the ship at the satellite stage may present major problems. The problems of living under conditions of weightlessness, artificial atmosphere and close confinement are yet to be adequately investigated. The manned satellite station that will be necessary first stage for any such program would provide an excellent laboratory to study all the effects of outer space.

Some interesting comparisons can be drawn between such a contemplated space flight and some of the earlier exploratory voyages of the 15th and 16th centuries. For example, by the time the first space ship leaves for Mars, its trip will be much better planned in every respect and detail than was Columbus' expedition when he started out in 1492. The probability of the safe return of these first space travelers will be much greater than was that of Columbus' safe return. You will recall that Magellan started out on his around-the-world trip with three ships, but only one completed the voyage and the commander and many crew members died en route. You will also recall that Columbus' navigation capabilities were so poor that he thought he had reached Asia when he had actually only reached America.

Concerning living conditions while traveling, recall that for the ship designed by Dr. Stuhlinger we talk in terms of 150 tons payload with possibly 10 persons per ship. Of Columbus' three ships, the Santa Maria had a gross weight of 100 tons and carried 52 persons whereas the Pinta and Nina had respectively gross weights of 50 tons and 40 tons each and carried 18 persons. The Mayflower had a gross tonnage of 180 tons and carried 102 passengers in addition to a crew of approximately 30 persons. You can thus see that relatively speaking living conditions one one of these space ships would be rather plush.

The crew of such an interplanetary ship would be carefully selected on the basis of health, emotional stability and scientific interest. As Dr. Stuhlinger has pointed out, men of this nature will not mind spending two quiet years traveling on board a space ship. They would simply pack their briefcases with a backlong of unfinished scientific work and have an excellent opportunity to pursue it without a single telephone call. This prospect alone would be enough to entice many a modern scientist to sign up for such a trip.

Having the potential for interplanetary travel within our technological grasp, it is interesting now to speculate on the potential for interstellar travel. A brief consideration of the propulsion problem indicates that such a trip is not now feasible

because of the large masses required for propulsion by available means. Such a trip will have to await the technological breakthroughs necessary to render the photonic propulsion system feasible.

Although the technical requirements are still completely out of range of our present technology, a number of very through studies have been made on the mechanics of photonic propulsion systems by Professor Saenger in Stuttgart. Assuming that the direct and controlled conversion of matter into radiant energy is feasible on a large scale and that the resulting photons could be collimated by lenses or mirrors without noticeable absorption, Professor Saenger developed the relativistic formulae for mass consumption, thrust, velocity, mass ratios and flight times of photonic space ships. Such a propulsion system would render possible space travel that is completely beyond the reach of "classical" systems. The following table lists some interesting figures for several such trips.

TABLE I

Trip	Mass Ratio	Ship Time	Earth Time	Distance
Half around earth	1.00007	47 min	47 min	2×10^4 km
Moon	1.0003	3.5 h	3.5 h	4×10^5
Planets	1.006	2 d	2 d	10^8
Alpha Centauri	20	3.6 y	6 y	4×10^{13}
Center of galaxy	10^4	20 y	6×10^4 y	2.8×10^{17}
Andromeda nebula	10^{11}	26 y	2.5×10^6 y	7×10^{18}
Round trip through the universe	10^{19}	42 y	4×10^9 y	3.2×10^{22}

A well known result of the theory of relativeity is that for a system moving with a velocity approaching that of light, time essentially stands still. Thus, trips to remote galaxies could conceivably be made within a few years as observed by the travelers. One man's life would be long enough for a round trip through the whole universe. Of course, this would require a period of a few billion years as measured by people on earth and noticeable changes might have taken place when the travelers returned.

It is seen that the mass necessary to reach the planets is almost negligible. On the other hand, the necessary mass ratio of a photonic ship capable of a round trip through the universe would require, for an empty mass of 600 tons, a take-off mass equal to that of our whole earth. Thus we can see that; within our present

Continued on page 48

Louisiana Engineering Society to Affiliate with National Society of Professional Engineers and Engineers Joint Council

At the December 1956 meeting of the Board of Direction of the Society, a resolution was introduced urging the Society to consider affiliation with the National Society of Professional Engineers. At the January 1957 Board meeting, a resolution was introduced similarly urging the Society to consider affiliation with the Engineers Joint Council.

Committees were appointed to investigate the desirability of the Society affiliating with these organizations. The committees, upon completion of their studies, reported to the Board of Direction. Their reports were mailed to the entire voting membership, together with a letter explaining the purpose of preparation. This was followed by the mailing to the membership of a selection, made by the committees, of typical material published by N.S.P.E. and E.J.C. illustrating the activities of these groups.

The President and Secretary of the Society then met with every section throughout the State discussing with each group the committee's reports and the information compiled on the activities of the two national societies. At these meetings, many questions were aked concerning the activities of the national organizations. These were collected by the Secretary, together with other questions proposed by mail and otherwise, and consolidated into two comprehensive lists. These lists of questions were then submitted to the national offices of the National Society of Professional Engineers and Engineers Joint Council through the appropriate officers and a list of answers obtained on all major points raised.

The lists of questions and answers were then reviewed in detail at meetings of the Board of Direction of the Society and upon unanimous vote of the Board were forwarded by mail to all of the voting membership of the Louisiana Engineering Society. This mailing included a secret ballot on which each voting member could express his preference for or against affiliation with National Society of Professional Engineer or for or against affiliation with Engineers Joint Council. The votes were received and tabulated with the following result:

National Society of Professional Engineers

For affiliation	426
Against affiliation	137
Not voting	15
Total	578

Engineers Joint Council

For affiliation	436
Against affiliation	124
Not voting	18
Voting	578

This indicated a decisive vote in favor of affiliating with both the National Society of Professional Engineers and the Engineers Joint Council. Accordingly a committee on constitutional amendment was appointed with James Janssen as Chairman to examine the Society's constitution and bylaws and recommend whatever changes appeared to be necessary to effect affiliation. The proposed amendments were then considered at a Board meeting, presented to the Society and voted on by due process, the vote being as follows:

Ballots returned 559

Of this number, 25 were unmarked and therefore were not counted. Of the remainder, some did not indicate preference on all amendments; those voted were tabulated as follows:

Proposed Amendment	Votes For	Votes Against	% Carried
Article II, Section 2	427	54	88.8
Article II, Section 3	425	57	88.6
Article II, Section 5	455	26	94.6
Article II, Section 6	450	29	93.9
Article VI	367	113	76.4
Article VII, Section 1	447	31	93.5
Article VIII	432	48	90.0
Article IX	445	36	92.5
By-Law 7	419	61	87.3

The amendments were adopted at the January 9th meeting of the Board of Direction, to become effective March 10, 1958. At the January 10th meeting of the Board of Direction and section officers from throughout the State, resolutions authorizing the petitioning of the national groups and petitions addressed separately to the National Society of Professional Engineers and to the Engineers Joint Council for affiliation with those groups, were adopted by unanimous vote. The resolutions and petitions are published in the Society's proceedings immediately following this discussion, together with an accompanying Summary of Activities of the Louisiana Engineering Society and Statistical Data submitted with the petitions.

The Society's actions do not affect the status of any of the present members, in any grade, of the Louisiana Engineering Socie-

ty. Those members who wish to remain in status quo may do so. Those members who wish to become members of the National Society of Professional Engineers, and are qualified, may do so by securing application forms from John P. Fernandez, the Secretary, completing these and remitting through him the N.S.P.E. dues of $10.00 per year.

The conduct of these investigations and deliberations has consumed a great deal of time and caused the Secretary and Board of Direction a great deal of work. It is felt that a thorough and impartial investigation has been made. In the course of the studies, the Society or its Board has conferred with or been addressed by Mr. R. J. Rhinehart, Past President of the National Society of Professsional Engineers, Mr. Fischer S. Black, Vice-President of Engineers Joint Council, and Mr. Paul Robbins, Executive Director of National Society of Professional Engineers. The President of the Louisiana Engineering Society conferred with both Mr. Robbins in his office in Washington and with Mr. Paul Lange, Executive Secretary of the Engineers Joint Council, in his office in New York. Mr. Garvin Dyer, current President of National Society of Professional Engineers, attended the annual meeting of the Louisiana Engineering Society in New Orleans January 9, 10 and 11 and was introduced to the membership and to the Board of Direction.

It is our sincere hope that these activities have not been in vain and that the Louisiana engineering organizations will continue to grow in service to its members and to promote the profession of engineering both in the State and the Nation.

Waldemar S. Nelson, Past President

APPENDIX A

January 10, 1958

RESOLUTION

WHEREAS, the committee of this Society appointed to investigate the subject has recommended that the Louisiana Engineering Society become affiliated with the National Society of Professional Engineers, and

WHEREAS, the membership of the Society, having been informed on the issues by discussion at meetings and the mailing of printed matter and pertinent questions and answers, has expressed itself in favor of such affiliation, and

WHEREAS, the membership of the Society has voted by the necessary majority to amend the Constitution of the Society necessary to permit such affiliation;

NOW THEREFORE, BE IT RESOLVED that the Board of Direction of the Louisiana Engineering Society petition the National Society of Professional Engineers for membership as an Affiliated State Society, retaining full autonomy in all matters, including specifically retention of the present name, Constitution and By-Laws as of December 31, 1957; the election of officers; and the management of funds of the Society and dues of its members; and

BE IT FURTHER RESOLVED that the Board of Direction in behalf of the Louisiana Engineering Society hereby subscribes to the provisions of the Constitution of the National Society of Professional Engineers, which endorses the stipulations herein; and

BE IT FURTHER RESOLVED that the officers be and are hereby authorized to take such action necessary to effect the intent of this resolution.

APPENDIX B

January 10, 1958

The President and Board of Directors
National Society of Professional Engineers
2029 K Street, N. W.
Washington 6, D. C.

Gentlemen:

The Louisiana Engineering Society, in accordance with the provisions of Article III of the Constitution of the National Society of Professional Engineers, entitled "Member State Societies", hereby petitions for acceptance as the affiliated professional engineering organization of the National Society in the State of Louisiana.

We transmit herewith ten copies of a resolution of the Board of Direction authorizing this petition, the Constiution and Bylaws of the Society, the membership list, and a roster of officers. If the Louisiana Engineering Society is accepted as an affiliate, these documents will be amended to provide for the election of representation to the National Society of Professional Engineers by Louisiana Engineering Society. Initially such representation can be effected through the Board of Direction of the Society.

The Society was founded in 1898. As of December 31, 1957, there were 1,394 members entitled to vote for officers. A substantial majority of the total membership qualify for member grade in the National Society of Professional Engineers, being registered by a state board of registration for professional engineers. A brief description of the major activities of the Louisiana Engineering Society is transmitted herewith.

We shall be pleased to furnish any additional information if you so desire.

Yours very truly,
LOUISIANA ENGINEERING SOCIETY
By E. M. Freeman, President

APPENDIX C

January 10, 1958

RESOLUTION

WHEREAS, the committee of this Society appointed to investigate the subject has recommended that the Louisiana Engineering Society become affiliated with the Engineers Joint Council, and

WHEREAS, the membership of the Society ,having been informed on the issues by discussion at meetings and the mailing of printed matter and pertinent questions and answers, has expressed itself in favor of such affiliation, and

WHEREAS, the membership of the Society has voted by the necessary majority to amend the Constitution of the Society necessary to permit such affiliation;

NOW THEREFORE, BE IT RESOLVED that the Board of Direction of the Louisiana Engineering Society petition the Engineers Joint Council for membership as an Affiliated State Society, retaining full autonomy in all matters, including specifically retention of the present name, Constitution and By-Laws as of December 31, 1957; the election of officers, and the management of funds of the Society and dues of its members; and

BE IT FURTHER RESOLVED that the Board of Direction in behalf of the Louisiana Engineering Society hereby subscribes to the provisions of the Constitution of the Engineers Joint Council, which endorses the stipulations herein; and

BE IT FURTHER RESOLVED that the officers be and are hereby authorized to take such action necessary to effect the intent of this resolution.

APPENDIX D

January 10, 1958

Engineers Joint Council
29 West 39th Street
New York 18, New York

Attention: Mr. E. Paul Lange, Secretary

Gentlemen:

The Louisiana Engineering Society hereby submits its application for membership in Engineers Joint Council as an Affiliate Society and respectfully requests your consideration of its qualifications for such membership.

The Society was founded in 1898. As of December 31, 1957, there were 1,394 members entitled to vote for officers. A substantial majority of the total membership quafily for Member grade under terms of the Engineers Joint Council Constitution, Article II, 1 (b), being either engineering graduates of colleges or recognized standing or licensed or registered by a state board of registration for professional engineers. A brief description of major activities of the Louisiana Engineering Society is transmitted herewith.

We also transmit, in accordance with your requirements, eleven copies of the Constitution and Bylaws of the Society. Annual dues assessments to the individual members are stated in the Constitution and Bylaws.

We shall be pleased to furnish any additional information if you so desire.

Yours very truly,

LOUISIANA ENGINEERING SOCIETY

By E. M. Freeman, President

APPENDIX E

L. E. S. Summary of Activities

The Louisiana Engineering Society was organized in 1898 and is observing its 60th anniversary this year (1958). It functions on a state-wide basis with headquarters at New Orleans and has six state sections with headquarters at Alexandria, Baton Rouge, Lafayette, Lake Charles, Monroe and Shreveport respectively. At December 31, 1957 it membership consisted of 1,394 Members, 228 Junior Members and 93 Affiliate Members, a total of 1,715.

Continued on page 45

CONSTITUTION

PREAMBLE

The members of the Louisiana Engineering Society, in accordance with their Charter, and for the effectual execution of the design of their institution, do establish and ordain the following Constitution and By-laws for the government of said Society.

ARTICLE I—Objects

The objects of this Society are the professional improvement of its members, the encouragement of social intercourse among Engineers and men of practical science, and the advancement of Engineering; and for the promotion of these objects, stated meetings of the Society shall be held, and a library formed for the use of its members.

ARTICLE II—Membership

Section 1. The members of the Society shall be designed as Members, Junior Members, Student Members, Affiliate Members, Honorary Members and Life Members.

Section 2. A Member shall be a Professional Engineer or an engineer of similar qualifications in a branch of engineering for which there is no provision for licensing under the registration laws of Louisiana. A Professional Engineer, for the purpose of this constitution, shall be defined as a person holding a valid license or a valid certificate of registration as a Professional Engineer issued by the lawfully constituted registration board of any state, territory, possession or district of the United States.

Section 3. A Member at the time of his admission shall be not less than twenty-six years of age. Fulfillment of one of the following eligibility requirements shall be construed as evidence that a candidate is qualified for Member Grade:

(a) Registration as a Professional Engineer in any state, territory, possession or district of the United States of America and not less than four years of satisfactory professional practice of engineering.

(b) Graduation from a school of engineering of approved standing and, in addition, thereto, four years of satisfactory professional practice in a branch of engineering for which there is no provision for licensing under the registration laws of Louisiana.

The term "professional practice" shall mean responsible professional service when such service requires application of engineering or scientific principles. The word "satisfactory" as used

herein applies to the actual experience record of a candidate. Whether a candidate's record is such as to warrant favorable consideration lies within the judgment of the Board of Direction.

The teaching of engineering or applied science in the grade of Professor, Associate Professor, or Assistant Professor may be construed as professional practice. Undergraduate study shall not be considered as professional practice.

Section 4. A Junior Member shall be not less than twenty years of age. He shall have had active practice in some branch of his profession at least two years, or shall have graduated from a technical school of recognized standing. His connection with the Society shall cease when he becomes thirty-two years of age unless he be previously transferred to Member or Affiliate Member.

Section 5. A Student Member shall be an undergraduate matriculate of the School of Engineering of any educational institution of recognized standing. Upon graduation or leaving college he shall, if qualified, be transferred to the grade of Junior Member without application.

Section 6. An Affiliate Member shall be an engineer or a person who, by scientific acquirements or practical experience, has attained a position in his special pursuit qualifying him to cooperate with engineers in the advancement of professional knowledge and practice, but who is not eligible or does not elect to hold membership in a higher grade.

Section 7. Honorary Members shall be chosen only from persons of acknowledged eminence in engineering or the sciences related thereto.

Section 8. A member who has paid dues for a period of thirty years, other than as a student Member, shall by virtue of that fact become a Life Member and shall be exempt from the payment of further dues.

Section 9. Any member whose address on the records of the Society is in the Parish of Orleans, Jefferson or St. Bernard shall be defined as a Local member; any member whose address is in any other parish of the State shall be defined as a State member; and any member residing outside the State shall be defined as a Non-Resident member.

Section 10. Failure on the part of a member to accept transfer to another grade when eligible, within three months of date of notice of such transfer, shall be taken as equivalent to the resignation of such member.

ARTICLE III—Officers and Directors

Section 1. The officers of the Society shall be a President, a 1st Vice-President, a 2nd Vice-President and a Secretary-Treasurer. These officers together with four directors elected from the membership of the Society, the immediate Past-President, and the presiding officer of each local section shall be the Trustees and shall constitute the Board of Direction in which the government of the Society shall be vested.

Section 2. The Board of Direction shall select and the President shall appoint not later than the October meeting of the Society, three voting members to act as a committee for the nomination of officers and directors of the Society for the ensuing year. The notices for the November meeting shall advise the membership of the personnel of this Nominating Committee and of the fact that it will consider suggestions for nominations for ten days following the November meeting. This committee shall report its nominations in writing at the December meeting. These nominations, together with any additional nominations ordered to be included by vote at the December meeting, shall be submitted to the membership by letter ballot.

Section 3. The Officers and Directors shall be elected from the membership of the Society at the Annual Meeting by a majority of the votes cast by the letter ballot, and shall hold office until their successors are qualified. The President shall be ineligible to succeed himself. Directors shall be elected for a term of two years. The retiring President shall be a member of the Board of Direction for the year following his term as President. The duly elected presiding officer of a local section shall be a member of the Board of Direction of the Society during his term of office.

Section 4. In the case of a vacancy in the office of President, occasioned by resignation or otherwise, the 1st Vice-President shall discharge the duties of the President for the remainder of the elective term.

In the case of a vacancy in the office of 1st Vice-President, occasioned by resignation or otherwise, the 2nd Vice-President shall discharge the duties of the 1st Vice-President for the remainder of the elective term.

In the case of a vacancy in the office of 2nd Vice-President, occasioned by resignation or otherwise, this position shall not be filled for the remainder of the elective term.

In the case of a vacancy in the office of Secretary-Treasurer, occasioned by resignation or otherwise, this position shall be filled by the Board of Direction for the remainder of the elective term.

In the case of a vacancy in the office of Director occasioned by resignation or otherwise, the Board of Direction shall appoint a member to serve as Director until the next general election. The Nominating Committee shall nominate a member to complete the remainder of the two-year elective term only if the vacancy occurred during the first year of the elective term.

ARTICLE IV—Management

The Board of Direction shall be responsible for the general administration of the affairs and property of the Society. It shall outline and direct the duties and activities of the several officers of the Society. It shall have the accounts of the Secretary-Treasurer audited annually as of December 31st. It shall present a written report at the Annual Meeting outlining the activities of the Society during the past year. Appended thereto shall be the annual report of the Secretary-Treasurer and other pertinent reports of officers or committees.

ARTICLE V—Meetings—Quorum

Section 1. Meetings of the Society shall be held in New Orleans at such times as may be prescribed by the By-laws. The regular meeting in January shall be the Annual Meeting for the election of officers and for the hearing of the annual reports. At the discretion of the Board meetings may be arranged for and held outside of New Orleans.

Section 2. Twenty-five voting members shall constitute a quorum for the transaction of business.

ARTICLE VI—Dues

The annual dues shall be as follows:

Local Members	$22.00
State Members	20.00
Local Affiliate Members	12.00
State Affiliate Members	10.00
Junior Members	5.00

Non Resident:

Members or Affiliate Members	5.00
Junior Members	3.00
Student Members	1.00

Dues of Local and State Members above stated include dues of the National Society of Professional Engineers.

For all Members, who, at the time this article is adopted, do not elect or are not qualified to become Members of the National Society of Professional Engineers, the annual dues shall be as follows:

Local Members	$12.00
State Members	10.00

Honorary, Life and Non-Resident Members, if qualified, may become members of the National Society of Professional Engineers by remitting the national dues of that organization.

The Annual Dues for the current year shall become due on the first day of January and shall be paid in advance. A statement of the amount shall be mailed by the Secretary-Treasurer to each member at least thirty days prior to the due date. A newly elected member or a member transferred from one grade to another shall be charged with dues beginning with the quarter following his election.

ARTICLE VII—Admission to Membership or Transfer to Higher Grade

Section 1. An applicant for admission to membership or for transfer to a higher grade of membership in the society shall make a statement in writing of his educational training and professional experience, which shall be in the form prescribed by the Board of Direction.

The applicant shall furnish the names of at least three members of the Society to whom he is known personally. Each of these references shall be requested by the Secretary-Treasurer to advise the Board of Direction of his personal knowledge of the applicant's character and professional ability, and of the grade of membership, if any, for which he deems the applicant to be qualified. All applications shall be referred to the Membership Qualifications Committee for review and for a determination of the grade of membership, if any, for which the applicant is eligible. The findings of the Qualifications Committee shall then be submitted to the Board of Direction, and all applications approved by the Board for membership in any grade or for transfer from one grade to another, shall be submitted to the members for a vote by letter ballot. Any applicant receiving five or more negative votes shall fail to be elected to membership. Any member voting in the negative should furnish the Board of Direction with a valid reason for so doing. No record of such failure of election shall be entered upon the minutes, but the candidate shall be so notified. Upon failure of an applicant to be elected to membership, the Board shall consider issuing a new ballot if at least eight members request such

action in writing, stating the reasons therefor. If such reasons are deemed good and sufficient, the Board shall order a new ballot in the same form as the first, and the second ballot shall be governed by the same rules as the first.

Dues for the remainder of the year after date of election are payable at the time of election. If payment is not made within three months the Board may declare the election void.

Section 2. Any name submitted for Honorary Membership shall be endorsed by at least ten members of the Society in good standing. All living Past-Presidents who are members of the Society shall constitute the Honorary Membership Committee. The President of the Society shall be Chairman of this committee without vote. Should the person proposed for election to the grade of Honorary Member be favorably recommended by 80% of the entire committee, action thereon shall be taken by the Board of Direction. Election shall be only by the affirmative votes of 75% of the members of the whole Board. The honorary membership of any person so elected shall be cancelled if his acceptance is not received by the Board within 60 days after the mailing of the notification of election to him.

The voting of the members of the Honorary Membership Committee shall be by sealed ballots which shall be delivered unopened at a duly assembled meeting of the Board of Direction by the Chairman of the committee only after he shall have received replies totaling at least 80% of the committee membership.

ARTICLE VIII—Resignation of Membership

Any member whose dues have been fully paid for the current year may withdraw from the Society by notifying the Secretary-Treasurer. Any person so resigning his membership may be reinstated at the discretion of the Board of Direction.

The Board of Direction may, at its discretion, accept the resignation of any member who states in writing or by personal appearance that his financial status prevents him from liquidating his current year's obligation to the Society.

ARTICLE IX—Forfeiture of Membership

Ten months after January 1st the Secretary-Treasurer shall notify in writing any member whose dues are in arrears for the current year, except as provided for in Article VIII, that unless his dues are fully paid before the end of the year his membership in the Society shall cease. The names of members dropped from the rolls for nonpayment of dues shall be published in the LOUISIANA ENGINEER.

The Board of Direction may, at its discretion, reinstate any former member dropped from the rolls for nonpayment of dues upon payment of one year's dues for reinstatement plus the dues for the remainder of the current year.

ARTICLE X—Expulsion of Members

The Board of Direction shall consider proceedings looking toward the expulsion of any member (a) upon information coming to its notice, or (b) upon the written request of five or more members (not of the Board of Direction) that for cause set forth a person belonging to the Society be expelled. The Board of Direction shall consider such cases and if the circumstances appear to warrant further action shall request the informants to formally prepare charges and shall advise the accused of the charges against him. He shall have the right to demand and receive a copy of the charges against him and he may, if he so desires, present a defense, either in person, in writing, or by a representative, which shall be considered at a meeting of the Board of Direction, of which he shall receive due notice. The final action of the Board shall be by ballot at the meeting designated for consideration of the case, or at a later meeting to be set by the Board. The affirmative votes of at least 75% of the membership of the entire Board shall be required to expel if the resignation has not been tendered or a satisfactory defense made, in which case he shall be notified and his name shall be at once dropped from the list of members; provided, that he shall have the right to appeal to the Society at large.

In any case where expulsion is based on malicious or false statements concerning the officers of the Society, the Board of Direction shall appoint a committee of the last five available past-presidents to function for the Board on such case; and all requirements and powers set forth above as applying to the Board of Direction in such case shall apply to such Committee of Five Past Presidents.

ARTICLE XI—Privileges

All the rights of the Society shall be common to all grades of membership except those of voting and of holding office, which shall be confined to Members and Life Members.

ARTICLE XII—Motions or Resolutions

Motions or resolutions which provide for expression of the Society's views may be adopted by a two-thirds vote of the members present and voting at any regular meeting; provided, (1) the motion or resolution has been approved by the Board of Direction

and (2) due notification thereof, including the motion or resolution, has been sent to each member with the notice announcing the date of the meeting; provided further that the rule requiring such notification may be suspended by unanimous consent of members present and eligible to vote at any meeting.

ARTICLE XIII—Local Sections

Section 1. The Society shall encourage and recognize the establishment of local sections of its State members, the purpose of which shall be the furtherance of the objectives of the Society in sundry localities within the State of Louisiana. For the establishment of a local section, written application signed by not less than fifteen voting members of the Society, residing within the area of the proposed local section, together with a copy of the proposed By-laws shall be submitted to the Board of Direction for approval. The proposed By-laws shall set forth the name of the section and define its jurisdictional area. Upon notice of approval given by the Board, the section shall be considered established. Such approval will be followed by the granting of a certificate to this section.

Section 2. The Board of Direction may annually assign, from the funds of the Society, to each local section, a sum not to exceed $5.00 for each member belonging to that section, except Life, Honorary, and Junior Members, and $2.50 for each Junior Member belonging to that section.

Section 3. Each local section shall conduct its affairs in conformity with the Constitution of the Society and rules established by the Board of Direction, except that officers and directors of the local section shall be elected as set forth in its By-laws. Any amendment to the By-laws of a local section must be approved by the Board of Direction before becoming effective. A local section shall not assume to speak for the Society unless authorized by the Board of Direction.

Section 4. The Board of Direction of the Society may, after due consideration, revoke the certificate of any section if, in its judgment, the section has not complied with the provisions of these regulations.

ARTICLE XIV—Amendments

Section 1. The Constitution of the Society may be amended as herein provided.

A proposed amendment must be submitted to the Secretary-Treasurer of the Society in a written petition signed by at least fifteen voting members in good standing. The amendment shall

be sent by letter to all members of the Society along with the notice of the next regular meeting, at which meeting the amendment shall be in order for discussion. The amendment may be amended in any manner pertinent to the original amendment by a majority vote of the members present and voting. If so amended, it shall be submitted to the membership of the Society and voted upon by letter ballot in its amended form; if not so amended, it shall be voted upon by letter ballot in its original form. The vote shall be counted at the first regular meeting following that at which the amendment was presented.

If, after discussion of a proposed amendment, the meeting shall so decide by a majority vote it may refer the amendment to a Committee, to be appointed by the President of the Society, for further consideration. This committee shall report at the next regular meeting whereupon the amendment shall be acted upon as hereinbefore provided.

The proposed amendment in its original or amended form may, at the written request of a majority of those signing the original petition, be withdrawn at any time prior to its submission to the membership for letter ballot.

An affirmative vote of two-thirds of all ballots cast shall be necessary to the adoption of any amendment. Amendments shall take effect immediately upon adoption unless specifically provided otherwise.

Section 2. An amendment to the By-laws may be made by a two-thirds vote of the members present and voting at any regular meeting; provided, it has been proposed in writing at a previous regular meeting, and due notification thereof has been sent to each member with the notice of the meeting.

BY-LAWS

(1) Meetings.—Regular meetings of the Society shall be held on the second Monday of each month at 8 o'clock P. M., unless otherwise provided by the Board of Direction or by vote of the Society at a previous meeting.

(2) Special Meetings.—A special meeting may be called at any time by the President when he deems it expedient, and he shall be bound to do so when so instructed by the Board of Direction, or upon receipt of a petition in writing signed by at least 5% of the voting members in good standing. Written notice of time, place and purpose of such a meeting shall be mailed to each

member at least seven days prior to the date fixed therefor. No business shall be transacted except that stated in the notice.

(3) Order of Business.—The order of business at regular meetings of the Society, unless otherwise provided, shall be as follows:

1st. Reading of the minutes of the preceding meeting

2nd. Report of Committees

3rd. Unfinished business

4th. New business

5th. Announcements

6th. Special program features

(4) Nomination and Election of Officers.—The Constitution provides for appointment of a Nominating Committee, which shall present nominees for election to office.

Additional nominations for each office may be made from the floor at the December meeting. When more than one nomination is received for any office, written ballots shall be cast by the voting members present, and the nominee receiving the majority of votes shall have his name included on the letter ballot. In the event there are more than two nominees for any office, and no nominee receives the majority of votes cast in balloting, successive ballots shall be taken until one of the nominees receives a majority vote. The nominee receiving the lowest number of votes is to be dropped after each balloting.

Within six days after the December meeting the Secretary-Treasurer shall mail a letter ballot to each member of the Society in good standing. This ballot shall list the names of all persons nominated for each office, and shall provide a blank space so that voters may write in another name for each office should they so desire.

This list, to count as a vote, shall be returned to the Secretary-Treasurer at least four days before the Annual Meeting, and shall be enclosed in two envelopes, the inner one containing the ballot being blank, the outer one having upon it the signature of the member voting. The nominees upon the list whose names are not scratched shall be the ones voted for. In case of a tie, the members present at the Annual Meeting shall elect the officer.

(5) Management.—The Board of Direction shall manage the affairs of the Society in conformity to the provisions of the Constitution. It shall direct the investment and care of the funds of the Society; order all ordinary or current expenditures of funds; act upon all applications for membership; approve the composition of all standing committees; take measures to advance the interests of

the Society; pass on all papers submitted with reference to their fitness for presentation to the Society and for publication in the Proceedings; have the power to eliminate or reduce the entrance fees for any and all grades of membership for such period of time as it deems advisable; and generally direct its business. To perform these duties, the Board shall be authorized to appoint committees of its members, and to delegate to them such of its powers as it deems fitting.

The President shall have general supervision of the affairs of the Society. He shall preside at meetings of the Society and of the Board of Direction, and shall be ex-officio member of all committees. He shall select, and with the approval of the Board of Direction, appoint the members of standing committees to serve during his tenure of office. He may appoint special committees at his discretion. He shall deliver an address at the Annual Meeting. In the absence of the President, the 1st Vice-President shall discharge the duties of the President. In the absence of the President and the 1st Vice-President, the 2nd Vice-President shall discharge the duties of the President.

The Secretary-Treasurer shall keep a full record of the transactions of the Society and of the Board of Direction, and shall make an annual report and such other reports as may be prescribed by the Board. He shall issue all proper notices and announcements; conduct all correspondence appertaining to his office; be custodian of the property of the Society; acknowledge all donations; and shall perform all other duties which may be properly assigned to him by the Board. He shall receive all monies due to the Society and shall deposit same in the name of the Society in a depository selected by the Board; draw checks on the Society's depository to be signed by himself and the President for the payment of all bills against the Society which have been duly approved by the Board, give surety for the protection of the funds and securities of the Society in such amount as the Board shall determine, and the premium thereon shall be paid out of the funds of the Society. He shall be exempt from annual dues during his term of office.

Written notice of each meeting shall be sent by the Secretary-Treasurer to each member at least one week prior to the date set for the meeting.

Newly elected members and members transferred from one grade to another shall be promptly notified in writing by the Secretary-Treasurer.

(6) Committees.—The President, within one month after the Annual Meeting and with the approval of the Board of Direction,

shall appoint from the Society's membership the following standing committees to serve during the current electorial year:

Membership Committee

Membership Qualification Committee

Professional, Civic and Industrial Affairs Committee

Publications Committee

Publicity Committee

Technical Papers Committee

Additional standing committees composed of members may be appointed by the President with the approval of the Board of Direction and special committees may be appointed by him at his discretion. The Board shall appoint from its own membership a Finance Committee.

The President shall appoint on each standing committee a Junior Member of the Society who shall participate in its meetings without vote.

(a) The Membership Committee shall see that proper contacts are made to secure eligible members for the Society throughout the State. It shall furnish prospective members with application forms and assist in the preparation of applications when so requested.

(b) The Membership Qualifications Committee shall be composed of three members of the Society whose names shall not be divulged to the membership. Its general duties are to review each application and to advise the Board of the eligibility of the applicant for membership in the Society.

(c) The Professional, Civic and Industrial Affairs Committee shall deal with matters pertaining to the advancement of the profession and assist in obtaining participation and recognition of the engineering profession in civic or industrial affairs. Neither this committee nor the Society as such shall take part in municipal, parish or state political activities.

(d) The Publications Committee shall assemble and recommend to the Board of Direction articles which it may deem fit for publication in the Proceedings or for public distribution in any other form. It shall be authorized to make general rules for the presentation or preparation of all papers. It shall assist and endeavor to obtain necessary and proper advertising so as to make all publications self-supporting.

(e) The Publicity Committee shall advise the press of the time, date and location of all general meetings of the Society. It also shall take measures to publicize the activities of the Society.

(f) The Technical Papers Committee shall make arrangements for a speaker or a suitable technical program for each regular monthly meeting, with the exception of the Annual Meeting. Such selection should be made sufficiently far in advance so that proper notification can be supplied to all members and to the Publicity Committee.

(g) The Finance Committee shall be composed of three members of the Board of Direction. It shall prepare a budget for the current year not later than one month after the Annual Meeting. Its Chairman, with the Committee's approval, shall sign warrants authorizing the Secretary-Treasurer to make payments of all proper bills. It shall approve budgets prepared by all other standing or appointed committees.

(h) The Annual Meeting shall be arranged and conducted by a special General Committee under the direction of a general chairman who shall be appointed for this purpose by the President with the approval of the Board of Direction. The President of the Society shall serve as Chairman Ex-Officio of all general sessions of the Society during the meeting. The Secretary-Treasurer of the Society shall serve this Committee also as Secretary-Treasurer. All special committees required to satisfactorily carry on the activities for the Annual Meeting shall be appointed by the General Chairman, and the Chairman of each special committee shall be a member of the General Committee. A special Finance Committee shall prepare a budget covering the proposed expenditures of the Annual Meeting, subject to the approval of the Board of Direction, and render a final report of the actual cost within thirty days after the close of the meeting.

(7) Affiliation or disassociation of the Louisiana Engineering Society with a national organization may be proposed by a majority of the Board of Direction or by a petition signed by not less than 10% of the Members in good standing of this Society. Such petition for affiliation or disassociation shall first be reviewed by the Board of Direction and the findings of this review shall be presented to the membership.

A copy of any proposal for affiliation or disassociation, together with a letter ballot, shall be mailed by the Secretary to each voting Member not later than six months after such petition has been received by the Board.

Affiliation or disassociation shall become effective only upon the affirmative vote of two-thirds of the votes cast by the qualified Members, provided that not less than 20 per cent of the qualified members of the Society cast affirmative ballots.

Revised December 31, 1957

CANONS OF ETHICS

FORWARD

Honesty, justice and courtesy form a moral philosophy which, associated with mutual interest among men, constitutes the foundation of ethics. The engineer should recognize such a standard, not in passive observance, but as a set of dynamic principles guiding his conduct and way of life. It is his duty to practice his profession according to these Canons of Ethics.

As the keystone of professional conduct is integrity, the engineer will discharge his duties with fidelity to the public, his employers and clients, and with fairness and impartiality to all. It is his duty to interest himself in public welfare, and to be ready to apply his special knowledge for the benefit of mankind. He should uphold the honor and dignity of his profession and avoid association with any enterprise of questionable character. In his dealings with fellow engineers he should be fair and tolerant.

PROFESSIONAL LIFE

Section 1. The engineer will cooperate in extending the effectiveness of the engineering profession by interchanging information and experience with other engineers and students and by contributing to the work of engineering societies, schools and the scientific and engineering press.

Section 2. He will not advertise his work or merit in a self-laudatory manner, and he will avoid all conduct or practice likely to discredit or do injury to the dignity and honor of his profession.

RELATIONS WITH THE PUBLIC

Section 3. The engineer will endeavor to extend public knowledge of engineering, and will discourage the spreading of untrue, unfair and exaggerated statements regarding engineering.

Section 4. He will have due regard for the safety of life and health of public and employees who may be affected by the work for which he is responsible.

Section 5. He will express an opinion only when it is founded on adequate knowledge and honest conviction while he is serving as a witness before a court, commission or other tribunal.

Section 6. He will not issue ex parte statements, criticisms or arguments on matters connected with public policy which are inspired or paid for by private interests, unless he indicates on whose behalf he is making the statement.

Section 7. He will refrain from expressing publicly an opinion on an engineering subject unless he is informed as to the facts relating thereto.

RELATIONS WITH CLIENTS AND EMPLOYERS

Section 8. The engineer will act in professional matters for each client or employer as a faithful agent or trustee.

Section 9. He will act with fairness and justice between his client or employer and the contractor when dealing with contracts.

Section 10. He will make his status clear to his client or employer before undertaking an engagement if he may be called upon to decide on the use of inventions, apparatus, or any other thing in which he may have a financial interest.

Section 11. He will guard against conditions that are dangerous or threatening to life, limb or property on work for which he is responsible, or if he is not responsible, will promptly call such conditions to the attention of those who are responsible.

Section 12. He will present clearly the consequences to be expected from deviations proposed if his engineering judgment is overruled by nontechnical authority in cases where he is responsible for the technical adequacy of engineering work.

Section 13. He will engage, or advise his client or employer to engage, and he will cooperate with, other experts and specialists whenever the client's or employer's interests are best served by such service.

Section 14. He will disclose no information concerning the business affairs or technical processes of clients or employers without their consent.

Section 15. He will not accept compensation, financial or otherwise, from more than one interested party for the same service, or for services pertaining to the same work, without the consent of all interested parties.

Section 16. He will not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with his client or employer in connection with work for which he is responsible.

Section 17. He will not be financially interested in the bids as or of a contractor on competitive work for which he is employed as an engineer unless he has the consent of his client or employer.

Section 18. He will promptly disclose to his client or employer any interest in a business which may compete with or affect the business of his client or employer. He will not allow an interest in any business to affect his decision regarding engineering work for which he is employed, or which he may be called upon to perform.

RELATIONS WITH ENGINEERS

Section 19. The engineer will endeavor to protect the engineering profession collectively and individually from misrepresentation and misunderstanding.

Section 20. He will take care that credit for engineering work is given to those to whom credit is properly due.

Section 21. He will uphold the principle of appropriate and adequate compensation for those engaged in engineering work, including those in subordinate capacities, as being in the public interest and maintaining the standards of the profession.

Section 22. He will endeavor to provide opportunity for the professional development and advancement of engineers in his employ.

Section 23. He will not directly or indirectly injure the professional reputation, prospects or practice or another engineer. However, if he considers that an engineer is guilty of unethical, illegal or unfair practice, he will present the information to the proper authority for action.

Section 24. He will exercise due restraint in criticising another engineer's work in public, recognizing the fact that the engineering societies and the engineering press provide the proper forum for technical discussions and criticism.

Section 25. He will not try to supplant another engineer in a particular employment after becoming aware that definite steps have been taken toward the other's employment.

Section 26. He will not compete with another engineer on the basis of charges for work by underbidding, through reducing his normal fees after having been informed of the charges named by the other.

Section 27. He will not use the advantages of a salaried position to compete unfairly with another engineer.

Section 28. He will not become associated in responsibility for work with engineers who do not conform to ethical practices.

APPENDIX E

Continued from page 28

The Society works very closely with local Sections of the national Engineering Societies and serves as a coordinating agency for many fields of professional activity in which these Sections and other engineering groups in Louisiana are concerned. Part of this coordination has been handled through the Louisiana Council of Engineers, in which group the President and Secretary of L.E.S., by virtue of their office, serve respectively as Chairman and Secretary. L.E.S. is the source, in accordance with Louisiana law, of nominations for members of the State Board of Registration of Professional Engineers and Land Surveyors, from which nominees the Governor makes selections as vacancies occur.

The Society presents technical papers at its regular meetings under its own sponsorship and jointly with local Sections of national Societies. In addition, it conducts a three-day Annual Meeting in January of each year which features a variety of technical programs, an engineering student conference, plant trips, social events and presentation of honors and awards. The latter include the "Louisiana Engineering Society Civic Activities Medal—Andrew M. Lockett Award" and the "Louisiana Engineering Society Technological Accomplishment Medal."

Other activities in professional and civic matters are sponsored by the Society through its Vocational Guidance, Legislative, Engineers' Week, and Professional, Civic & Industrial Affairs committees. The vocational guidance activity was organized on a statewide basis in 1952 and has stimulated high school student interest in engineering and scientific careers through school visits, career days, consultation and formation of "JETS" clubs in the schools. The Engineers' Week Committee annually plans a program designed to publicize the accomplishments and objectives of the engineering profession through newspaper articles, radio and TV interviews, civic club speakers, engineering society meetings and other appropriate channels.

There is also a vigorous, well organized Woman's Auxiliary which supplements the Society's activities in several important respects, including a Student Loan Fund and other projects. The Auxiliary was organized in 1932.

Statistical Data, January 10, 1958

TOTAL MEMBERSHIP

Voting Members:

Charter Member	1	
Honorary Members	14	
Life Members	71	
Members	1,308	1,394

Non-voting Members:

Affiliate Members	93	
Junior Members	228	
Student Members	61	382
TOTAL		1,776

* * * * *

BREAKDOWN OF VOTING MEMBERSHIP

Registered by a State Board of Registration for Professional Engineers	902
Not registered, but graduates of colleges of recognized standing	278*
Others	214
	1,394

*This figure is conservative. It was obtained by reference to applications for membership. Prior to 1946 application forms did not specifically request this information.

RESULTS OF JANUARY 1958 SURVEY

	Members	Affiliates	Juniors
Total Cards Returned	892	38	138
Total Registered	616	7	93*
Affiliated with Nat'l Societies:			
ASCE	166	—	34
ASME	112	—	10
AIEE	94	3	13
AIChE	33	—	5
AIME	16	—	2
ASHAE	28	—	3
SAME	38	—	1
AWWA	10	—	—
ASEE	17	—	1
ASRE	9	1	1
ASAE	6	—	—
AICE	6	—	—
AIIE	2	—	—

*Louisiana law does not provide for engineer-in-rtaining. Junior members are registered as professional engineers.

* * * *

MEMBERSHIP GROWTH OBTAINED FROM ANNUAL REPORTS

Year	Total Gains	Total Losses	Net Gain
1948	240	55	185
1949	255	78	177
1950	255	61	194
1951	150	94	56
1952	111	92	19
1953	101	80	21
1954	176	76	100
1955	126	87	39
1956	125	94	31
1957	208	91	117
Average	175	81	94

AGE OF SPACE

Continued from page 22

knowledge of the basic laws of physics, there are certainly some fairly definite limits to the ultimate extent of our space travel.

We thus find ourselves truly on the threshold of actual space travel. We see that technologically we have the potential to travel from the earth to the Moon, or the nearby planets. The technology necessary for travel to the more distant planets and beyond our solar system is still in its infancy. How long it will take to realize some of the potential that has been discussed here depends on a number of factors. However, there appears to be little doubt now that sometime within the next five to ten years a manned satellite will be placed in an orbit and that sometime within the next 25 to 40 years interplanetary travel will be accomplished.

In addition to the time necessary for the orderly development of technology and engineering of hardware, there are two very important ingredients. These are money and manpower. Dr. Stuhlinger has estimated that possibly $25 to $50 billion would be required to develop his ionic propulsion ship. This seems an enormous figure, but actually it is only of the order of magnitude of our defense budget for one year, and if spread over 25 to 40 years it is not so bad.

Much has been said and written recently about our shortage of technically trained manpower. The educational program proposed by the President is certainly one step in the right direction. However, much more needs to be done and much of it can be done at the non-governmental level. The two major problems are to provide inspiration to youngsters and the teachers for educating them. These are problems that can best be tackled at the local level and so comprise a role for you as citizens and as practicing engineers and scientists.

To provide the necessary qualified teachers, several things are required. The educational program proposed by the president is basic. However, in addition to this, there must also be provided the inducements to draw and hold qualified persons to the teaching profession.

The primary factor in this is financial remuneration. We cannot hope to attract and retain competent teachers at extremely low salaries in competition with other fields of endeavor. This is basically a local problem and must be solved at the local level. Government aid is, of course, valuable, but not a complete answer.

Although higher salaries are imperative, they cannot provide a quick solution. Even if we doubled all teaching salaries, it would be five to ten years before the real impetus would be felt in improved teaching. There are, however, some steps that can be taken by persons and groups such as you to give more immediate results, both in the quality of teaching and in the amount of learning.

One of the simplest is to provide stimulation and technical incentive for both science teachers and students. Classroom teaching in science must be alive and interesting. At the university level, teachers are expected to conduct research programs to keep in touch with advances in their specific fields. At the high school level this is not feasible. However, much the same purpose can be accomplished by summer employment in technical areas in industry. The high school teachers of mathematics, physics and chemistry derive a great deal of practical benefit from such experience that gives a new vitality and emphasis to their teaching. Also, they prove to be interested and diligent employees and can make very worthwhile contributions during such summer employment. For the students, you can provide science fairs, tours of technical installations, technical projects for Scout groups, etc.

But inspiration and teaching ability are only half the problem. Our students must be expected to learn. Our schools need more of an aura of work and learning. Extracurricular activities have usurped too much of our school time. Too much thought is given to entertaining students and to making schooling easy. Non-educational courses are too often carried in the curriculum to pad attendance figures to bolster government aid. Let's face it. We need more hard core learning and hard work at the elementary and secondary school levels. And we need more realistic assessment of actual progress without fear of offense to either student or parent.

If the problem of inspiring and training boys and girls and the associated problem of maintaining competent teaching staffs is accepted as an individual problem by those closest to it rather than being considered entirely a remote governmental function, we can provide the manpower necessary to met the immediate demands of our technical economy and our national defense, and to expand into these new frontiers that are now opening to us. If we do not provide this manpower, we will lose much of the ground we have gained in the past 50 years and will have to sit back and watch somebody else reap all the benefits while we become only a second-rate nation.

In Memoriam

1957

CHARLES E. CASSAGNE, JR.

GEORGE H. DAVIS

ALLEN S. HACKETT

JOHN D. HAVERKAMP

CARL J. HELBAK

SEBASTIAN V. MASSIMINI

ADAM G. MUNDINGER

LAWRENCE K. NELSON

PAUL PASCAL PARETI

LYMAN C. REED

W. HORACE WILLIAMS

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, Monday, Novembver 11, 1957, Engineers' Club, New Orleans

The meeting was called to order by President Nelson with Messrs. Freeman, L'Heureux, McLellan, Taylor, Wallace and Fernandez present. Dr. Wallace moved that minutes of the preceding meeting be accepted as read, seconded by Dr. Taylor and carried. President Nelson then gave a brief report on the Section Coordination Conference held at Alexandria November 1-2.

The secretary read a financial report for the third quarter of 1957, which was accepted upon motion by Mr. McLellan, seconded by Mr. Freeman and carried. A list of amendments to the society's constitution, prepared by a special committee appointed for the purpose, was read by the president. Mr. Freeman moved that the report be accepted and approved, seconded by Mr. McLellan and carried. The secretary read a proposed amendment suggested by the Membership Qualifications Committee and Dr. Wallace moved that it be incorporated with the other amendments. The motion was seconded by Dr. Taylor and carried. Mr. McLellan moved that the membership-at-large be informed of the Board's unanimous approval of the proposed amendments at the time they are submitted for vote, seconded by Mr. Freeman and carried.

President Nelson, Chairman of the Honorary Membership Committee, announced that over 80% of his committee had voted favorably to award honorary membership to Hermann L. Lehmann for his outstanding leadership in organizing the society's state sections, and to John H. O'Neill for his contribution in the field of Public Health Engineering. Dr. Taylor moved that honorary membership be conferred upon these two members, seconded by Dr. Wallace and carried unanimously.

The secretary read letters of thanks received from W. Horace Williams, Jr., and Mrs. A. A. Woods for copies of the LOUISIANA ENGINEER containing obituaries of deceased members.

The secretary reported receipt of a letter informing the society of the second annual Mayor's Traffic Safety Conference to be held November 26-27 and requesting confirmation of the society's representatives. In accordance with appointments made earlier in the year, the General Chairman of the conference was advised that Messrs. B. A. Grehan, F. B. Grevemberg and A. J. Naquin would represent the society.

A letter from Mr. James McLemore, State Custodian of Voting Machines, was read in which he offered the use of state voting machines for the society's elections. The secretary was instructed to thank him but decline the offer since L.E.S. elections are conducted by letter-ballot.

A letter from Colonel William H. Lewis, District Engineer, Corps of Engineers at New Orleans, relating to the Permanent International Association of Navigation Congresses which plans to meet in the United States in 1961, was read. Colonel Lewis advised that New Orleans might be considered as a possible host city, and suggested that the L.E.S. contact the Director, Port of New Orleans, if it was interested in having the congress meet here. Dr. Wallace moved that the society contact the port director and offer its assistance in this connection, seconded by Mr. L'Heureux and carried.

A partial report from Mr. Allen Betz, Chairman, Publications Committee, containing quotations from a publishing firm for handling the LOUISIANA ENGINEER, was read. The cost appeared to be prohibitive, however it was indicated that present advertising rates were below average and could be increased. It was decided that no action would be taken until a complete report was received from the committee.

President Nelson announced that he had appointed Messrs. James L. Campbell, Chairman, Arthur J. Naquin and Michael C. Abrahm to prepare the obituary of the late John D. Haverkamp. The secretary reported that Lyman C. Reed, a member of 50 years' standing, had passed away during the preceding week, whereupon the President stated he would appoint an obituary committee for Mr. Reed in the near future.

The president stated that new appointments should be made in 1958 to the New Orleans Building Code Committee and the Mayor's Coordination Committee, since the society's present representatives have requested to be relieved of their duties.

Mr. L'Heureux moved that the society's Certificate of Appreciation for 1958 be awarded to Mr. Otha E. Barron for his work in organizing the Section Coordination Conference, seconded by Dr. Taylor and carried.

Dr. Wallace moved that Mr. Freeman be designated as Master of Ceremonies for the "President's Night" meeting to be held December 9.

The secretary announced that the Nominating Committee for 1958 consisted of Messrs. Wayne P. Wallace, Chairman, Michael C. Abrahm and W. Stone Leake, and that board members were expected to submit names of possible candidates to the committee.

Discussion followed on affiliation with national organizations. Correspondence between Mr. Paul N. Robbins, Executive Secretary of N.S.P.E., and President Nelson was read. It was the consensus of opinion among those present that official request to affiliate with E.J.C. and N.S.P.E. would be made as soon as amendments to the constitution were adopted.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society Held at the Engineers' Club, New Orleans on November 11, 1957

The meeting was called to order by President Nelson with approximately 125 members and guests present. Reading of minutes of the preceding meeting was dispensed with, after which the secretary read minutes of a meeting of the Board of Direction held in October.

Mr. James L. Campbell read an obituary of the late John D. Haverkamp, and a moment of silence was observed in memory of the deceased member.

President Nelson urged members to send to the Nominating Committee the names of desired candidates for the election of officers for 1958, after which he introduced the moderator for the evening's program, Mr. George Elmer May. ,Mr. May introduced the panel members, who discussed aspects of Engineering Education outlined below:

Dean Ben T. Bogard, L.P.I.—"Design and Engineering System"

Dr. P. A. Chieri, S.L.I.—"Engineering Sciences"

Dr. F. J. Germano, L.S.U.—"Humanities, Economics, etc."

Dean Lee H. Johnson, Tulane U.—"Basic Science"

After the panel discourses Messrs. Waldemar S. Nelson, Calvin T. Watts, Richard F. Muller and Lionel J. Cucullu, followed with discussions from the consulting, public employee, industrial and utility viewpoints.

A short question period followed, after which the meeting adjourned with a rising vote of thanks to all speakers.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction Held at the Engineers' Club, New Orleans, Monday, December 9, 1957

The meeting was called to order by President Nelson with Messrs. Bogard, Freeman, L'Heureux, McLellan, Scales, Sessums, Wallace and Fernandez present. Mr. Scales moved that minutes of the preceding meeting be accepted as read, seconded by Mr. Freeman and carried. Dr. Wallace, Chairman of the Nominating Committee, presented the following report of nominees selected by the committee for the forthcoming election of officers:

For President—Ernest M. Freeman

For First Vice-President—Roy T. Sessums

For Second Vice-President—Edward A. McLellan

For Secretary-Treasurer—John P. Fernandez

For Director for 2 Years—Ben T. Bogard

For Director for 2 Years—James S. Janssen

Dr. Wallace moved that the report be accepted and presented to the membership at the society's regular meeting, seconded by Mr. L'Heureux and carried. The secretary read a report of the Section Coordination Chairman, Mr. Z. L. Loflin, addressed to his committee, in which he requested Messrs. Barron and Tucker to secure a speaker to tour the state sections during March 1958. The secretary was instructed to contact the Technical Paper Chairman for New Orleans to see if arrangements could be made to present the tour speaker at the March 10 meeting.

President Nelson advised that he had visited Washington and New York, where he spoke with the national officers of NSPE and EJC. In connection with the proposed amendments to our constitution and by-laws he reported that NSPE would like to have a by-law providing for the selection or election of a National Director for their organization. It was the consensus of opinion that, for the first year, the Board would select a director from the society's officers since Article IV of the constitution states "the Board of Direction shall • • • outline and direct the duties and activities of the several officers of the society."

The secretary read letters of thanks received from Mrs. Carl Helbak, Mr. C. Espy Reed and the Rector, Grace Church, N.C., for memorials in honor of deceased members.

A letter from Mr. C. C. Edwards was read in which he suggested that the certificate of honorary membership scheduled to be presented to Hermann L. Lehmann could be received by the president of the Baton Rouge Section, since Mr. Lehmann will not be able to attend the annual meeting.

Correspondence between the Professional, Civic and Industrial Affairs Committee and the Chief Administrative Officer, City of New Orleans, was read, in which the committee pointed out the professional nature of the position of Chief of Mechanical Inspection Section, Department of Regulatory Inspection, and urged that it be filled by a registered professional engineer; a reply signed by Hon. Bernard McCloskey, Director, Department of Safety and Permits, indicated that recommendation would be made to employ only a registered engineer as requested.

Mr. Freeman presented the following resolution, which was adopted by the Board an dthe secretary was instructed to carry out its contents:

"Whereas the Board of Direction of the Louisiana Engineering Society was privileged to attend the dedication on October 11, 1957 of the new Engineering Building at Southwestern Louisiana Institute and to inspect its contents ,and

"Whereas the Board is fully cognizant of the value and benefit to the profession as well as to the institute of these modern facilities, therefore

"Be it resolved that the Board of Direction, in behalf of the Louisiana Engineering Society, express to Dr. Frederick W. zurBurg, Dean of Engineering at Southwestern Louisiana Institute, its sincere appreciation of his long and tireless effort to achieve this splendid addition to engineering education facilities in our state, and his personal interest in its planning and design.

"Be it further resolved that this resolution be placed on record and a copy be forwarded to Dr. Joel L. Fletcher, President, Southwestern Louisiana Institute."

Mr. McLellan moved that the resignations of the following be accepted with regret, seconded by Mr. L'Heureux and carried: Glen L. Corrigan, Texas (Member); Kenneth L. Kinney, France (Member); Thomas H. Nolan, Alabama (Junior).

Dr. Wallace moved that the following be dropped from the rolls for non-payment of dues, seconded by Mr. McLellan and carried: Howard W. Judson, Michigan (Member); Richard C. Herrell, (Member); Irwin C. Weidig, New Orleans (Member).

A letter from the Qualifications Committee concerning an application for transfer from junior to member grade was read. Dr. Wallace advised that he would obtain additional information on the matter and report back to the board.

The following junior members are over-age, and, since the constitution requires that their membership shall cease if they are not transferred to a higher grade by age 32, and since no application for transfer has been received from any of them, Mr. McLellan moved that they be transferred to Affiliate members, seconded by Dr. Wallace and carried: Harold J. DeBray, Monroe; Ralph C. Elliott, Metairie; Gaudenz Gadmer, Texas; Gary J. Guidry, New Iberia; Ralph W. Junius, New Orleans; Robert D. Law, Jr., Baton Rouge; William A. Massimini, New Orleans; Harold A. Miller, New Orleans; Otis O. Miller, Baton Rouge; Jean F. Smith, Baton Rouge; Ramon D. Spilman, Sulphur; Guy E. Templet, Baton Rouge.

The secretary was instructed to try to secure a private dining room in the downtown area for the board meeting with section officers to be held on January 10.

First Impressions are Important

The public gets its first impression of you from your office — and that impression is important, for first impressions either turn people away or bring them back. Don't take a chance on losing them when it's so easy to modernize your office with inexpensive lighting fixtures.

A Public Service representative will call at your convenience, discuss your problem with you, and explain how modern lighting can improve your office appearance. Just call RAymond 7751, extension 215.

NEW ORLEANS Public Service INC.

The secretary was instructed to order two additional Technological Accomplishment Medals and two Civic Activity Medals to be kept in reserve for future use.

Mr. Scales stated that the society should seek and urge that publicity favorable to engineers and engineering be obtained as a feature of the dedication of the new Mississippi River Bridge. The meeting then adjourned so that the regular meeting could begin on time.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of Louisiana Engineering Society Held Jointly With New Orleans Section, American Institute of Chemical Engineers, December 7, 1957

The meeting was called to order by President Nelson with approximately 100 members and guests present. Reading of minutes of the preceding meeting was dispensed with. Dr. Wallace, Chairman of the Nominating Committee, presented the following report, after which he moved that the names of nominees be placed on a letter-ballot and forwarded to the membership-at-large.

For President—Ernest M. Freeman
For First Vice-President—Roy T. Sessums
For Second Vice-President—Edward A. McLellan
For Secretary-Treasurer—John P. Fernandez
For Director for 2 Years—Ben T. Bogard
For Director for 2 Years—James S. Janssen

The motion was seconded by Mr. Grevemberg and carried. No nominations were received from the floor, and the nominations were closed upon motion duly made and seconded.

Mr. Freeman expressed the society's thanks to all former presidents for their contribution to its progress, after which he introduced each one in attendance and gave a few highlights of the administration of each. Former presidents Derickson, Todd and Cucullu had expressed their regrets over inability to attend by letter.

President Nelson announced that proposed amendments to the constitution had been mailed out with the meeting notice and were now open to discussion. Mr. Janssen moved that a letter-ballot on the proposed amendments be forwarded to the membership, seconded by Mr. Freeman. After some discussion on the pros and cons of L.E.S. affiliation with national organizations a vote was taken and the motion carried, with Mr. Ole Olson abstaining from voting.

President Nelson then relinquished the chair to Mr. John R. Tusson, Chairman of A.I.Ch.E., and the principal speaker of the evening, Lt. Col. Duane W. Ackerson, C.E., Executive Officer, U. S. Army Engineer District, New Orleans, was introduced. Col. Ackerson addressed the meeting on the subject "Mississippi-Gulf Outlet," a discussion on the New Orleans Tidewater Seaway.

After a lively question period the meeting adjourned with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction Held in the St. Charles Hotel Thursday, January 9, 1958

The meeting was called to order by President Nelson with Messrs. L'Heureux, Freeman, Scales, Sutton, Taylor, Wallace and Fernandez present. Dr. Wallace moved that minutes of the preceding meeting be accepted as read, seconded by Mr. Scales and carried.

The secretary reported that the entire slate of officers recommended by the Nominating Committee had been elected and that all applicants for membership named in the December ballot had been elected to their respective grades. (A copy of the ballot is attached to these minutes.) He also announced the results of the constitutional amendment ballot as follows, stating that all of the amendments had been adopted:

Ballots returned—559. Of this number, 25 were unmarked and therefore were not counted. Of the remainder, some did not indicate preference on all amendments; those voted were tabulated as follows:

WHY YOU SHOULD SPECIFY . . .

ZURN

- ON THE SPOT Sales Engineering Service
- SPEEDY DELIVERIES from Stock to job site . . . .
- MOST COMPLETE SELECTION of Engineered Plumbing Controls

Z-1376

Z-1376 Inspecdor (R) — Stainless steel, hinged, one-piece construction with 180° door opening. Concealed hinges, tamper-proof cylinder lock, rounded door corners. Also available in chrome-plated and perma-coated steel.

Z-100

Z-100 Roof Drain — Dura-coated cast iron, removable bayonet-locking mushroom dome strainer, extra large protected sump.

Z-1396

Z-1396 Wall Hydrant —Non-freezing type for concealed flush installation in any type of wall construction. Working parts can be removed face of hydrant for easy maintenance.

Z-1170

Z-1170 Greaseptor (R) —Lightweight, horizontal basket baffle for grease removal and vertical baffle, forming integral unit readily removable from body by means of handle.

Z-1326

Z-1326 Supremo (R) Perfect Seal Cleanout —Floor level type. Provided gas and water tight connection, cover and plug always easy to remove. Adjustable top compensates for variations in floor surfaces.

Z-1205

Z-1205 SHR—Zurn System (R) provides supporting carrier and trim for all off-the-floor plumbing fixtures.

Z-1800

Z-1800 Shoktrol (R)—Water hammer arrestor. All-welded stainless steel construction. Bellows precharged with air pressure for superior shock capacity. Lightweight, compact, safe, completely corrosion-resistant.

Z-215

Z-215 Tru-level Floor Drain — Dura-coated cast iron drain body and clamp collar, adjustable Zurn Nickel Bronze (R) strainer, and corrosion-resistant clamping colts.

Z-823

Z-823 Swimming Pool Equipment — Narrow grate type drain practical for walks, gutters and other narrow installations. Complete selection of durable drainage and recirculating fittings available for pool application.

Z-510

Z-510 FBS LPD (R) Pipe Line Strainers—Sinlex straight thru type, available with bolted or yoke cover. Strainer basket is offset to minimize pressure drop and is regularly furnished in stainless steel.

ZURN SOUTHERN SERVICES INC.

Represented in Louisiana by . . . .

A. R. BROUSSEAU

822 Perdido St. **Ph. RAymond 4672**

New Orleans 12

Proposed Amendment	Votes For	Votes Against	% Carried
Article II, Section 2	427	54	88.8
Article II, Section 3	425	57	88.6
Article II, Section 5	455	26	94.6
Article II, Section 6	450	29	93.9
Article VI	367	113	76.4
Article VII, Section 1	447	31	93.5
Article VIII	432	48	90.0
Article IX	445	36	92.5
By-Law 7	419	61	87.3

Discussion followed on the handling of applications now pending. Mr. Scales moved that the amendments become effective two months from the date of this meeting, or March 10, in order that the Qualifications Committee may clear all pending applications. Motion was seconded by Mr. Freeman and carried.

A report of the Publications Committee was read by the secretary. Dr. Wallace moved that the report be accepted and that Mr. Allen Betz, Chairman, be thanked for his committee's efforts, seconded by Mr. Freeman and carried.

A letter from the Science Education Council of Shreveport was read and the secretary was instructed to refer it to the Chairman of the Vocational Guidance Committee.

Dr. Wallace moved that the resignations of the following members be accepted with regret, seconded by Mr. Sutton and carried. V. H. Brogdon, New York (Member); Thos. D. Clark, Jr., Lafayette (Member); Frank S. Foster, Jr., New Orleans (Member); Albert A. Glodt, New Orleans (Member); Henry I. Hutto, Indiana (Member); James B. Kalmbach, Arkansas (Junior); Arch. D. Strange-Boston, Shreveport (Member); Dean C. McKee, Baton Rouge (Junior).

Discussion followed concerning the application for transfer of Alexander B. Bell. Mr. Freeman moved that he be transferred from the grade of Junior Member to that of Affiliate Member, seconded by Mr. Scales and carried.

A draft of the resolution and letters of transmittal to NSPE and EJC in connection with affiliation were prepared, after which Mr. Scales moved that they be presented at the board meeting on Friday, January 10 when all sections of the society would be represented. Motion seconded by Dr. Wallace and carried.

The meeting then adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Annual Meeting of the Society Held on Thursday, January 9, 1958

The meeting was called to order by President Nelson in the Claiborne Room, St. Charles Hotel with approximately 250 members and guests in attendance. The invocation was given by the Rt. Reverend Girault M. Jones, D.D., The Bishop of The Episcopal Church in Louisiana.

Mr. Grevemberg moved that the reading of minutes be dispersed with, seconded by Mr. Rhodes and carried. President Nelson then introduced Mr. Garvin Dyer, President of the National Society of Professional Engineers, and the following presidents of local sections of L.E.S.: Mr. W. L. Sutton, President, Baton Rouge Section; Mr. Roland J. Cambre, President, Lafayette Section; Mr. Glendon L. Smith, President, Lake Charles Section; Mr. John S. Malahy, Jr., President, Shreveport Section.

He also announced that the following presidents were unable to be present: Mr. Farrell W. Adams, President, Monroe Section; Mr. Andrew M. Moore, President, Alexandria Section.

The principal speaker, Dr. Gilford C. Quarles, Scientific and Technical Consultant to the Commanding General of the Army Ballistic Missle Agency, was introduced and spoke on "Missles, Satellites and Space Travel." A standing round of enthusiastic applause was accorded Dr. Quarles for his highly interesting talk.

President Nelson also introduced Mr. James S. Janssen, who headed the special committee appointed to prepare the amendments to the society's constitution.

The secretary-treasurer presented his annual report, a copy of which is attached to these minutes.

The president gave his annual report, outlining the highlights of his administration.

Mr. Roy Sessums then introduced three resolutions, copies of which are attached hereto, and moved that they be accepted. The motion was seconded by Mr. Grevemberg and carried.

The president then awarded certificates of merit to the following speakers at the Student Conference and presented them with tokens of appreciation for their efforts:

Farrell J. Perdreauvill, Louisiana Polytechnic Institute,
"The Effects of Varying Inlet Air Temperature on Automobile Engine Performance"

Rodolfo Augilar, Louisiana State University,
"Structural Experimentation in the Architectural Field"
Walter Theriot, Southwestern Louisiana Institute,
"Simultaneous Drilling"

Henry Gamble Favrot, Tulane University,
"Some Legal Aspects of Engineering Practice and Construction"

President Nelson awarded certificates of Life Membership to the following who have completed thirty years of active membership in the society: Raymond P. Bassich, Lionel J. Cucullu, William Wallace Hay, Everett G. Roessle, Carl Schneider, Alvin A. Voss, Stephen A. Wallbillich.

Presentation of the society's annual Certificate of Appreciation was made to Otha E. Barron in recognition of his outstanding service to the society during the year.

The president then called on Mr. William H. Rhodes to present a certificate of Honorary Membership to Mr. John H. O'Neill.

The president presented a certificate of Honorary Membership to Mr. Hermann L. Lehmann, which was accepted by Mr. W. L. Sutton, President of the Baton Rouge Section, in Mr. Lehmann's unavoidable absence.

Dr. Wayne P. Wallace, Chairman of the Nominating Committee, then presented the teller's report and stated that, in addition to the newly elected officers who would be introduced, the Board of Direction for 1958 would include the Presidents of the State Sections elected by their local memberships who were introduced by President Nelson earlier in the meeting. He then called on former presidents in the audience to escort the following officers and board members to the rostrum:

Walter H. Scales—Incumbent Board Member
Francis M. Taylor—Incumbent Board Member
Ben T. Bogard—Newly elected Board Member
James S. Janssen—Newly elected Board Member
John P. Fernandez—Secretary-Treasurer
Edward A. McLellan—Second Vice-President
Roy T. Sessums—First Cice-President
E. M. Freeman—President

Retiring President Nelson then handed the gavel to President-elect Freeman, who accepted the office with a few words of thanks.

Mr. Edward A. McLellan, General Chairman of the 1958 Annual Meeting, presented the retiring president with a token of appreciation for his outstanding leadership during the past year.

Announcements were made of the remaining programs of the meeting, after which the gathering adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

RESOLUTION

WHEREAS, the Board of Commissioners for the Port of New Orleans, through its President, Mr. W. D. Roussel, has so generously provided the yacht "Good Neighbor" for the use of members and guests of the Louisiana Engineering Society, affording the man opportunity to see the facilities of the Port of New Orleans, and

WHEREAS, this tour will afford to our membership an experience both pleasurable and informative, therefore

BE IT RESOLVED, that the Louisiana Engineering Society extend to the Board of Commissioners and to Mr. Roussel its sincere gratitude and appreciation for this privilege, and

BE IT FURTHER RESOLVED, that this resolution be incorporated in the minutes of the society and a copy be forwarded to Mr. Roussel.

RESOLUTION

WHEREAS, New Orleans Public Service Inc., through its Vice-President, Mr. Clayton L. Nairne, has so generously invited the members and guests of Louisiana Engineering Society to inspect the facilities of its Michoud Steam Electric Generating Station, and

WHEREAS, this inspection tour will afford to our membership an experience both pleasurable and informative, therefore

BE IT RESOLVED, that the Louisiana Engineering Society express to New Orleans Public Service Inc. its sincere gratitude and appreciation for this courtesy and privelege, and

BE IT FURTHER RESOLVED, that this resolution be incorporated in the minutes of the Society and a copy forwarded to Mr. Clayton L. Nairne, Vice-President.

RESOLUTION

WHEREAS, the Engineers' Club of New Orleans has so generously offered the use of its facilities for tonight's program in a fine spirit of cooperation with the Louisiana Engineering Society and the Woman's Auxiliary, and

WHEREAS the Engineers' Club also has extended an invitation to our members and guests to make use of its headquarters individually during this Annual Meeting, therefore

BE IT RESOLVED, that the Louisiana Engineering Society express to the Engineers' Club of New Orleans its sincere thanks and appreciation for this courtesy and privilege, and

BE IT FURTHER RESOLVED, that this resolution be incorporated in the minutes of the Society and a copy sent to Mr. Mallard Seago, President, Engineers' Club of New Orleans.

Financial Report of the Secretary-Treasurer For 1957

Income:		
Advertising	$1,502.97	
Annual Meeting	3,415.00	
Annual Outing	1,778.78	
Certificates	34.00	
Dividends and Interest	381.04	
Dues	14,650.25	
		$21,762.04
Expenditures:		
Annual Meeting	$3,658.48	
Annual Outing	1,731.78	
Auditor's Fee	150.00	
Dues to Other Organizations	82.00	
Dues Rebates to Sections	3,612.45	
Engineers' Week	164.82	
Headquarters Rental	165.00	
Miscellaneous	137.29	
Monthly Meetings	296.86	
Office Supplies	117.77	
Postage	452.06	
Publication (Louisiana Engineer)	3,666.72	
Salaries	4,320.00	
Scholarships, Awards, Gifts:		
Scholarships	$400.00	
Medals	89.05	
President's Gift	73.45	
Engraving Trophy	6.09	
Floral Offerings	76.80	
	645.39	
Stationery and Printing	1,782.95	
Taxes	105.65	
Traveling Expenses	215.80	
Vocational Guidance	131.87	
Capital Account	280.87	
		21,717.76
Net Increase in Liquid Assets		$ 44.28

STATEMENT OF LIQUID ASSETS

December 31, 1957

Cash, Whitney National Bank			$ 1,882.61
U. S. Savings Bonds:			
March 1946	Series F	$ 980.00	
June 1950	Series F	1,732.00	
March 1955	Series J	750.00	
April 1955	Series J	750.00	
			4,212.00
Homestead Investments:			
Columbia Homestead Association		$1,384.46	
Commonwealth Building & Loan Association		1,307.64	
Greater N. O. Homestead Association		2,107.04	
Security Building & Loan Association		1,500.00	
State Savings & Loan Association		1,500.00	
Union Savings & Loan Association		1,500.00	
			9,299.14
Value of Lapel Emblems on Hand			381.59
Total Liquid Assets December 31, 1957			$15,775.34
Total Liquid Assets January 1, 1957			15,731.06
Increase in Liquid Assets during 1957			$ 44.28

1957 MEMBERSHIP REPORT

GAINS:			
Elected:			
Members	97		
Affiliates	14		
Juniors	35		
Students	55		
		201	
Reinstated:			
Members	3		
Juniors	4	7	
Total Gains			208
LOSSES:			
Deceased:			
Life Members	4		
Members	7		
		11	
Resigned:			
Members	17		
Juniors	4		
Affiliate	1		
		22	
Dropped:			
Members	38		
Juniors	16		
Affiliates	4		
		58	
Total Losses			91
Net Gain			117

TRANSFERS:	
Life Member to Honorary Member	1
Member to Honorary Member	1
Member to Life Member	6
Affiliate Member to Life Member	1
Junior Member to Affiliate Member	14
Junior Member to Member	53
Student Member to Junior Member	17

SUMMARY:	
Charter Member	1
Honorary Member	14
Life Members	71
Members	1,308
Affiliates	93
Juniors	228
Student Members	61
	1,776

LOUISIANA ENGINEERING SOCIETY

Minutes of Meeting of the Board of Direction With State Section Officers Held at Broussard's Restaurant, Friday, January 10, 1958

The meeting was called to order by President Freeman with Messrs. Fred R. Adams, L. J. Cucullu, J. S. Janssen, H. F. Leiendecker, H. B. L'Heureux, J. S. Malahy, Jr., E. A. McLellan, W. S. Nelson, W. H. Scales, R. T. Sessums, Glendon L. Smith, W. L. Sutton, F. M. Taylor, A. C. Thigpen, W. P. Wallace and J. P. Fernandez present. Mr. Freeman announced that the object of the meeting was to obtain closer cooperation among the sections and that several items affecting all sections would be discussed, namely, the petitions for affiliation with NSPE and EJC, the State Planning Conference, the society's publication, and legislation affecting the Engineering Registration Law.

In order to refresh the memories of those who were present at last year's meeting and to inform those who were not, the secretary read minutes of the meeting of the Board of Direction and State Section Officers held on January 11, 1957.

Mr. Nelson read a resolution of the Board of Direction concerning affiliation with NSPE and distributed copies to those present. He then moved that it be adopted, seconded by Dr. Taylor and carried unanimously. Mr. Nelson then read a letter of transmittal intended to accompany the resolution and moved that it be acceped, second by Mr. McLellan and carried. (Copies of resoluion and letter are attached to these minutes.)

Mr. Nelson also read a resolution and letter of transmittal pertaining to affiliation with EJC, copies of which are attached to these minutes, and moved that they be adopted. Motion was seconded by Mr. Scales and carried unanimously.

Discussion followed on section coordination and Mr. McLellan moved that the board recommend that the next State Planning Conference be held as early in March as practicable and that the Alexandria Section again be the hosts. Motion seconded by Mr. Sutton and carried.

A report from Mr. Allen Betz, Chairman, Publications Committee, was read. Mr. McLellan moved that it be accepted and referred for further action to the new committee to be adopted for 1958. Motion seconded by Mr. Nelson and carried.

At this point a distinguished guest arrived and President Freeman introduced Mr. Garvin Dyer, President of the National Society of Professional Engineers, who came to New Orleans to attend the Annual Meeting of L.E.S.

Recommendations for proposed changes in the General Engineering License Law prepared by Mr. Louis Duclos, Chairman, Legislative Committee, were read. After some discussion Mr. Sessums moved that the Board of Direction endorse the recommendations of the Legislative Committee, seconded by Mr. Malahy and carried.

Section representatives then were called upon to discuss matters pertaining to their individual sections. Mr. Thigpen (Monroe) announced that his section had been meeting only quarterly but that beginning in 1958 it would hold six meetings a year. Mr. Sutton (Baton Rouge) reported that his section had sponsored a joint meeting with many other engineering groups in Baton Rouge at which the speaker was Charles F. "Boss" Kettering of General Motors Corporation. The meeting was such a success that it was decided to hold a similar joint meeting annually. Discussion followed on Vocational Guidance and the Jet Club Program. A tally was made which indicated that the following JET clubs were in operation or in process of organization, in addition to those now functioning in New Orleans:

Alexandria: Bolton High School, Pineville High School, Menard High School.

Baton Rouge: Baton Rouge High School (2 clubs), Istrouma High School (2 clubs), Zachary High School, Baker High School, Catholic High School, University High School.

President Freeman appointed a Finance Committee for 1958, consisting of Messrs. Sessums as Chairman, Nelson and Fernandez, and instructed them to prepare a budget for presentation at the next meeting of the Board of Direction. Dr. Taylor moved that the President and the Secretary-Treasurer be authorized to sign checks of the society, seconded by Mr. Nelson and carried. President Freeman thanked Mr. McLellan for assuming the responsibility of the Annual Meeting in his capacity as General Chairman, and the meeting then adjourned.

Minutes of Meeting of the Alexandria Section, Louisiana Engineering Society

The September meeting was held at Herbie K's Restaurant at 7:00 p.m. on September 26, 1957.

The meeting was called to order by President, Howard L'Heureux.

Mr. O. E. Barron moved that the reading of the minutes be dispensed with, seconded by Mr. L. J. Melancon and carried.

The need of and the possible formation of an Ethical Practice Committee for the improvement of ethics among the engineers of the section and the general betterment of the engineering profession was discussed. No action was taken.

Mr. O. E. Barron, Vice-Chairman of the State Section Coordination Committee, gave a report on the joint meting of the sections to be held in Alexandria on November 1st and 2nd. He received plans for the meeting and reported on his attendance at the September meeting of the L.E.S. Board of Directors and the favorable response to the proposed meeting.

A motion was made by Mr. J. B. Smith, seconded by Mr. Louis Daigre, the Alexandria Section underwrites the financial obligations that may be incurred by the November joint meeting. Motion approved.

There being no further business, the meeting then adjourned.

DALLAS C. ROBERTS, Secretary-Treasurer

Minutes of Meeting of the Alexandria Section, Louisiana Engineering Society

The November meeting was held at the Community Center at 7:00 P. M. November 20, 1957.

The meeting was called to order by President Howard L'Heureux.

Mr. Louis Daigre, Jr. made a motion that Mr. L. J. Melancon be congratulated on a splendid job done in making the Sectional Coordinating meeting a success. The motion was seconded by Mr. W. D. Roland.

Mr. L'Heureux announced the Legislation meeting to be held in Baton Rouge November 21 and urged that those interested be present.

The propsed revision to Louisiana Professional Engineer Law was explained by Mr J. B. Smith and discussed by the membership.

The entertainment committee was urged by the President to start making plans for the Christmas party.

The nominating committee recommended the following names be considered for office for the coming year: President—L. J. Melancon, Andrew Moore; Vice-President—Louis Daigre, Jr., Chas. R. Westerchil; Secretary-Treasurer—D. C. Roberts.

Motion made by Mr. W. D. Roland that those names recommended by the committee be placed on the ballot and a space for a write in candidate be left. The motion was seconded by Mr. O. E. Barron.

There being no further business the meeting was adjourned.

D. C. ROBERTS, Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society

Date: December 7, 1957; Time: 7:00 P. M.; Place: Continental Room, Bellemont Motor Hotel; Officers Present: Randall Meyer, President; W. L. Sutton, 1st Vice President; T. E. Alexander, 2nd Vice President; H. F. Leiendecker, Secretary-Treasurer.

A total of 141 members and guests met for the nineteenth annual meeting of the Baton Rouge Section. After a social hour and dinner, Mr. Meyer opened the business session by introducing several special guests. Those included Mrs. Floyd D. Richards, President of the Baton Rouge Women's Auxiliary; and H. L. Lehmann, Wayne P. Wallace, and W. S. Leake, Past Presidents of the Louisiana Engineering Society. Annual reports of the Section officers and committee chairmen then were presented, a special certificate of appreciation was awarded to Tom Alexander for his outstanding contribution to the Section as chairman of the Technical Papers Committee. Mr. Alexander sparked the October joint meeting of Baton Rouge scientific and technical societies, at which Mr. C. F. Kettering spoke. His committee for that event has developed plans for a permanent council of Baton Rouge technical societies.

The following officers were nominated and elected for the year 1958: President, W. L. Sutton; 1st Vice President, T. E. Alexander; 2nd Vice President, D. F. Latimer; Secretary-Treasurer, H. F. Leiendecker; Member-at-Large of Executive Committee (2 year term), F. J. Germano.

Mr. Jack S. Burk continues his term as Member-at-Large of the Executive Committee for another year. Past Presidents F. G. Hornsby and Randall Meyer will also serve as members of the Executive Committee, in accordance with Section By-Laws.

Following adjournment of the business meeting, Jimmy Varnado's orchestra provided music for dancing.

HAROLD F. LEIENDECKER, Secretary-Treasurer

Consulting Engineers

ADLOE ORR, JR. & ASSOCIATES

Consulting Engineers

315 St. Charles Ave. — New Orleans, U. S. A.

FROMHERZ ENGINEERS

Structural — Civil — Sanitary

Design, Supervision of Construction, Appraisals, Reports
Consultants for Plant Operation

816 Howard Avenue — New Orleans 12

DESIGN ENGINEERS ASSOCIATED

Formerly James M. Todd & Associates

Consulting Mechanical, Mining, & Electrical Engineers

311 Board of Trade Annex Bldg. — New Orleans 12, La.

ROESSLE AND GALLOWAY

Consulting Engineers

Municipal — Structural — Industrial

3213 Metairie Road

Phone VErnon 5-7155 — Metairie, La.

PALMER AND BAKER ENGINEERS, INC.

Consulting Engineers

Tunnels — Bridges — Highways — Airports — Industrial Buildings
Harbor Structures — Soils, Material and Chemical Laboratories

3004 Jefferson Highway
New Orleans 21, La.

P. O. Box 346
Mobile, Ala.

A. W. THOMPSON & ASSOCIATES

Consulting Civil Engineers

635 Commercial Place — New Orleans, La.

T. EDWARD ERNST, C. E.

Consulting Engineer

822 Perdido Street
New Orleans 12 — TUlane 1461

FREDERIC R. HARRIS, INC.

Consulting Engineers

Port Development :-: Foundations :-: Highway and Bridges
Marine Structures :-: Power Plants

1915 TULANE AVENUE — NEW ORLEANS, LA.

Minutes of Meeting of the Alexandria Section, Louisiana Engineering Society

The January meeting of the Alexandria Section of the Louisiana Engineering Society was held at the Alexandria Community Center at 7:00 p.m. with 12 members present.

The meeting was called to order by President Andrew Moore.

A report was given by the following committees:

Publicity Committee—Mr. E. Levy
Mr. Levy was commended on a splendid job done in 1957.

Engineering Week—Mr. L. J. Melancon
Mr. Melancon has received all material for the 1958 Engineering Week.

Membership—Mr. D. C. Roberts
On Roll for 1957—Members 55; Affiliate 8; Junior 6.

President Moore appointed Mr. L. J. Melancon as Chairman of the State Coordination Meeting to be held in March. Mr. O. E. Barron and Mr. C. R. Westerchill were asked to serve on this committee. Others to be appointed at a later date.

Each member present was given five members to contact for the purpose of correcting their mailing addresses.

Each one present was urged to contact the members on their list to inform them of the February meeting.

There being no further business the meeting was adjourned.

DALLAS C. ROBERTS, Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society

Date: January 16, 1958. Time: 7:30 p.m. Place: Agricultural Engineering Auditorium, Louisiana State University.

Officers present: W. L. Sutton, President; T. E. Alexander, 1st Vice-President; D. F. Latimer, 2nd Vice-President; H. F. Leiendecker, Secretary-Treasurer.

Mr. Donald E. Mullen, Sales Manager for nuclear ordnance projects, General Electric Company, spoke to a joint meeting of ASME and LES. His subject was "Guided Missles Are Smarter Than People." This timely and interesting topic provoked many questions and much discussion.

Mr. Herman Lehmann was presented with a certificate of Honorary Membership for his service to the Society in establishing State Sections.

Total attendance was 70. Refreshments were served before and after the meeting.

HAROLD F. LEIENDECKER, Secretary-Treasurer

THE LOUISIANA ENGINEER

FEBRUARY, 1958

"Patronize Our Advertisers"

INDEX TO ADVERTISERS

THE LOUISIANA ENGINEER

Vol. 44 APRIL, 1958 No. 2

CONTENTS

Cover illustration by Marcus Tully II, Art Director

THE LOUISIANA ENGINEER

APRIL 1958

"Patronize Our Advertisers"

INDEX TO ADVERTISERS

Underground Storage of Hydrocarbons

J. L. Nanney, Esso Standard Oil Company

Since 1859, when Edwin L. Drake drilled the world's first oil well at Titusville, Pennsylvania, people have heard a great deal about taking oil from the ground. Now they are beginning to hear more and more about a new procedure of the petroleum industry. We are putting it back again. Many companies throughout the country are using underground cavities for the storage of petroleum products. The type of underground storage facility used in each case is dependent on the geological formations in the area and on the type of product being stored.

In the eastern United States, abandoned mines and quarries are used. Elsewhere caverns have been excavated for storage of products. Here in Louisiana, as in Mississippi and east Texas, a number of salt domes have been used for that purpose.

This paper proposes to discuss briefly three general points which are:

1. Reasons for underground storage
2. Underground storage possibilities in Louisiana
3. Esso Standard Oil Company's storage project at Sorrento, Louisiana

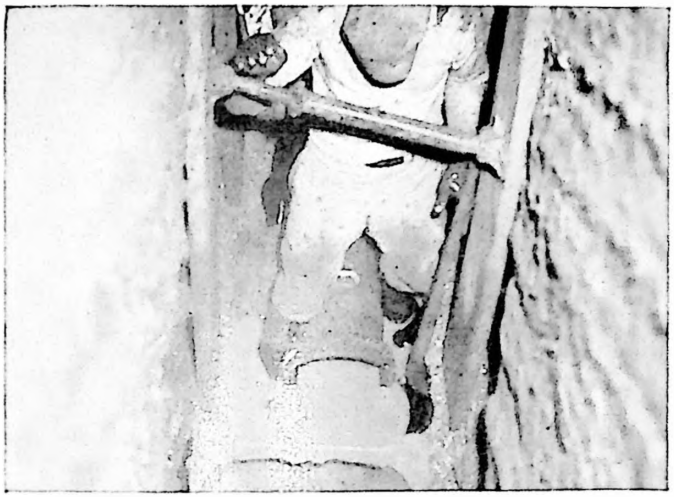
The primary reason for using underground storage is lower cost. Reports from companies who have used chambers dissolved in salt have indicated that it is a very economical method. Costs have been reported which range between $0.50 and $2.50 per barrel. By comparison, standard steel storage vessels such as spheres and spheroids vary in cost from $5 to $6 per barrel for some hydrocarbons to as much as $20 per barrel for propane spheres. Costs such as these show the real incentive for using underground storage where geological conditions are favorable and the necessary formations are readily accessible.

Louisiana has several possibilities for underground storage of hydrocarbons. In April, 1956, the Research and Coordinating Committee of the Interstate Oil Compact Commission published a report entitled "Underground Storage of Liquid Petroleum Hydrocarbons in the United States," in which were listed the possibilities of 42 of the 48 states. This report discussed three possibilities for Louisiana. These are caverns, closed geologic structures, and salt domes.

The first of these, caverns, is called a remote possibility. Although the state is underlaid in some areas by limestones, there are no known areas of cavernous limestone. There are some quarries or other excavations, but little information is available and, because of the nature of the limestone, a sealing agent would be required to make them usable.

The second, closed geologic structures, such as anticlines and fault blocks, offers greater promise but has several serious disadvantages. One company attempted to use a permeable sandstone near Benton, Louisiana, for the storage of liquified petroleum gas. The recovery from this sand was low and the LPG was contaminated to such a degree that reprocessing was required. That project was abandoned.

The really good possibilities in Louisiana are in its salt domes. The report mentioned earlier lists one hundred and ten known domes in the



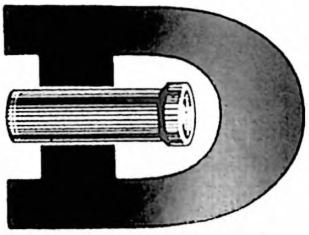
- *Flexible*
- *Permanent*
- *Watertight*
- *Easy to install*

Perfect joints in a wet trench with the new Dickey Coupling

With the new Dickey PVC* Coupling, you can make completely watertight joints—even under a foot of trench water. Pipe installation is faster and simpler. No mixing compounds are required —just a firm push of the spigot into the bell joins the two pipe sections and the joint remains flexible. Fused to the pipe at the factory, it comes to you ready to use. This new Dickey Coupling—a result of years of research by the Dickey Co.—is different from any other method of jointing pipe. When you specify the new Dickey Coupling on Dickey Salt-Glazed Vitrified Clay Sewer Pipe, you know your sewers will be watertight, acid-proof and root resistant.

*Polyvinyl chloride

Send today for free fact-filled Bulletin 718



Providing improved sanitation for better living

DICKEY sanitary salt-glazed clay pipe

W. S. DICKEY CLAY MFG. CO.

Birmingham, Ala. Chattanooga, Tenn. Kansas City, Mo. Meridian, Miss. St. Louis, Mo. San Antonio, Tex. Texarkana, Tex.-Ark.

e014 If it's made of clay it's good . . . if it's made by Dickey it's better

State. Ninety-nine of these are within the land area and eleven are in the offshore tidelands area. A salt dome is very well suited for the storage of petroleum products because salt forms a highly efficient seal for products. These products will not dissolve the salt nor will the salt contaminate the products.

Let us digress for a moment to discuss salt domes. What are they? How large are they? How are they formed? These domes are known to exist in many regions of the world: the most notable regions being Germany, Russia, Iran, and our own Gulf Coast. They are just what their name implies; huge mounds of rock salt. American domes are generally circular in plan and have diameters which range from ½ to 2 miles near the top. Some of the Russian domes on the northeast shore of the Caspian Sea have diameters up to 7½ miles. The sides of the domes dip downward at angles of 30° to 90°. The salt core of these domes is thousands of feet thick. Wells have been drilled more than 4,000 feet into the salt without finding bottom. To the best of my knowledge, no concrete evidence exists today of the true depth of the salt in any dome.

The generally accepted theory of the formation of salt domes is that they are the result of the plastic flow of a salt strata. At some period in geologic history, a bed of sedimentary salt was deposited which was subsequently buried deeper and deeper as other sediment was deposited above it. As the weight to the overlying strata increased, the enormous pressure caused the salt to move upward in a semi-plastic condition at the points of weakness. Thus, these huge mounds were formed.

These domes have been and are of enormous economic value. Petroleum is often trapped in the sedimentary beds which have been cut off by the upthrust of the salt mass. Large quantities of sulphur have been mined from the cap rock of some domes. Some of the domes are mined for the salt. And now, companies such as ours are using cavities formed in the salt for product storage.

It is in such a dome, located at Sorrento, Louisiana, that the Esso Standard Oil Company is now engaged in preparing five storage cavities. These cavities will be used for the storage of butane, propane, ethylene, and propylene.

The cavities are formed by leaching, or dissolving, the salt at the bottom of wells drilled into the salt dome. Two of the cavities will have a capacity of 150,000 barrels each, one will hold 200,000 barrels, and the remaining two will have capacities of 300,000 barrels each.

We had a threefold purpose in installing these new storage facilities: first, to allow us to meet efficiently the demands of the increasing number of chemical companies which use ethylene as a basic raw material; second, to provide storage for butane and propane during seasons of low demand; third, to provide storage for butane and propylene to be used in refinery operations.

Esso Standard Oil Company is not an oil producing company. Our business is refining and marketing. As a result, we had little knowledge of the dome formations of the State or of the methods and procedures involved in doing the drilling work associated with this project. Therefore, we sought the services and advice of consultants and others who have been

directly concerned with such work. From our own studies and the advice of these people, the decision was made to make our cavities in the salt dome at Sorrento. This dome is well suited to our needs. It is only 35 miles from the refinery and is, at our work site, 2 miles from the Airline Highway and the Kansas City Southern Railroad.

We then leased a 100-acre tract in the area of this dome. We, of course, tried to get a tract which would put us as near the top of the dome as possible in order to minimize the amount of drilling necessary. In addition to the five storage wells, our facilities at Sorrento consist of one brine disposal well and a brine storage pit which will hold 1,100,000 barrels of brine.

Our original plans included the construction of a spur track along the Kansas City Southern tracks with the necessary tank car unloading facilities. The product would then be piped from this facility to the wellhead. This portion of the project was later dropped when the Interstate Oil Pipeline Company agreed to install pipelines from Baton Rouge to Sorrento. They have installed two 4-inch lines, one 6-inch line, and one 8-inch line.

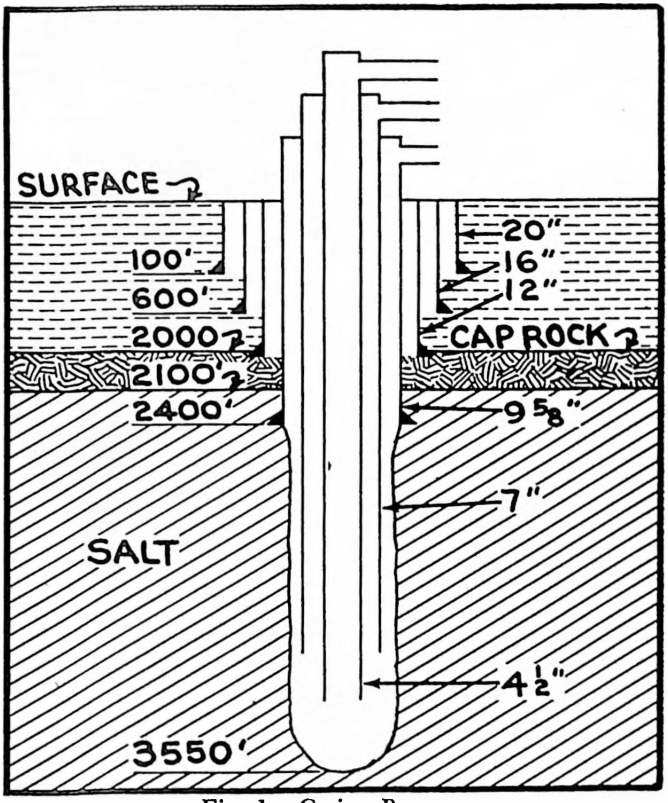


Fig. 1 — Casing Program

Figure No. 1 shows the casing program used on the storage wells. This is typical of all the wells, and the depths vary due to the contour of

the dome cap. The 20-inch surface casing was set and cemented at 100 feet. The next casing, a 16-inch, was set and cemented at 600 feet. This casing protects the fresh water sands encountered during the drilling. Because of circulation difficulties, we had to install a 12-inch casing which is cemented in the cap rock. This was followed by a 9⅝-inch casing which was set and cemented into the salt 300 feet below the cap rock. Next a 7-inch and a 4½-inch tubing string were placed. These strings are suspended from the top and are adjusted in length depending on the operation being performed.

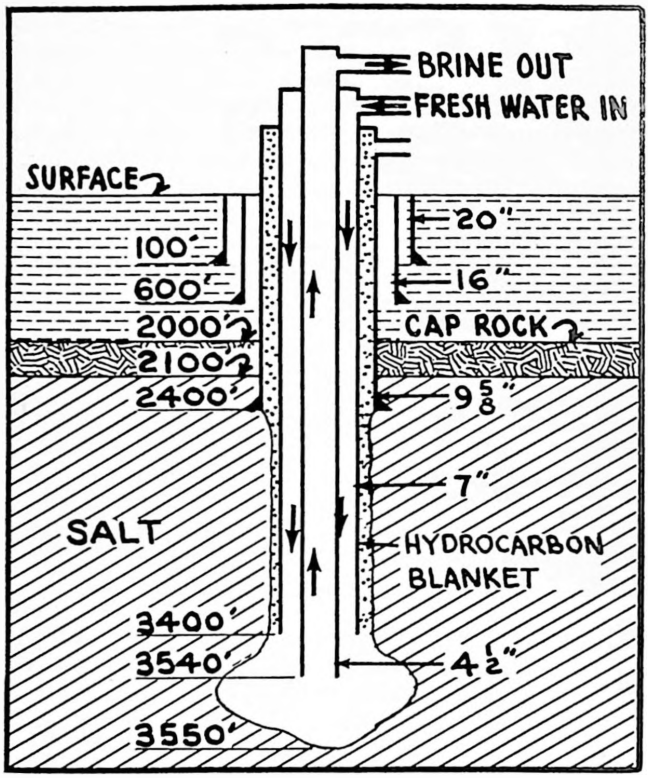


Fig. 2 — Development of Pocket

Figure No. 2 shows the positions of the tubing strings when leaching a pocket to contain the insolubles in the salt. During the drilling through the salt, cores were obtained and from them we estimated the amount of insolubles present and then planned to make a pocket at the base of the well to contain them. The 4½-inch string was hung about 10 feet above the bottom of the drilled hole and the 7-inch tubing was hung 140 feet higher. Fresh water was then pumped down through the annular space between

the 7-inch and 4½-inch tubing, and the brine was brought to the surface through the 4½-inch string. This gave, to some extent, a sweeping effect at the bottom of the hole and aided us in that some of the smaller particles were swept up and out through the 4½-inch. During this leaching, an oil blanket was introduced between the 9⅝-inch and the 7-inch strings for two reasons. Being lighter than the brine being formed, it could remain in place by floating on the brine and perform its primary function of protecting the cement sealing the 9⅝-inch casing to the salt. In addition, in this particular operation, by keeping the oil blanket near the bottom of the 7-inch string we could, in effect, control the area of leaching to give the desired type of pocket. During the leaching of this pocket and the storage cavity itself, the rate at which the leaching was progressing was determined by salinity tests on the brine effluent.

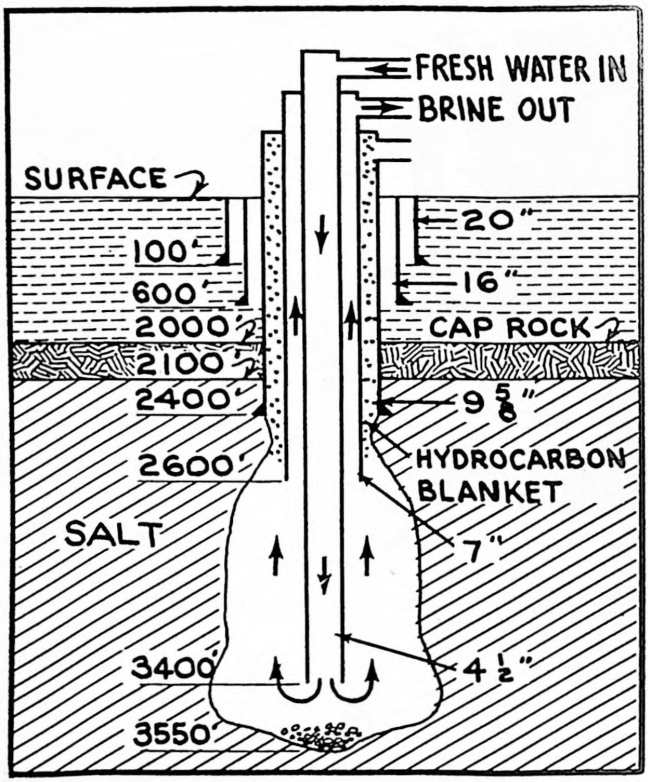


Fig. 3 — Leaching

Figure No. 3 demonstrates the method of leaching of the storage cavity. The 4½-inch string was raised to the 3400-foot elevation, and the 7½-inch tubing was set approximately 200 feet below the bottom of the 9⅝-inch casing, in this case at 2600 feet. With the start of the leaching, the oil

blanket was again established between the 9⅝-inch and the 7-inch to protect the seal. In this case, the circulation procedure differed from the pocket leaching in that the fresh water was introduced through the central tubing, and the brine was removed through the 7-inch annulus. The purpose here was again to give us some sort of control of the shape of the cavity being formed. The flow here was outward from the 4½-inch then up toward the 7-inch. This gave a shape roughly approximating a cone which is the shape most desired because it gives the strongest roof structure.

During the leaching process, one of our major problems was the disposal of the brine being formed. As mentioned earlier, our facilities included a brine storage pit which would hold 1,100,000 barrels of brine. However, this amount is equal to the total capacity of the five cavities and is kept to replace the hydrocarbon when we are removing it from the well. Thus, we had the problem of disposing of several million barrels of brine. We were fortunate in that there was a salt water sand above the cap rock of this dome into which we could inject the brine. We, therefore, drilled a sixth well for this purpose. Information available on this sand had indicated that it would take the required brine flow with no difficulty. We found that this was not the case. We were able to inject the brine only after installing pumps which would provide 600 psi pressure.

The second major problem faced during the leaching was gas. Immediately after the beginning of leaching in the first well, we noticed that gas was being returned with the brine. Obviously, our first thoughts were that we might have tapped some outside source of gas which could later provide an escape route for our product; or, if the gas were continually released into the cavity, it could contaminate the stored material. However, as we continued the leaching operation, the following facts were brought out:

1. Gas was found in all wells.
2. The composition of the gas varied radically from well to well.
3. The composition of the gas from any single well varied considerably during the progress of the leaching.
4. The volume of gas produced varied from well to well during equivalent stages of leaching and also varied from time to time for each well but always roughly in proportion to the salinity of the brine produced.
5. Although gas was produced in every well, it only replaced the oil blanket in one well.
6. In one case, no gas appeared while circulating brine as a drilling fluid, but began as soon as fresh water was circulated.

From these facts, it was concluded that the gas was not coming from an outside source but was gas trapped in interstices between crystals in the salt body. At the temperatures and pressures existing in the cavities (120° and 140°F. and 1400 to 2000 psi), the quantity of gas released was such that it was taken into solution in the brine. In one well, the amount was too great and the oil blanket was displaced. In every case, the gas was released from solution at atmospheric temperature and pressure.

The presence of the gas in the brine contributed to one of our more spectacular moments during the construction. While leaching the second

well and when at a stage at which the salinity of the brine was quite high with its corresponding high degree of dissolved gas, a ¾-inch nipple on the 9⅝-inch annulus was accidentally hit by another piece of pipe and was broken off. With this sudden release in pressure, the well "blew." The gas being released from the brine blew all of the oil out of the annulus and then continued to blow, bringing out some brine with it.

Attempts were then made to seal the well to stop the blowing action, and it was finally accomplished by using golf balls. On the side of the 9⅝-inch casing opposite the broken nipple was a 3-inch connection with a valve. Three golf balls, trimmed down to remove the dimples, were placed against the valve disc and then a short section of pipe was bolted to the valve. When the pressure in this short section was raised to a level higher than that in the casing, the valve was opened and the balls were forced into the annulus. The blast stream on the other side caught one of them and forced it into the break where it formed a seal which was effective enough to allow repair of the nipple.

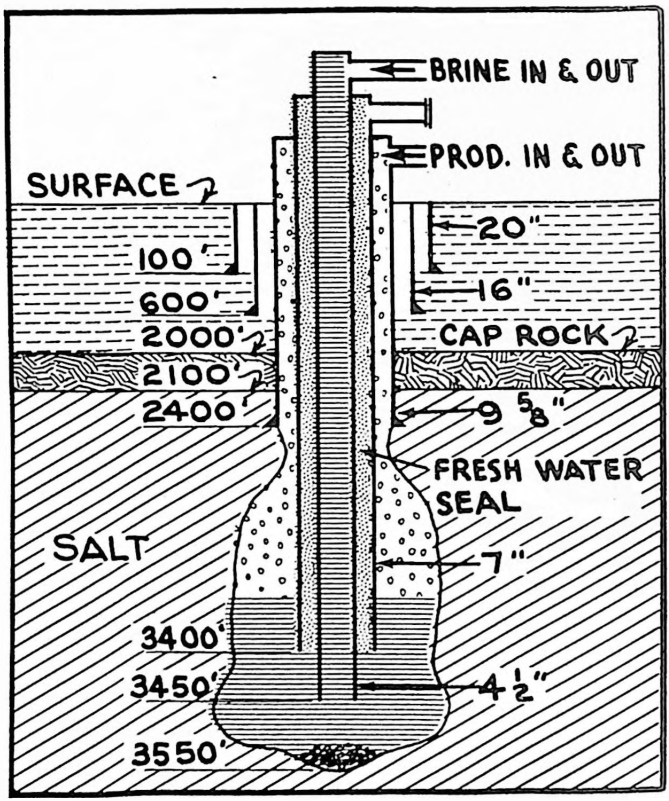


Fig. 4 — Operation

Figure No. 4 shows the operation of a typical well. The well when not in use would be completely filled with brine. The product being stored

is pumped into the cavity through the 9⅝-inch annulus. As it is pumped in, it forces the brine level in the cavity down, and the brine escapes through the 4½-inch tube to the brine storage pit.

The brine after being in the cavity for some time is, of course, saturated and, as mentioned earlier, is at a temperature of approximately 140°F. As it rises through the tubing, it is cooled slightly; therefore, to guard against its coming out of solution and plugging the 4½-inch tubing, a small tube is

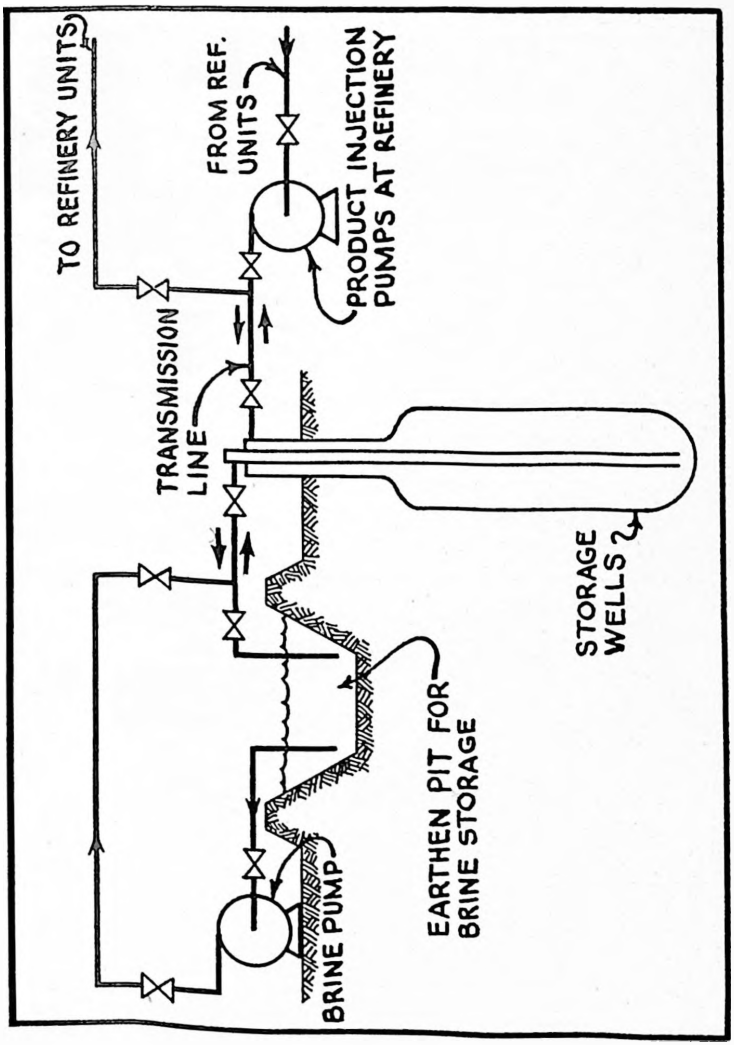


Fig. 5 – Flow Diagram

installed inside the 4½-inch to allow us to inject small quantities of fresh water at the 550-foot level.

During operational phases, the annular space between the 7-inch and 4½-inch tubing strings is filled with either fresh water or brine, and this provides us with a means of having a warning against overfilling. When fresh water fills the annular space, it will, due to the difference in density, float on the brine. Therefore, at the top of the 7-inch tubing a pressure gauge will indicate a pressure which represents the differential between the column of brine and the column of fresh water. If the product is injected to such an extent that it forces the brine below the bottom of the 7-inch tubing, the hydrocarbon, being lighter yet, begins to displace the fresh water. Because of the decrease in density in the annular space, the pressure gauge at the top begins to show an increase which automatically closes the valve on the inlet.

A very simple flow diagram of the system is shown in Figure No. 5. Pumps located at the Baton Rouge Refinery move the product through the 35 miles of pipeline and into the cavity. The brine is forced out into the brine storage pit. To remove the product, the valve on the inlet line is opened and the material is forced out by the pressure exerted by the column of brine. The brine is siphoned from the storage pit.

At the present time, two of the wells are in service. Products started into the first well late in August and into the second during October. The in-service dates for the remaining three are November, January, and February.

Engineering Briefs

"Non-burning" Fuels—Three suggestions for a nonflammable fuel that would save lives in transportation accidents and home fires have been made by Chemical Week Magazine. The proposed fuels include one in the form of two inert fluids that would ignite only when combined inside a combustion chamber, another with a flame-inhibiting additive that would be eliminated under engine operating conditions, and one with a compound flammable only in the presence of both heat and a catalyst. *—Chemical Week*

Gold Measures River Flow—Radioactive gold is being used to test the volume of water flow in a fast-moving stream. Radioactive gold particles are dropped into the water, then, about a mile downstream, radiation from the passing gold is measured with a Geiger counter. Calculations disclose how many cubic feet of water per second move past the point of measurement. The test, which used to require several days with conventional apparatus, takes less than two hours. *—Electronics*

Sweet Smelling Exhaust—From fume to perfume, that's the story of the Edmonton, Alta., Transit System's diesel buses. A new fuel now contains 0.02 per cent of perfume to sweeten exhaust odors. *—Chemical Engineering*

Weapon for Cancer Battle—A pulsating x-ray machine has been devised to aid in the fight against cancer. Regular x-rays sometimes harm normal cell tissue in the attempt to destroy cancerous cells. The pulsed x-ray is being studied to determine a pattern frequency that will be most destructive to cancer cells and least destructive to normal cells. *—Electronics*

Vodka from Pears—Oregon pear growers are washing their biggest headache away with vodka. Vodka is now being produced from 32,000 tons of combined waste pear products, thus eliminating the expense of cull pear disposal. Distillers are producing 2,000 to 3,000 gallons of vodka every 24 hours. *—Food Engineering*

European Technical Digests—The best articles from European technical and industrial journals, translated and digested, are now available monthly to American industry. The Organization for European Economic Cooperation, a multi-government agency set up to stimulate economic growth of member-nations, will distribute "Technical Digests," designed primarily for those interested in manufacturing and production. These digests will cover almost all fields of industrial interest.

Many of the articles in the periodical, which averages 140 illustrated pages, discuss new products and processes developed by European manufacturers. It contains only the most effective articles gleaned by specialists from over 1000 European periodicals.

Subscriptions are handled by the O.E.E.C. Mission Publications Office 2000 P. St., N. W., Washington 6, D. C. The rates are $24.00 a year or $2.50 per single issue. *—Research and Engineering*

The Perspective of Computers In Engineering

T. W. Helweg

Mr. T. W. Helweg, author of this paper who served as Chief Engineer for Remington Rand computer installations before becoming Regional Manager, Remington Rand UNIVAC, Division of Sperry Rand Corporation, Dallas, Texas. This address was given at the 1958 annual meeting.

Engineering as a profession has always given participants a solid sense of accomplishment and pride. This security undoubtedly stems from the fact that engineering is the application of basic facts. As engineers develop and mature, they realize that they have definite responsibilities to society as regards qualifications and proficiency. The Louisiana Engineering Society is an outward manifestation of the acceptance of this responsibility.

The professional engineer must also justify his existence economically. The measure of his success is often the completion of a particular project with a reasonable profit margin. Many times his contribution is not nearly so distnict, but without a doubt, it exists in every instance. Through his positive contributions, the standard of living for all is raised. There is not any room for non-producers within this profession.

Realizing responsibilities is not enough unless they signal or trigger plans for action. Combining professional competence and economic limitations within a competitive structure such as our capitalistic system, is indeed a challenge worthy of consideration. The more obvious areas involve the maximum use of personnel. Great steps have been taken towards fitting the proper people in the proper positions; conducting training so as to orient the thinking of the staff so that each contribution might be significant. Another obvious item would be the utilization of available equipment in a most expedient manner. Again this could involve a training program, but it would also necessitate an understanding of the equipment capability and the operation.

Computers might be considered as a weapon, forged to meet the challenge flung forth to every engineer. Its contribution will be significant, if not revolutionary. It is important that the computer be considered a weapon or a tool and not an end in itself. As we explore its place in the engineering field, in effect, we are attempting to establish the perspective of computers in engineering.

There have been numerous articles written concerning computers and their application. Too often, they are referred to as "giant brains," "electronic wizards" and other such awe inspiring, Hollywood-type descriptions. This attaches a veil of mystery to their functional purpose and often clogs the vision of engineers investigating them for their companies. Heaped on

Today

NEW ORLEANS—THE PORT CITY

is also...

NEW ORLEANS—THE PLANT CITY

Actually, port commerce is one of the reasons for the influx of many industries to this area. For to New Orleans' wharves come the multitude of raw materials needed by a wide variety of plants. The very waters that bear that port traffic supply industry abundantly with fresh water for manufacturing purposes.

There are other factors for the city's distinction as a plant city. The people here are friendly and willing, cooperative workers. Nearby resources like natural gas, sulphur, salt, petroleum and timber plus low cost electric power amply supply many kinds of industries.

Every form of transportation serves the city — ocean, inland waterway, rail, air, highway. Facilities are interconnected, efficient; rates are low.

New Orleans offers you even more.

It has the mild, pleasant climate you need for year 'round high production. If you decide to go into foreign markets, at your service are the usual trade aids *plus* these unique ones: International House, International Trade Mart, Foreign Trade Zone.

Yes, as a plant city New Orleans is well worth your investigating. Write and we'll gladly send you your copy of "These Industries Chose the New Orleans Area." And to make your investigation of a New Orleans location easier, we invite you to call on our experienced Industrial Development Staff, New Orleans Public Service Inc., 317 Baronne Street. Valuable staff assistance comes to you as a confidential cost-free service. Contact us today for the full plant-profit story.

NEW ORLEANS Public Service INC.

top of this, of course, are the claims and counter-claims of the various computer manufacturers. Certainly it is not hard to understand how confusion could result, and on the pinnacle of the entire heap, there is a persistent nasty rumor that circulates to the effect that this gear will eventually replace all engineers.

To effectively appreciate equipment, or any new subject matter, it is highly desirable to relate it to something we already know and build from that point. Inasmuch as we are exploring the situation together, an excellent avenue of approach could be disassembly. This standard engineering procedure has enjoyed wide popularity, even though the reverse process has often caused considerable consternation. To eliminate the difficulties encountered by our three blind friends examining the elephant, visual material will be presented concurrent with the following descriptions.

Man has always strived to record events as time memorial. Undoubtedly as barter was replaced by coin, it became imperative to develop a record keeping system and eventually some data processing techniques. Of course, the Chinese had their Abacus, but the first mechanical calculating machine was Babbage's which was invented in England. Through the 1800's, we find the adding machine, cash register and punched cards putting in their appearance. These mechanical devices were improved as time advanced. The first so-called computers made their appearance in the '30's and utilized relays. World War II supplied the necessary stimulus for the development of ENIAC, which was the forerunner of UNIVAC, and today we find that the offspring of these massive computers have established themselves as the outstanding mathematical tools of the century.

Computers can be divided into two broad categories; analog and digital. The analog, of course, depends upon the physical movements or measurements of some measurable media for its results. There are both electrical and mechanical analog computers. The electrical utilizes the measurement of electrical current or resistance, and in the mechanical category we find our very familiar slide rule.

On the other side of the picture, we have digital computers in which all of the problems and values are represented mathematically. Everything is represented by a series of significant digits. Digital computers also can be either mechanical or electrical; the most familiar mechanical ones being the desk calculators, while in the electrical line, we find the relay type computers and the electronic equipment which we are exploring today.

The binary method of notation is extremely important and significant in the logic of electronic computers. All of our lives we have been dealing with the decimal system which utilizes 10 digits 0-9 to represent all numbers. In the binary system only a 0 (zero) or 1 (one) is used to represent all numbers. The first question is always, "Why change?"

The important significance of a binary notation is that it takes advantage of the electronic building blocks. A light is either on or off; a voltage is either plus or minus; a core is magnitized north or south. A signal is either there or it is not there. A tube is either conducting or not conducting and this binary function can be interpreted as numbers. The physical, or more properly electronic, state of the logical building blocks then have mathematical significance and are available for manipulation.

All electronic digital computers contain five main elements. These are: memory, arithmetic units, control units, input-output equipment, and power supplies. Each has a unique function and inter-relationship with the computer as a whole.

The memory units can be thought of as pigeon holes in a desk. Each pigeon hole will have a unique address very similar to your own street address. A term quite common in the computer field is word length, and essentially this refers to the depth of the pigeon hole. The particular computer that we have decided to disect today is the UNIVAC Scientific, which is widely used in the solution of engineering problems. It has pigeon holes that are 36 digits deep. The particular machine that we are examining today has three separate types of memory or pigeon holes.

High speed memory is composed of magnetic core storage. Taking advantage of the binary notation and logic, we magnetize a core, either north or south. If it is nouth, we consider it a (one) and if it is south, we consider it a (zero). The size of these cores approximates a small "o" on a typewriter. In our particular example, each matrix contains 4,096 cores. They are referenced in a manner similar to locating yourself on a roadmap, as you would find L-5 on the two axes of a map you could also pass a half-current pulse through the L axes on the matrix and a half-current pulse through the 5 axes on the matrix, and obviously only one core will receive a full current pulse, which is sufficient to swing the core through the hysteresis loop and magnetize it in the opposite direction by stacking the matrices in a pile 36 plates high and referencing all 36 of the L-5's simultaneously. The stack of 36 plates represents the depth of the pigeon holes.

Another type of memory or pigeon hole is the magnetic drum. It has a slower access speed; in other words, it takes a little longer to obtain the information, but it has a very large capacity and is more economical. The UNIVAC Scientific drum contains 16,384 36-digit words. Any drum, of course, has a variable access time because the particular information that you desire may have just passed the reading heads, and a full revolution must take place before it is available for interrogation. Information is stored on the drum by magnetizing the drum surface, again either north or south, and the binary notation becomes mathematically significant.

The final memory source available is the magnetic tape units. Magnetic tape is characterized by its extremely large capacity, 384,000 words, but somewhat slower access time. Obviously, a tape must be unwound to reach information stored in the center of the reel. Information is packed on this tape at a density of 128 lines per inch, and each line contains 6 bits or six binary digits of information. It passes the reading head at 100 inches per second. Magnetic tape also serves as an input-output function which will be described later.

The arithmetic unit contains the circuitry necessary to perform all of the operations required, such as adding, subtracting, multiplying or dividing, plus many logical operations which are useful. It is possible to mask out certain portions for interrogation and inspection. The entire arithmetic unit is electronic. There are not any gears or mechanical registers involved. The operations are performed at micro-second intervals and, of course, all of the operations are in binary. This particular machine adds and subtracts

all 36 digits of the number simultaneously, taking advantage of its parallel flow construction, which we encountered in the memory units.

Computers usually are of a serial or parallel flow circuitry. The serial flow can be likened to having 36 marbles in the pigeon hole and pouring them out one end one by one. The parallel flow can be thought of as having sealed the pigeon hole and carrying it intact with its 36 digits over to the arithmetic unit where two such slugs of information are merged and the answer carried in its sealed container and jammed back into place in the memory. Actually each digit follows its own path from the arithmetic unit into the memory. The parallel flow technique is sustained throughout the entire computer. It greatly increases the speed of the arithmetic operation and manipulation.

All computers have three major modes of operation. The cases are: the computer is speaking to the outside world, or the outside world is communicating with the computer, or the equipment is chewing on a computation by itself. Within the first two cases are found the input-output equipment. There are numerous input-output devices. The UNIVAC Scientific has four distinct output methods and three input modes. This gives the equipment the flexibility required to integrate it into an office or industrial application.

The other purpose for magnetic tape, other than storage, is as an input-output media. Raw data or programs can be entered directly onto the tape and fed into the computer at tape speeds. Tape speed is equivalent to a rate of 150 punched cards per second. Information can also be obtained from the computer and placed upon magnetic tape.

Peripheral devices have been developed to take this output information and print it at the rate of 600 lines per minute, or transmit it over standard teletype circuits to another location for printout there.

Standard punched card input-output is also available. By utilizing the binary notation, considerably more information can be packed on any one card. These are processed at the rate of 120 cards per minute.

This computer also has paper tape input-output capability. This is standard teletype tape and is an extremely useful feature when field reports and data must be transmitted for insertion into the computer and answers prepared for distribution. The paper tape reader can read 12,000 characters per second and the output is a standard teletype machine of 60 lines per minute.

A monitoring typewriter is available to interrogate various areas in storage for an inspection of the status of the program or answers up to that point. It is also used as a signal to indicate the progress of the long program by typing out headings of each particular phase, as it is initiated.

There are visual indications on the panel regarding the operation, and small bits of information can be manually inserted upon occasion.

The power supplies are furnished with the equipment. They furnish and supply the muscle for this tremendous array of electronic equipment. This particular computer, the UNIVAC Scientific, also has the standard air-conditioning equipment integrated as part of the mechanism, eliminating the need for special housing and installation arrangements.

Having reviewed the hardware as such, one is in a position to appre-

CYPRESS PUBLISHING COMPANY

New Orleans, La.

Dear LES Members:

In this, the first issue of the **Louisiana Engineer** published by our organization, we of Cypress Publishing Company wish to convey our sincerest thanks to you for the splendid response received in answer to our request for advertising leads. The large number of replies received is indicative of the spirit and cooperation of the membership of the Society.

In our initial issue we have instituted only minor changes. Our advertising has and will continue to expand until not only local manufacturers and individuals are included, but a number of national concerns will be represented. Consequently, in circulating our magazine to these advertisers and out-of-state individuals, we hope to be able to present a true picture of the tremendous advances being made in the field of engineering by you, the Louisiana Engineers. If we can, in some small way, be responsible for interesting a major concern in locating its offices, or a branch office, in the state of Louisiana, and thereby furthering the interests of the membership of the Society, we shall feel that we are serving you well.

Should you have, at any time, suggestions to make to the publishing company regarding policy, editorial or advertising matter, please feel free to contact us directly. And if, in the course of your labors, you happen across an interested potential advertiser, we would appreciate your cooperation in furnishing his name and address.

We thank you, the members and the officers of the Louisiana Society of Engineers, for your display of confidence in our company. We shall do our very best to bring you an attractive publication, one you may be proud to show, containing news you want to know, available to you every other month.

Yours very truly,

THE PUBLISHER

ciate the computer capability. Throughout the discussion, it was obvious that operations were carried on at a tremendously high speed. In computing, everything is referenced in terms of micro-seconds. A micro-second, of course, is one millionth of a second. Undoubtedly, at some time or another, you have observed, or experienced a foreign bit of matter flying into your eye. The involuntary closure of the eyelid takes approximately 250,000 micro-seconds. When you consider that the addition of two 36 digit numbers takes 100 odd micro-seconds, multiplication or division, a few hundred more, and you keep whittling down the pile of 1,000,000 micro-seconds and finally use it up, look at your watch! You have used one second!

This speed can be expressed another way. The same metrological problem that would require 8 years for one person to complete on a hand calculating machine, could be completed by a large scale computer in only 25 minutes. The economic evaluation of this comparison can be constructed considering the mathematician's time with his calculator as compared to the six weeks of programming necessary to develop the computer program.

The man's pay, for six weeks, plus the cost of the computer for 25 minutes would run approximately $900.00. The man's pay, for one year, times the 8 years it would take to do the problem by hand, would run close to $60,000.00. There is a general tendency, that as long as a man is busy, he is producing. I think this dramatizes the fact that although the man's time would have been justifiably spent for 8 years, and you could afford the salary, it is doubtful whether or not you could afford the 8 years. Also, a man working on a problem for 8 years is bound to make an error. If this is an interative problem, he will be in serious trouble.

These tremendous speeds are possible with no sacrifice. On electronic digital equipment, it is possible to extend the number of significant digits, so-called decimal places, by programming techniques. On the later model computers, a floating point feature is available, which automatically saves the significant digits in large scale calculations.

The feature that has contributed most to the "giant brain" stories surrounding computing equipment, has been the decision making capacity of the gear. The computer is able to determine in an instant whether one number is larger than another, whether a number is positive or negative, whether a number is equal to another number or if in a summation process the result has not exceeded a certain figure. Depending upon particular operational requirement, the computer may alter its course of action in response to these indications. This decision making capacity is consistent with the binary "Yes," "No," "Off" logical construction of the computer.

As a practical example it is a simple matter for the computer to scan a payroll and deduct a 2% tax for Social Security from all personnel whose wage exceeds $4,000 per year. It will discover those above $4,000, multiply by the 2%, deduct that from their particular weekly wage, and actually print out the correct amount of the check.

If, however, the computer were to be asked to give a 5% increase to all personnel doing a good job, you would find the equipment completely helpless. There is a precise difference between decision making capability and judgment. Electronic digital computers have zero capacity for judgement, and they are unable to render opinions.

As we pass from the operational capabilities of the equipment, the next important step is utilization. Generally, any engineering problem that can be defined can be placed on a computer. Once defined it must be expressed mathematically. The conversion from a mathematical formula to computer language is relatively simple, but time consuming. In our programming training course, we have a problem that takes students approximately a week and a half to program and it runs on the computer in seven seconds.

This is certainly an area that deserves consideration. A great deal of progress has been made in the direction of the almost self programming computer. These efforts have been rewarding in really important savings of skilled manpower. A collection or library of programs or routines, by means of which many standard frequently used mathematical problems may be solved have been built up by our applications groups and customer's staffs.

A near automatic programming device called "compiling routines," enables a computer to select programs out of its library and string them together to assemble a special routine for the solution of a given problem. For example, the techniques of square root manipulation, the sine and consines, arc tangents, matrix inversion, and many other standard mathematical processes are available in the libraries. For the solution of engineering problems, two or more of these are usually needed to solve the problems. Obviously, it is very difficult to insert them in the proper memory locations and in the proper sequence without confusion. It is for this purpose that compilers have been developed. The time for a computer to assemble a compiling routine program is about one and one half minutes, whereas the corresponding time for a human programmer is about 16 hours.

Automatic programming techniques as such, are devices which enable the engineer to speak to the computer in a language with which he is familiar, namely the alpha-numeric mathematic equations. By expressing his problem in equation form and directly inserting it into the computer he is freed from the burdensome task of converting his language to computer language. In the reverse sense, the computer will reinterpret the answer and submit it to the engineer, again in his familiar equation unit form. We are quite proud to say that Remington Rand has a significant leadership in this particular field.

Quite often, however, the problems encountered are not always so definite, and we approach a most interesting field which has many names, ranging from Operations Research, Management Control, Office Automation to Electronic Horsesense. What this really means is that when one understands the capabilities and limitations of computing equipment, they can inject judgment factors of their own based on their background and experience. The inter-relationship of many variables involved in any management decision is quite often a guesswork proposition. Just how far the effect of any one factor will influence the outcome as a whole, is a very nebulous question.

The construction industry has always considered the cut and fill operation as one of the most expensive of all jobs peculiar to road building. It requires earth moving equipment and highly paid labor. Peaks along the

projected route must be cut down and valleys filled in order to satisfy slope specifications. When cut material is not the sort or amount for fill, then fill material must be brought in at high rates. Perhaps soft spots must be dug out and replaced by gravel, or piles must be driven to support the road. These and dozens of other considerations cover cost figures for cutting and filling.

Depending on the objectives of the particular case, the cut and fill operation may or may not be considered a major area for management decision. Not only will it determine how the operation will be done, but it enters into the selection of alternate routes.

Another area of consternation in the construction business is that of scheduling workloads. Roadbuilders, as well as other fabricators, must take into account certain technological orderings of the job to be performed. Certain jobs have fixed starting and finishing times and alternate ways of performing the job. This last situation gives rise to different job performance times and cost rates. Construction schedules may differ depending upon whether a job consists of building a new road, or repairing an old one. Also of prime importance is the availability of men and materials. Finally, if a number of jobs, whose inter-relations are complex make up the project, the task of setting up efficient schedules becomes quite difficult.

During the course of the projects, successive scheduling problems arise. Initially, a suitable schedule must be prepared. As jobs proceed, delays and shortages of men and materials, require revision of the schedule in order to meet the situation most efficiently. It is desirable to have a neat way of determining how other jobs are affected by delay in one job and how these job delays affect completion dates of certain projects. Deadlines must be met and penalties accompany delays. Road builders need to know the best course of action.

Computer technology attacks this problem with a mathematical model approach. The inter-relationship between variables can be determined by the use of multiple-correlation and regression routines now available. The solution of simultaneous linear equations has been sophisticated and proven. By inserting the numerical data peculiar to this problem, we essentially construct a mathematical model. Now a blending of judgment and experience is woven into this model. Our mathematical techniques have shown the relationships between the standard variables, but by judgment, we vary factors involved and determine the range of their effect. The probability of occurrences and the assessment of working conditions are all judgment considerations developed by experience that must be blended into the mathematical model before a final decision is reached. However, it is clear that many choices have been avoided and are not even being considered.

Sputnik has certainly provided the stimulus for an accelerated missile program. The performance criteria of the rockets has been steadily upgraded and modified. It would be impossible, both from a time, as well as from an economical standpoint to build and qualify all of the proposed configurations. By selecting the most desired characteristics and transforming them into mathematical expressions and subsequently, a mathematical model, our manufacturers are in a position to test fly their proposed missile

on a computer before spending any time or money building it. On the basis of these exhaustive and comprehensive calculations or test flights, so to speak, the most promising designs are placed in production, and physical models constructed for tests. In this manner, the overall program forges ahead swiftly yet thoroughly.

The actual flight of the selected physical models are closely monitored and recorded. The data secured is correlated and deviations from the theoretical test flights evaluated. It would be safe to say that the field of missile development would be crippled if not completely stopped if it were not for the availability of this giant mathematical machine, called electronic computer.

In the petroleum industry we find that by applying linear programming techniques the complex considerations involving pipeline distribution coupled with take or pay contracts from the various fields is handled much more efficiently. At the Remington Rand Service Center in Dallas, there is a linear programming routine that can consider 268 variables with 106 restraints.

Restraints, of course, are limitations upon the model. Obviously, cost cannot be negative. If you are considering storage of fluids or gases, there is a limitation as to the number of tanks available. Naturally, flows are inter-directional. These and other limitations, form what the mathematician classifies as restraints. Linear programming techniques form the base of the majority of operations Research Techniques and are suitable for any engineering problem or field.

After reviewing the hardware, its capability, and its utilization, it is a simple step to reach some realistic, positive conclusions. First, the computer will definitely extend research horizons, handling information and data heretofore considered too massive or complicated to consider. Not only will it process this information, but it will also have it available in a very short time. The results will be current, applicable to today's decision and tomorrow's planning.

Secondly, by acquainting our engineers with this equipment, we can extend the capability of our present staffs. It will do a great deal towards alleviating the shortage of well qualified people. The ultimate aim and purpose of our training would be to blend well qualified backgrounds of our senior engineers with the advanced techniques of computation and create a fertile soil in which our new engineers and embryo students can grow. The computer technology will be a common denominator in the entire engineering profession. Finally, we must recognize the engineer's place in this picture, or his perspective, if you so choose. The engineer occupies essentially the same position as he ever has. This machine does not lesson his responsibilities; it does not release him from his obligations, of well qualified professional integrity. In fact, it increases his load, because it demands that he acquire this equipment as a tool. With it and his inherent motivations, of which we are so proud in this country, we will be accepting the challenge of leadership and be capable of executing it. Therefore, our engineers of today, both junior and senior must consider this digital computer as their electronic slide rules. Explore it! Exploit it! Experience it! It's yours for the asking!

Working For Firms Overseas Is Not Always An Exotic Job

Working in an office overlooking the Rue de la Paix, the Ginza or Picadilly Circus may sound exotic, but there are often more drawbacks than enticements in these jobs. In a special report, Product Engineering, McGraw-Hill publication, gives a country-by-country analysis of the opportunities and conditions that will be met by engineers who want to work abroad.

Australia has a strong demand for engineers not over 45, but salaries are low. Wages of $100 a week are on the high side. Specialized engineers can command more. Food, accommodations and entertainment are cheaper than in the U. S. Cars, appliances and other durables are substantially more expensive.

Argentina mainly looks for the product engineer, with experts in industrial organization, refining, electronics and steel furnaces next in demand. Most Argentine firms prefer a European engineer because he is easily satisfied with living conditions. Salaries range from $110 a month for a young Argentine to $1,000 a month for a top-notch imported engineer.

Brazil needs specialists in all phases of mechanical, electrical, chemical, atomic and plastic engineering. Only civil engineers are not short in supply. Salaries are considered high, but inflation makes savings hard. If an American wants to be a "registered engineer," and many companies insist upon it, he must pass an examination in Portuguese.

England: The status enjoyed by the engineer in Britain is slightly lower than in the U. S. A graduate engineer can expect to start at between $1,500 and $2,100. With ten years' experience he will get $4,400. The ceiling is around $15,000 for a technical director. As a result of this poor salary and status picture, an American production engineer can get a job in almost any English factory.

France has an engineering shortage, but it is not easy for an American to get a job. American firms operating in France must show a ratio of nine Frenchmen for every American employed. Best opportunities lie in the mechanical field. Electronic, chemical and petroleum engineers are in slightly less demand, but the future is bright. Need for nuclear engineers will double in the next few years while the demand for chemical engineers will increase by 30 per cent. France's greatest need is for the technician. Average salary with an American company is high — $10,000 to $15,000 per year.

Germany has demand for both mechanical and electrical engineers. Any American engineer going to work in Germany will have to reduce his living standards. Cost of living is a good third cheaper than in the U. S. but average salaries range between $2,300 and $3,500 annually. The electronics industry pays higher.

India: Opportunities exist with American firms operating in India, government agencies needing consultants, and the large Indian engineering and chemical firms. Greatest demand is for mechanical, electrical and construction engineers. In general, the "less expensive and more adaptable" European engineers have been getting preference. An engineer can expect

TO ALL REGISTERED ENGINEERS IN LOUISIANA

LOUISIANA ENGINEERING SOCIETY
404 Baronne Street
New Orleans 12, Louisiana

April 1, 1958

Gentlemen:

With this issue many of you will receive "THE LOUISIANA ENGINEER," the official publication of the Louisiana Engineering Society for the first time. This journal customarily goes to members of the Society only but at a meeting of the Society's Board of Direction in January it was decided, in the interest of the profession, to send it to every registered engineer residing in Louisiana. The reasons for doing this were threefold.

The Louisiana Engineering Society founded in 1898 is the oldest and largest engineering society in the State, embracing all branches of the profession. It has for sixty years accomplished on a State level the unity of profession which the national societies are still seeking to accomplish on a national level. The Society has active groups and regular meetings in New Orleans, Baton Rouge, Alexandria, Shreveport, Monroe, Lafayette, and Lake Charles and thus effectively covers the entire State in one professional engineering organization. It was felt that every registered engineer should know of the Society and its activities.

The second reason for sending "The Louisiana Engineer" to every registered engineer resident in the State is to bring to the attention of these engineers the National Society of Professional Engineers. Our Society, after serious consideration and debate last year, voted overwhelmingly to affiliate with the National Society of Professional Engineers and was accepted by the N.S.P.E. at their spring meeting in Lansing, Michigan, in February. The qualification for membership in N.S.P.E. is that the applicant be a registered professional engineer and the organization should thus be of prime interest to every Louisiana registered engineer.

The third reason for sending "The Louisiana Engineer" to you is that this journal is published by and for professional engineers and reports statewide engineering activities. By receiving it, you will be informed on engineering news, events and official actions within the State.

Inside the back cover of "The Louisiana Engineer" you will find a post card addressed to Mr. John P. Fernandez, Secretary, 522 Crystal Street, New Orleans 24, Louisiana, with which you may obtain membership application forms for the Louisiana Engineering Society and the National Society of Professional Engineers. Send this in and contact Mr. Fernandez or Dr. Frank W. Macdonald, Chairman of the Membership Committee, at Tulane University if additional information is needed.

Yours very truly,

WALDEMAR S. NELSON
Chairman
Publications Committee

P. S. Your comments about this issue would be greatly appreciated – WSN

a salary of 30 to 50 per cent higher than for an equivalent job in the states. In addition, there are benefits which could include rent-free furnished home, entertainment allowance, car or car allowance, profit-sharing bonuses, and a paid home-leave for the family after two and a half years. American firms figure a minimum salary of $10,500 annually, Indian firms less.

Italy: Petroleum and mining engineers are most in demand, but employment possibilities do exist in the electrical, chemical, metallurgical and mechanical fields. The Italian engineer just out of school will get $250 to $300 per month, sufficient for comfortable middle-class living for a family of three. Salaries for the more experienced engineer are higher. Cost of living in Italy is about a quarter cheaper than in the states.

Japan: The three fields open to an engineer are road building, irrigation and electric power projects. Most American engineers are obtained under technical assistance agreements with U. S. firms, and usually get a living allowance in addition to their American salary. An independent engineer would have to bargain with the employer, who would probably pay an American salary, provided the engineer has more to offer than his Japanese counterpart. Otherwise his salary would be $100 a month. Cost of living is about the same as in the U. S.

Sweden at present has a pronounced shortage of design engineers, particularly in the machinery and electronic fields. The American engineer will get an average monthly salary of about $300 for routine design work and up to $600 for a design-management job. Taxes are high, but cost of living is about half that in the U. S.

—Special Report from McGraw-Hill Publishing Co.

CORRECTION:

In the biography of President E. M. Freeman in the February Issue the Editor stated that Mr. Freeman resides in Texas. This was an error. Mr. Freeman sustains his old family home there but is living at 3427 Youree Drive, Shreveport, La.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, Held at 1200 St. Charles Avenue, Monday, January 27, 1958

The meeting was called to order by President Freeman with Messrs. Janssen, Malahy, McLellan, Moore, Nelson, Scales, Sessums, Sutton and Fernandez present. Mr. L. J. Melancon also was present by invitation. Minutes of meetings of the board held on January 9 and 10 were read and approved.

Mr. Scales moved that the President be authorized to represent the society as its official delegate at the N.S.P.E. meeting to be held at East Lansing, Michigan, February 13-15, and that the secretary accompany him to assist in whatever manner possible. Motion seconded by Mr. Nelson and carried. Mr. Scales also moved that the president be authorized to appoint an alternate if necessary, seconded by Mr. McLellan and carried.

Mr. Sessums, Chairman of the Finance Committee, presented a budget for 1958, a copy of which is attached to these minutes, and moved that it be accepted. Motion seconded by Mr. Nelson and carried.

Discussion followed on the 1959 Annual Meeting and it was recommended that the committee for 1959 investigate the feasibility of eliminating the plant inspection trip on Friday afternoon and replace this time with the two technical papers usually held on Saturday morning, thereby avoiding the presentation of any technical papers on Saturday morning. Mr. Nelson moved that, subject to availability of hotel accommodations, the annual meeting be held on January 15-16-17, 1959. Motion seconded by Mr. McLellan and carried.

Mr. Sessums moved that the various committees for the 1959 meeting be instructed to submit a budget of their anticipated expenditures, seconded by Mr. Malahy and carried.

The secretary read a letter from Mr. H. L. Lehmann thanking the board for the honorary membership recently bestowed upon him.

A letter from Mr. Farrell W. Adams, President of the Monroe Section, concerning registration of the society's officers and members with the Louisiana Secretary of State, and the secretary's consequent letter to Hon. Wade O. Martin, Jr., Secretary of State, and his reply to same, were read.

A letter from Professor Harold Skamser, Director of the JET Prorgram, Michigan State University, advising that the second Istrouma High School Jet Club had been officially recognized, was read.

Discussion followed on the coming State Planning Conference and Messrs. Melancon and Moore advised that the conference would be held in Alexandria on March 22, and that the tentative schedule would be as follows: Registration, 8:30 Saturday morning, workshop sessions later in the morning, lunch, general afternoon meeting, and possibly some entertainment for the evening. The subject of the Tour Speaker was discussed and it was the consensus of opinion among those present that the committee in charge had contacted a sufficient number of the sections to insure success of the tour and that New Orleans would not be included.

Mr. Nelson moved that Mr. James J. VanHoof be dropped from the rolls in accordance with his own request, seconded by Mr. Sutton and carried.

Upon the recommendation of the board, President Freeman appointed the following chairmen and vice-chairmen to serve on standing committees for 1958:

Statewide Committees

Section Coordination: Otha E. Barron, Chairman, Wiley D. Poole, Vice-Chairman; **Professional, Civic and Industrial Affairs:** Arthur J. Naquin, Chairman, B. M. Dornblatt, Vice-Chairman; **Legislative:** Louis Duclos, Chairman, Henry L. Landry, Vice-Chairman; **Publications;** Waldemar S. Nelson, Chairman, Allen W. Betz, Vice-Chairman; **Honors and Awards:** Wayne P. Wallace, Chairman, R. Mallard Seago, Vice-Chairman; **Membership:** Frank W. Macdonald, Chairman, Tom E. Alexander, Vice-Chairman; **Annual Meeting:** Allen H. Jensen, Chairman, J. Bres Eustis, Vice-Chairman.

New Orleans Committees

Technical Papers: W. J. Verlander, Chairman, Forney Fuller, Vice-Chairman; **Entertainment and Outing:** T. Benbury Lockett, Chairman, Jos. J. Ranna, Vice-Chairman; **Employment:** E. L. Fithian, Chairman, Wallace J. Trammell, Vice-Chairman; **Publicity:** Sydney Ellis, Jr., Chairman, Norris L. Fant, Vice-Chairman; **Citizen's Planning Committee Representatives:** Michael C. Abrahm, Wm. H. Rhodes; **N. O. Bldg. Code Committee Representative:** Alvin M. Fromherz; **N. O. Chamber of Commerce Representative:** Frank C. Fromherz; **Mayor's Traffic Safety Conference Representatives:** Arthur J. Naquin, Bernard A. Grehan, F. B. Grevemberg.

A tentative schedule of board meeting for the year was set as follows:

February 24 at New Orleans	August 11 at New Orleans
March 21 at Alexandria	September 8 at New Orleans
April 14 at New Orleans	October (?) at Monroe (?)
May 12 at New Orleans	November 12 at New Orleans
June (?) at Baton Rouge	December 8 at New Orleans

Discussion followed on the limitation of scope of engineering activities of various branches of the profession permitted by law and it was suggested that a study be made by the Professional, Civic and Industrial Affairs Committee on this subject. The matter was tabled with the assurance that it would be brought up to the committee at a later date. The meeting then adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of the Monroe Section of the Louisiana Engineering Society February 18, 1958

The Monroe Section of the Louisiana Engineering Society met in the Cameo Room of the Virginia Hotel in Monroe, Louisiana on February 18, 1958. The meeting was called to order at 7:30 by the president, Mr. Farrell W. Adams. The minutes of the December 3, 1957 meeting were read and approved.

The president stated that March 10, 1958 is the affiliation date with the N. S. P. E. All new members after this date must be registered in the State of Louisiana.

The next meeting was changed to March 25 at Louisiana Tech which will be our Oyster and Shrimp supper.

Mr. Fristo initiated the program with a film entitled "The American Engineer." Mr. Colbern and each of his twelve students were then introduced. Mr. Colbern gave a talk on science and the need of up-grading science teaching in our High Schools today. A panel discussion was held with questions being directed to the students and Mr. Colbern.

Mr. A. D. Williams made a motion which was passed on that we write a letter to the members of the Board of Education commending them for raising the required number of hours in mathematics and science for graduation from High School in Louisiana. It was recommended that a copy of this letter be sent to the other sections of the Louisiana Engineering Society.

There were fifty-two present at the meeting including seventeen guests. The meeting was adjourned by the president and then refreshments were served.

DAN D. McDUFF, Secretary-Treasurer

Minutes of the Lake Charles Section January 13, 1958 Meeting

The Lake Charles Section of the Louisiana Engineering Society held their annual banquet and officer installation meeting on January 13, 1958 at the Chateau Charles Hotel banquet hall. Sixty-three members and guests registered and enjoyed a very fine dinner. After dinner the President, Mr. R. R. L. Ward, called the meeting to order. Mr. Murphy Davis gave the invocation. Mr. G. L. Smith gave a report on the State Society meeting in New Orleans and conveyed to the members the general high interest shown in New Orleans. The outgoing president, Mr. Ward, gave a report on activities of the past year with special words of commendations for the Committee Chairman who served so well this past year. Every meeting this past year was well attended and well planned, with an especially interesting program offered each time. Mr. Ward called on Mrs. Marion Garrison to inform the group of the progress being made in organizing a Ladies Auxiliary group. She reported that 18 ladies were applying for state membership as a preliminary to chartering a local section.

Mr. Ward then introduced the newly elected officers for 1958, Marion D. Garrison, Secretary-Treasurer, Fred R. Adams, Vice-President and Glendon L. Smith, President. Mr. Smith assumed charge at this time and asked retiring Program Chairman, J. P. Tucker to introduce the speaker of the evening. Mr. Tucker introduced Mr. Parker R. Ledbetter, the Secretary of the Lake Charles Association of Commerce, who spoke on the subject "The Role of the Engineer in the Lake Charles Economy."

The meeting closed at 10:00 p.m. with a hearty vote of thanks to the Chateau Charles for a very hospitable reception.

MARION D. GARRISON, Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society

February 20, 1958, Time: 7:30 P.M., Geology Building Auditorium, Louisiana State University.

Officers Present: W. L. Sutton, President; D. F. Latimer, 2nd Vice-President; H. F. Leiendecker, Secretary-Treasurer.

Mr. Charles I. Mansur, Vice-President and Chief Engineer of the Independent Well Point Corporation, discussed "Interesting Features of the Port Allen Locks — Design and De-watering."

Members of the LSU ground water short course were guests of the Society. Total attendance was 99. Refreshments were served after the meeting.

HAROLD F. LEIENDECKER, Secretary-Treasurer

Big Dates Coming Up — May 8, 9, 10, 1958

American Society of Civil Engineers

Joint-Section Meeting — Louisiana-Texas
Hotel Beaumont, Beaumont, Texas

Convention Theme: "Unity in Engineering"

Hotel Arrangements
George Schaumburg
1538 Lucas Drive
Beaumont, Texas

Registration
J. V. Dust
4540 Detroit
Beaumont, Texas

Minutes of Meeting of the Louisiana Engineering Society held in the University Room, Roosevelt Hotel, New Orleans, on Monday, February 24, 1958

The meeting was called to order by President Freeman with approximately 120 members and guests present. The president announced that this meeting was being held in commemoration of National Engineers' Week, February 17-22, and introduced the following representatives of participating local engineering organizations:

Mr. O. F. Weideman, Chairman, New Orleans Section, AIChE
Mr. A. J. Lehman, Chairman, New Orleans Section, AIEE
Mr. Leeman, Chairman, Delta Section, AIMM&PE
Mr. Bernard Grehan, President, Louisiana Section, ASCE
Mr. S. Brehm, Secretary, New Orleans Chapter, APWA
Mr. L. R. Maxwell, President, Delta Chapter, ASH&ACE
Mr. John F. Vogt, Jr., Vice-Chairman, New Orleans Section, ASME
Mr. A. Lusch, Vice-Chairman, New Orleans Section, ASRE
Mr. W. Reinhardt, New Orleans Section, ASSE
Mr. Conrad Berdon, New Orleans Chapter, Illuminating Engrs. Society
Mr. R. J. Drueding, Chairman, Louisiana Post, SAME
Mr. G. A. Heft, Secretary, Gulf Institute of Consulting Engineers
Mr. R. M. Seago, President, Engineers Club of New Orleans

President Nelson then called on Mr. Ed Pavia, local Chairman for Engineers' Week, who requested Mr. Grady Carlisle to introduce the principal speaker of the evening, Mr. Edward H. Holmes, Assistant Commissioner, Bureau of Public Roads, Washington, D. C., who addressed the gathering on the subject "Interstate, Primary and Secondary Road Systems."

Mr. R. B. Richardson, Director, Louisiana State Highway Department, then was called upon for a few remarks and the meeting adjourned with a rising vote of thanks to the principal speaker. A pleasant social hour followed.

JOHN P. FERNANDEZ, Secretary-Treasurer

THE LOUISIANA ENGINEER

Vol. 44 JUNE, 1958 No. 3

CONTENTS

EDITOR: Chester A. Peyronnin, Jr.
Post Office Station 20, New Orleans, La.

PUBLISHER: Cypress Publishing Company
724 Girod Street, New Orleans, La.

THE LOUISIANA ENGINEER is the official publication of the Louisiana Engineering Society and is published in February, April, June, August, October, and December. Subscription, $3.00 per annum; single copy, 50 cents.

Second Class mail privileges authorized at New Orleans, Louisiana. Acceptance for mailing at special rate of postage provided for in Section 1105, Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

404 Baronne St.

OFFICERS OF THE SOCIETY

ERNEST M. FREEMAN, *President*, 1103 Henry C. Beck Building, Shreveport

ROY T. SESSUMS, *First Vice-President*, P. O. Box 1520, New Orleans 5

EDWARD A. McLELLAN, *Second Vice-President*, P. O. Box 238, New Orleans 3

JOHN P. FERNANDEZ, *Secretary-Treasurer*, 522 Crystal Street, New Orleans 24

BOARD OF DIRECTION OF THE SOCIETY

BEN T. BOGARD, 36 University Drive, Ruston

JAMES S. JANSSEN, 317 Baronne Street, New Orleans 9

WALDEMAR S. NELSON, 1200 St. Charles Avenue, New Orleans 13

WALTER H. SCALES, 1822 Valence Street, New Orleans 15

FRANCIS M. TAYLOR, Tulane University, P. O. Station 20, New Orleans

OFFICERS OF STATE SECTIONS

Alexandria Section:

ANDREW M. MOORE, *President*, 1423 Donahue Ferry Road, Pineville

DALLAS C. ROBERTS, *Secretary-Treasurer*, 825 Murray Street, Alexandria

Baton Rouge Section:

WALTER L. SUTTON, *President*, 9653 Molly Lea Drive, Baton Rouge

HAROLD F. LEIENDECKER, *Secretary-Treasurer*, 657 Carol Marie Drive, Baton Rouge

Lafayette Section:

ROLAND J. CAMBRE, *President*, P. O. Box 898, S.L.I., Lafayette

GERALD R. DYSON, *Secretary-Treasurer*, P. O. Box 723, Lafayette

Lake Charles Section:

GLENDON L. SMITH, *President*, 39 Horseshoe Lane, Maplewood

MARION D. GARRISON, *Secretary-Treasurer*, 1709 Kirkman Street, Lake Charles

Monroe Section:

FARRELL W. ADAMS, *President*, Box 2867, Monroe

DAN D. McDUFF, *Secretary-Treasurer*, 602 Balboa Sereet, Monroe

Shreveport Section:

JOHN S. MALAHY, JR., *President*, 330 E. Kings Highway, Shreveport

ORVILLE T. ICE, JR., *Secretary-Treasurer*, 522 Egan Street, Shreveport

STUDENT CHAPTER NO. 1 SOUTHWESTERN LOUISIANA INSTITUTE

CHARLES R. BAKER, *President*, Box 119, S.L.I., Lafayette

JAMES M. McCLANAHAN, *Secretary*, Gen. Delivery, S.L.I., Lafayette

Industrial Site Selection and Industrial Design Problems In The Lower Mississippi Area

E. C. Anderson, Division Manager, Kaiser Engineers

INTRODUCTION° – This morning I would like to discuss with you some of the problems in connection with selection of industrial sites and of plant design and their solutions here in the lower Mississippi area. When we of Kaiser Engineers first came to this area in 1951, we regarded them through the eyes of newcomers. We found many natural conditions here, which to you are commonplace, to be totally new and somewhat formidable. Even after this time it still takes a second thought to orient to rainfall draining away from a river.

E. C. Anderson

Nearly 30 years of structural design and general engineering experience provide Kaiser Engineers' E. C. Anderson with the background and knowledge needed to direct one of the largest aluminum production and fabrication expansion programs in the nation. In recent years, he has been responsible for directing design and construction of alumina and aluminum plants and facilities in three areas of Louisiana. These include the completed expansion program of an alumina plant at Baton Rouge, a new aluminum reduction plant at Chalmette, and construction of a new alumina producing installation at Gramercy. Now, as Division Manager in the Aluminum Division, Kaiser Engineers of Oakland, California, Mr. Anderson is in complete charge of coordinating the design, procurement and construction of the combined new aluminum reduction plant and rolling mill project near Ravenswood, West Virginia. With Kaiser Engineers since 1938, Mr. Anderson also has worked as estimator, designer and project engineer on a variety of other projects. He holds a B. S. in Civil Engineering from the University of Washington and is registered in the states of California, Louisiana and Pennsylvania. He is a member of the American Society of Civil Engineers and of the Structural Engineers Association of Northern California.

We also found engineers here who were most generous in sharing their knowledge and experience gained in coping with these conditions so successfully. For their friendly attitude and high professional outlook we cannot say too much.

° *Presented at the Annual Meeting, New Orleans, January 10, 1958.*

A mission of site selection and plant engineering arrives in a region with well-defined objectives:

To assist from the engineering standpoint in the acquisition of the most advantageous site for a specific industrial operation from all those available;

To provide layout and design for a plant of most economical construction which would operate efficiently, profitably and with reliability and safety;

And not to be overlooked is the accomplishment of selection, design and construction within a tightly drawn time schedule.

Confining our consideration to plants in the aluminum industry, we can focus our attention first on site selection and secondly on design matters. Under each of these headings there are both general and specific considerations of special significance to the aluminum industry.

In the aluminum industry there are three basic types of plants:
Those in which natural ore is refined or concentrated;
Those in which the concentrate is reduced to metal;
And those in which the primary metal is fabricated to finished or semi-finished products.

These plants differ greatly in nearly every respect and consequently their site and design requirements are equally variant.

Design considered here does not include process design – which is certainly influenced to some extent by conditions encountered at a particular location. But the process is not influenced to the same degree by local conditions as is design of the structures, auxiliaries, and physical features of the plant. Rather, at this stage the process design is usually fixed, account has been taken of processing materials available in the region and the production objectives, and the process is present as a criterion in the matter of site selection and final plant engineering.

SITE SELECTION

The selection of an industrial site starts with a very clear definition of the fundamental requirements of the plant to be built. Requirements of the site have been evaluated and arranged in an order of importance with respect to economical first cost of the plant and to effective and profitable operation of the ultimate facility through each successive stage of development. It is not possible to generalize on what may constitute a good industrial site. Its purpose must be known and met.

So it is required that a thorough preliminary study be completed and the full extent of the objectives in the venture – initial, immediate and long range – be well specified. In addition those charged with assisting in the engineering aspects of site selection should try to envision throughout the search and analysis future expansion on the site even beyond the specified immediate or specified as long range objectives. There have been few cases where such extra long considerations have ever been regretted, although in the press of getting started with a project there is sometimes a tendency to ignore them or look upon them as impractical.

It is inevitable that some compromises will occur and that there will be a balancing of advantages and disadvantages as between a number of sites. Positive and negative features of each site will influence plant construction and will remain during its operation. However, in the case of each individual plant – the fully expanded plant – there will be the primary requirements which have to be fully met. These inescapable criteria must be adhered to rigidly throughout the period of selection. They are the first screen which will determine whether or not further consideration of a site is warranted.

We might name as purely commercial or business considerations in plant location those which are financial and deal with operating economics; including taking into account welfare of plant personnel and condition of the immediate neighborhood. Several general headings will cover them:

1. Price of land,
2. Availability of title,
3. Local tax structure,
4. Transportation costs,
5. Proximity and amount of raw material and energy sources,
6. Distance and relationship to markets for plant output,
7. And living and housing conditions, educational and community facilities available for those who will operate the plant.

The existing neighborhood, and the impact of a new development are inspected with care. In combination or singly these may be a determination for or against a site.

Considerations from a strictly engineering viewpoint are likely to be more numerous and varied. They are concerned with an adequate facility, with its first cost, and with safe, reliable and economical operation, and maintenance of the completed plant.

The useful available acreage of a site comes under immediate consideration. This would be the net area which is free from interferences, and from expected natural encroachments. In some cases the net area must include a body of land for waste disposal or extensive material storage.

Having a sufficient net acreage, there is a point of great importance to be looked at. This is the shape and contour of the land parcel, and the disposition of adjacent features such as location of railroads, highways, rivers, power lines. In a complex plant the possibility of alternates in making the basic layout is of great value. When the land permits a number of arrangements to be tried, optimum results in terms of first cost and operating convenience and economy can be achieved. It is at this point where the possibility of future expansions is well remembered.

Simultaneously with examination of parcels of land sufficient in size and protected from inundation, investigation and preliminary arrangements for a source of energy have been made.

In the aluminum industry, particularly the reduction operation, availability of a firm block of power is a must. In fact this consideration is major in pointing up a general area in which a new reduction plant is to

be placed. Plainly, the type of energy selected – gas, oil, coal, or electric power – for conversion or direct use will set to a great degree the character of the plant and its fundamental design and first cost outside of the purely processing area.

Water for plant process, steam generation or domestic uses is available here in abundant supply. Where uniform, treated water may be needed, the saline intrusions at low river water which are at a "break off" point in this vicinity may be a factor depending on the degree of chemical pureness required.

The suitability for river construction, character of the bank – depth of the adjacent stream – length of the river frontage – and the velocities are much in evidence in setting the design of docks or intake and outlet structures and require thought in each case.

It is desirable that the working area is not crossed by drainage channels or by facilities or utilities such as railroads, gas lines, power lines, etc.

Required heights of plant structures compared to aircraft regulations figure in the analysis of sites in the vicinity of airports.

There are also considerations which are common to both the commercial or business and to the engineering aspects of a project. They may be stated as the existing and potential supply of personnel, the working conditions and wage structures and the number of projects building or plants which are operating in the area.

The construction field inherently requires of those who engage in it both mobility and adaptability, and living in out-of-the-ordinary conditions usually temporary but sometimes inconvenient. This situation is taken in stride by those in engineering and heavy construction, and except in cases of unusual isolation is not a major factor in choosing one site over another.

In contrast is labor supply for plant operation on a permanent basis. Questions such as how many skilled personnel are available or will have to be brought to the area – how many will require a period of training before they can work in the plant, must be considered. It is a basic axiom of Kaiser organizations that people are the foundation and mainstay in the success of any venture and any operation. This means the entire family must obtain good living conditions and advantages of education, recreation and advancement. Facilities must be present or be made available. Answers to these questions are usually supplied by industrial relations, but they are most assuredly factors in the engineering economics of site selection.

Comparative soil conditions and their relation to foundation requirements are of course a paramount issue.

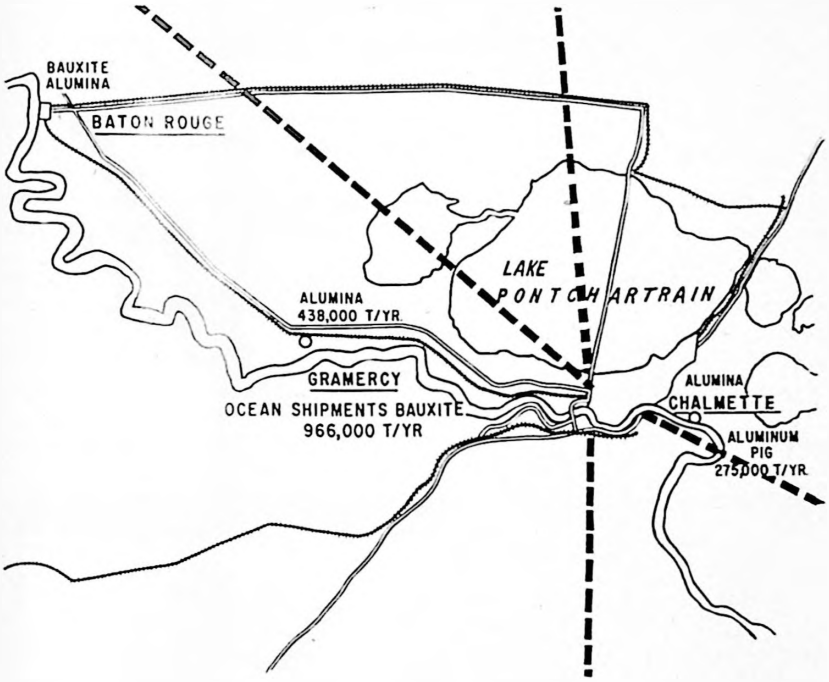
The climatic history takes scrutiny particularly as to the extent it will influence the design of the various plant features, and to the extent it will be a factor in efficient process operation, and healthful working conditions during extremes of temperatures and humidities.

In some instances, availability of construction materials and the cost of transporting them to the job site is a factor. Usually this requires separate analysis beyond transportation of raw materials to process.

These "not to be overlooked" items will not be the only ones which

come up for study and comparison by any means. Diligent searching will bring out a multitude of attributes to be balanced before a choice is recommended.

Through the process of investigation, each site comes to have a character – almost a personality of its own – after having all its features examined. The selected site should have a friendly quality of being a sure guardian of the plant investment and of unharassed and economical plant operation. The ideal site inspires confidence and assures the builder that it will wear well in the years to come.



The slide shows three plant locations and indicates fulfillment of basic requirements in each case. Economical transportation of the right type – ocean freight, river freight, rail and truck – is provided as required for incoming and outgoing materials. Sources of energy and water are available, and each plant is established in a secure surrounding.

DESIGN PROBLEMS

Design Problems – General – By the time a site has been selected after thorough preliminaries, the plant design itself begins without interruption of the activity.

In the case of large plant installations there are many and varying considerations which dictate the approach to basic design and the way of dealing with natural conditions which prevail. There is a wide diversity of structures and installations. Some are more vulnerable to exposure than

others, and in these the probability and effect of extreme occurrences have to be examined and evaluated individually and the actual design criteria and safety factors adjusted accordingly. This is true with respect to sections within a plant complex. For example, in certain areas of a reduction plant, inundation must be avoided. In such areas the strictest design criteria are adopted, and provisions are also made for relief in extreme cases by utilizing auxiliary means.

I believe there are four conditions prevailing in this area which are of major importance and require more careful attention in the design of any plant regardless of its purpose, and they are:

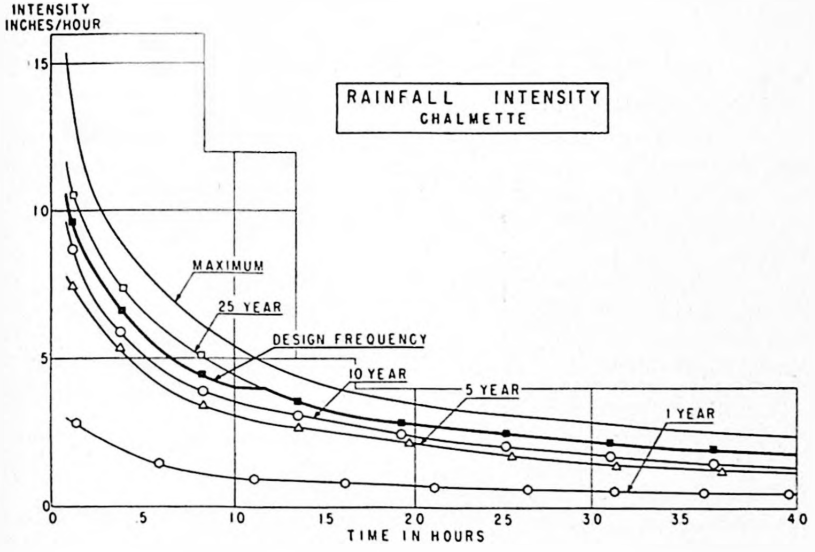
1. Rainfall, Natural Drainage of Ground, and Disposal of Rain Water
2. Flood Protection
3. Foundations, and
4. Wind Forces

As a general observation these conditions become more critical as one progresses southward toward the Mississippi Delta and the Gulf Coast.

Rainfall, Drainage, and Disposal of Rain Water — In this area the engineer is always dealing with water; trying to control its abundance, protecting against it in the wrong places, obtaining it for use, disposing of unwanted surplus, treating it to purify, using it to cleanse. Basically it is a question of getting the right amount at the right place at the right time.

Rainfall of great intensity and lengthy duration produces a high accumulation and runoff rate which coupled with the flat topography and the ever present high ground water table brings the designer very quickly face to face with a situation requiring a sure remedy. This combination results in drainage works of a magnitude greater than usually encountered in the United States. Here, the site as a whole will have benefited from the protective works which have been installed over the past, but the accumulation within the plant area will require handling. The remedy will be shaped by existing local conditions, the degree of reliability required in the system, and economic comparison of possible solutions. An interesting example is the drainage system devised for the Chalmette Reduction Plant situated on the east bank of the Mississippi River about five miles southeast of New Orleans.

The plant site lies wholly within the limits of the Chalmette Back Levee District. Physically this is a large drainage basin surrounded on all sides by levees. The levees keep out unwanted storm and tide water but at the same time retain the storm water which falls in the district. The district maintains a pumping station with a capacity of 200 cubic feet per second to remove water from the basin and lift it over the back protection levee toward Lake Borgne.



A careful study of the data on rainfall, storms, and flooding was made and a basis for proportioning for drainage works was established. It was assumed that the rainfall followed the same pattern of intensity, duration, and probable frequency of occurrence as at New Orleans. At one end of the curve an intensity of 10.5 inches per hour for a duration of five minutes was adopted; for the other end of the curve an intensity of 2.2 inches per hour for a duration of three hours was adopted.

A plot of points for the first hour falls between the ten year and 25 year probability curves. After the first hour the points fall along the 25 year curve.

Following from this the term "maximum storm" was defined as those maximum intensities which can be expected once in a period of 17½ years with durations of one hour or less, and the maximum intensities which can be expected once in a period of 25 years with durations over one hour.

In dealing with the usual problems of hydraulics, quantities of fluid and the various devices through which it is conveyed are known. In storm drainage work the quantity of water is never known for there is no such thing as a "textbook storm." As no two storms are alike, design is based on rainfall probabilities and translated into drainage works of specific dimensions. Their size and cost do not depend on total rainfall but do depend on rain intensity.

There is no safety factor multiplier in drainage works. They cannot be proportioned for the greatest probable storm as elements of fantastic size would result which are obviously uneconomical to construct.

The criterion determined for the basic of design for Chalmette, i.e. the combined 17½ – 25 year storm – will give complete protection in nearly all recorded cases. Auxiliary means were provided in critical areas to take care of the surplus water on the rare occasions of the maximum storms or storms exceeding the design intensities. The slide illustrates the relation of the design intensity – duration curve to the others developed from existing data.

In spite of the numerous formulas for storm drainage there have been comparatively few comprehensive studies. In fact little storm water (outside of stream flow) has actually been metered. The wide variation between the storm flow formulas can be explained by the fact that they are based on inference, comparison, and generalizations on observations in a particular location.

The system used at Chalmette for computing storm water runoff was the so-called "rational method." This method estimates the quantity of water actually flowing away by means of a runoff coefficient, and gives its result in rate of flow depending upon rainfall intensity.

Different components of the coefficient were developed for different classes of surfaces.

As a general concept in the plant, no primary reliance was placed on pumping as a means for disposing storm water. For many years, due to natural topography, the majority of rainfall on the plant site had drained to the northeast corner of the property and entered the Fortification Canal, which in turn conducted it to the pumping station of the Chalmette Back Levee District.

It was decided to maintain the rate of flow from the plant property into the Fortification Canal the same as it always had been. This rate of flow was set by the 30 inch diameter culvert under St. Bernard Highway north of the plant and leading directly into the Fortification Canal. Construction of impervious surfaces and addition of drainage ditches at the

plant area brought the runoff to the northeast corner of the plant more rapidly than in the past. It was decided to provide controlled retention of the water to permit speedy runoff from the plant area and still to prevent any unwanted overflowing due to the limited flow through the existing 30 inch culvert which limits the discharge to about 33 cubic feet per second.

The capacity of the Fortification Canal in its condition at that time was approximately 160 cubic feet per second in the section immediately north of the highway.

In a nutshell the problem was: rate of maximum runoff 670 cubic feet per second; rate of maximum culvert discharge 33 cubic feet per second. The scheme for retention consisted of construction of a basin large enough to hold the design storm less the comparatively small quantity of water flowing out through culverts. The shape in plan of the retention basin was unimportant as long as the required volume, less the culvert discharge, was provided. The basin was arranged to utilize the lowest ground in the area. This arrangement required the smallest amount of excavation and consumed the least amount of usable industrial property. However, within limited fall or difference in elevation available, it was also necessary to provide a basin from which the retained water would eventually flow through the culverts. The final selection was a basin which together with the ditch system and low areas outside the basin would provide capacity for handling approximately 4.76 inches of rainfall. This corresponds to approximately 75 minutes after the start of the design storm. If the design storm should proceed along the curve, the amount of rainfall after the 75-minute interval will be much decreased and continuing to decrease in intensity.

Illustration 1.

Illustration 2.

Two photographs illustrate that this was a satisfactory solution. These were taken on April 25, 1953 after a major storm. The first shows the northeast corner of the plant site, the plant by the way is still under construction in this photograph. It illustrates retention basin and low area in the plant site filled with water, but it shows the operating areas and the cemetery to the west of the plant in a high and dry condition.

The second photograph taken the same time shows the retained water in the foreground and the untaxed Fortification Canal extending northward.

Protection of the area at large against flooding and inundation by back waters has been taken care of by now by the tremendous systems of levees and pumping stations. Economic considerations in the selection of a site usually lead to locations where such protection is already in existence. The matter of internal plant protection and controlled disposal of rainfall still pose problems to plant designers.

Foundations – Although preliminary investigation and in some cases test borings had been done as a part of the site selection process, once a location was determined for the plant, an immediate and complete investigation of existing soil conditions was mandatory. One of the first facts evident to a new arrival in the area is the low bearing capacity of the soil. It follows that all foundations must be designed with extreme care, and also that there is an opportunity to effect economies in their construction.

At the three plants where foundation design was performed, soil of a character to sustain tip loading of piling or to sustain major unpiled foundations seemed to rise from elevations of minus 125 feet to minus 175 feet at Chalmette, to an elevation of approximately minus 40 feet at Gramercy. At Baton Rouge firm ground was encountered at the surface – elevation approximately plus 55 feet, and no piling were used under foundations on original ground. This cannot be taken as a geological pattern but simply the conditions which were found in three individual locations.

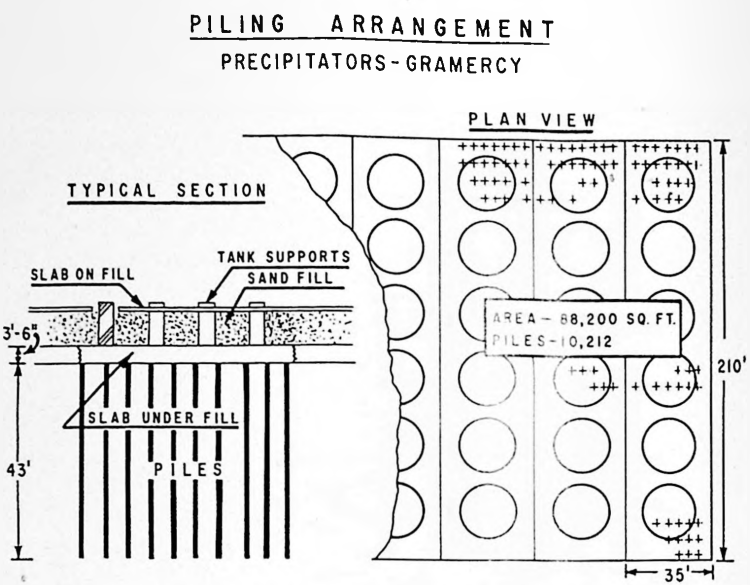
This firm material was apparently composed of several layers laid down in the Pleistocene era. Upper layers, though firm in themselves, were not adequate to support substantial pile loading since they were interspersed with yielding material in which considerable reconsolidation would be expected under the imposed load.

Aside from any general pattern, investigations reveal a wide variation within small areas, and tests must be made at the location of each major structure.

At the Chalmette site there is another variable as one draws back from the river. For a distance of approximately 3,000 feet north of the river bank, the ground is fill which was deposited by the river changing its course. Beyond this the ground is the former river bed. In the river fill on which most of the plant is located a conventional timber piling of 50 - 60 feet was chosen for foundations and has proved satisfactory. For structures located on the former deposit including the 500 foot stack, it was concluded that excessive settlement might occur under major loadings, and heavy loadings are founded on longer piles driven to solid Pleistocene material at

a maximum approximately minus 130 feet.

The character of the plants and the magnitude of individual elements at each location required a number of types of foundations.



There were massive foundations over large areas supporting bins and tanks – such as the precipitator tank foundation at Gramercy. The piling used are timber, approximately 50 feet long. Under this slab are 10,212 piles. The slab area is 88,200 feet square feet, by 3 feet 6 inches thick, with an approximate total loading of about 208,800 tons. This includes:

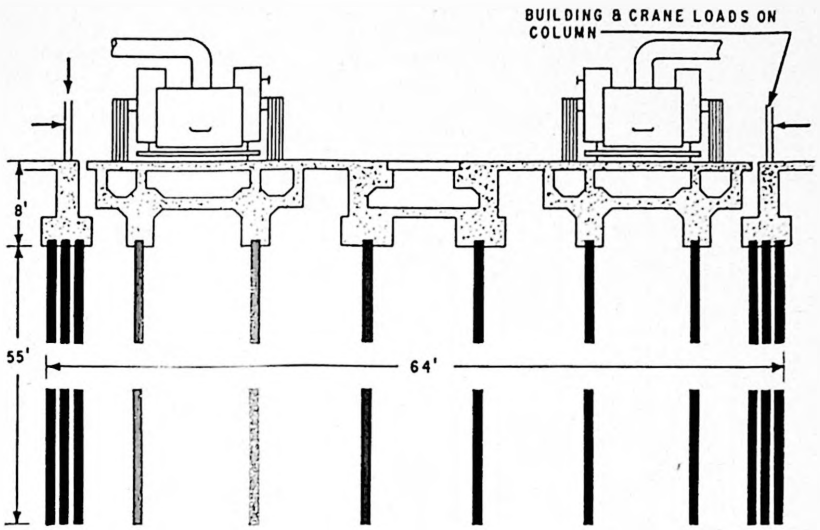
Dead Loading	172,800 Tons
Live Loading	36,000 Tons
Total	208,800 Tons

In this case the dead load composes the greater portion of the total. However, this dead load is a variable since the tanks supported on the foundation are being continually emptied and filled. Pile cutoff is at elevation 4.0, established on the assumption that after excavation and drainage a wet condition would be maintained at this elevation.

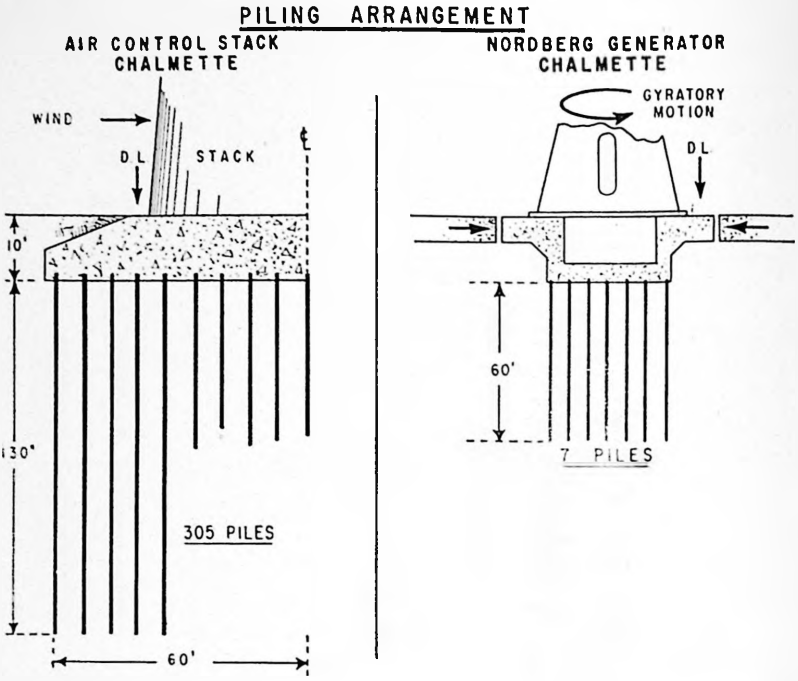
The alumina storage bins at the Chalmette Plant were essentially the same character, i.e. heavy loading over a large area supported by massing piles.

The potroom buildings at Chalmette require a large amount of foundation construction. These are essentially mill type buildings with the customary loadings including cranes. The building columns were supported on pile clusters and the construction was conventional. Within the potroom the reduction cells and air intake tunnels are on foundations separate from

PILING ARRANGEMENT
MILL BUILDING – POT ROOM
CHALMETTE



the building. Theoretically these could have been supported by the ground, using the upper allowable limits for flat slab loading. However, it was decided to support the interior foundations on piling in order to prevent occurrences of differential settlements. While the building footings are supported on pile clusters under each column, the pot and internal foundations are supported on rows of piling which extend through the length of the structure. Piling spacing is at intervals so that each pile supports its permissible load, and no reliance is placed on the combination of soil bearing and piling support.



Another unusual foundation supports the Nordberg gas engines and generators. These engines are radial type with 11 cylinders in a horizontal position, and turn a vertical generator shaft through gearing. The forces acting in gyratory motion induced resonant lateral vibration at the generator base. In the soil there was no lateral support for the piling and a "wobbling" condition was observed in some of the first engines put in operation. It was remedied by effecting solid lateral bracing to the floor slab systems. Once corrected there has been no further evidence of lateral vibration, and the seven piling per unit have supported the engines without vertical displacement.

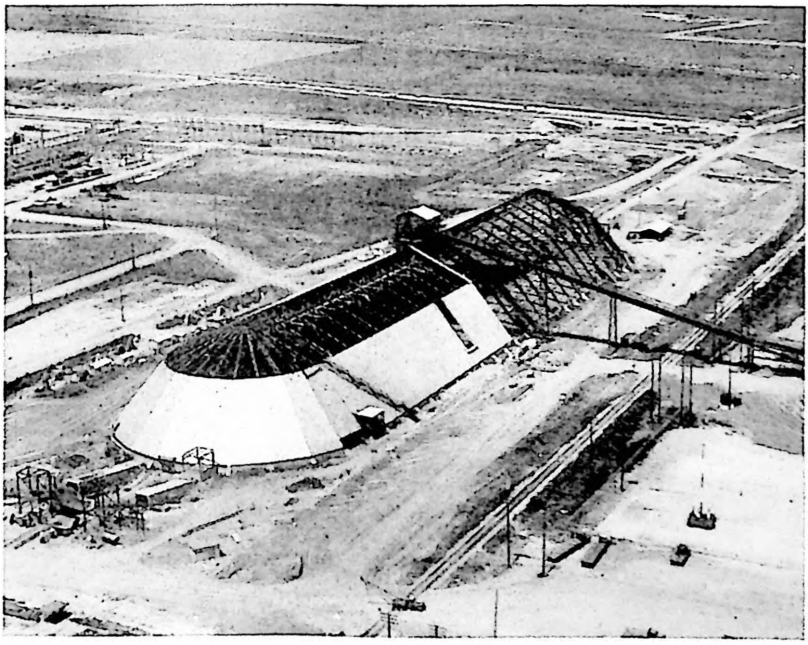
A contrasting type of foundation is used under the 500 foot stack. The location of the stack laid over the old river bed formation. The line of demarcation between the old and the new river beds fell between the north part of the potroom buildings and the stack foundation itself. It was necessary to treat the support of this structure in a completely different way than had been done for other structures in the plant. After considerable investigation concrete filled steel piles were selected approximately 130 feet in length, and driven to a tip elevation of approximately minus 132. The piles were specified not less than 12 inches in diameter, and the design loading was 60 tons dead load and 75 tons dead plus live load per pile. There were a total of 305 piles driven. The piling for the stack has been driven through its upper layers into the so-called Pleistocene formation.

Contrasted to the loading of tank and bin foundations, a far greater proportion of the load induced on the foundation of the stack was from live load, i.e. wind. Combined direct stress and bending were provided for in the piling design. In fact, during the design of the stack a comparison of lightweight against conventional reinforced concrete was made and a heavier type stack structure was selected to provide added dead loading for stability.

The Chalmette Pump House structure is located in the river, and was constructed on pile foundations which were driven within a sheet pile cofferdam. The piling design complied with standard criteria. The only essential difference was the method of driving. This was the only structure under which wooden piles were driven in an underwater location.

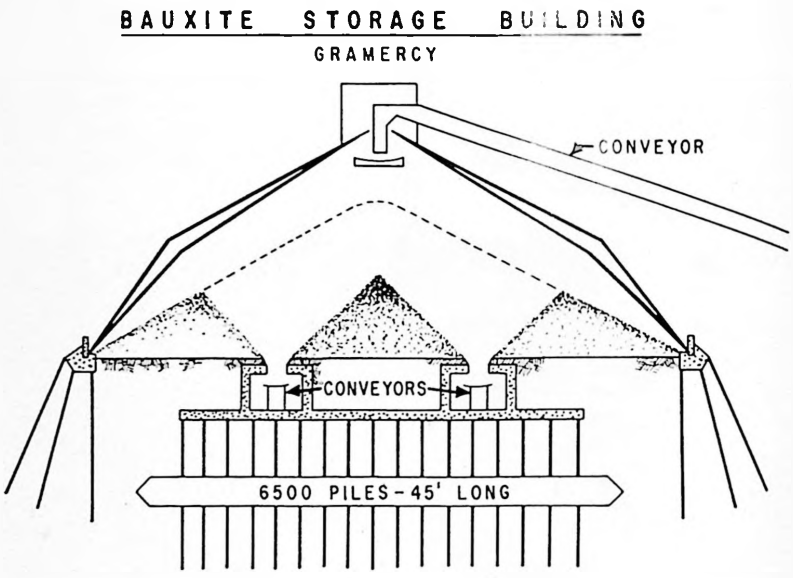
Docks at Baton Rouge and Gramercy and the Chalmette intake station are supported on steel members driven to support crane, ship and river loads as the case may be.

A nice balancing was required in the Steam Turbine Generator Building, where turbo-generators are supported on mass concrete and pile foundations. It was necessary to prevent differential settlement between the turbines and the adjacent light slabs carrying light equipment and supports in order to guard against deformation in pipe lines containing high pressure and high temperature steam. Slabs and trenches in this instance were designed for a loading of 1,000 pounds per square foot as spread footings. Turbine foundations were the conventional 50 - 60 foot length piles loaded in the standard manner.



Batter piling were used as a structural element in the case of one rather tall narrow building in the Chalmette Plant to oppose wind forces. There were insufficient vertical piling under the building frame to give lateral support and under the building frame a combination of vertical and batter piling were used. Batter piling were given both horizontal and vertical allowances in designing the footings. Tension connections were provided to develop the tensile capacity of piles on the windward side of the building.

Another structure which employed a rather unique foundation design is the Bauxite Storage Building at Gramercy. The purpose of this building is simply to provide a cover and support a conveyor over a pile of bauxite approximately 780 feet long by 204 feet wide, which attains a maximum height of approximately 65 feet. Obviously the load superimposed on yielding ground is great. Also a column-free structure of 240 foot span over the pile leads to a shape which will cause substantial lateral forces at the bases of the columns or ribs. A foundation embracing several structural combinations was worked out.



The pile of material was placed on ground. Some consolidation is expected but is not of great importance, since the material stored forms its own floor coating on the natural ground. The two reclaim tunnels were supported on a flat slab at still lower elevation. This slab sustained the weight on the tunnels, part of replaced fill, and superimposed loading from the bauxite pile. The building ribs were placed on individual foundations. Vertical and batter piling were placed to provide for the vertical loads and for the lateral loads and thrust reactions. The piles used were wood piles in usual lengths. However, in this case they were treated since the heads were at an elevation above the water table.

To date in the projects discussed there have been driven a total of approximately 70,000 piles. By far the greatest number of these are untreated timber piles ranging between 45 and 65 feet in length.

Design criteria were established or reviewed in the case of each project. It was perhaps unnecessary but it was considered advisable to take borings and drive a number of test piles within the construction limits especially in locations where critical loading was indicated by the plant layout.

Generally there were no reasons to depart from general practice in the area. Piling was untreated timber, Specification Class B. Cutoff was established at definite distances below ground surface subject to checking and to be compensated in cases where any construction would tend to lower the water table.

Permissible dead static loadings varied between 10 tons for a 40 foot long pile and 25 tons for a 65 foot long pile. Permissible dead static loadings were increased 10 per cent for dead plus live loading, 25 per cent for dead plus live plus wind loading; and were decreased 25 per cent for total loading under vibratory conditions. Spread footings were specified for permissible loading of 1,000 pounds per square foot bearing under dead load, with increases for combined loading the same as for piling. Slabs on compacted fill were specified for a permissible load of 1,000 pounds per square foot maximum.

In designing foundations, an engineer new to the area has a great deal to learn in a short time. A word of appreciation can well be repeated for the generosity of engineers here in sharing their knowledge and experience and for the valuable assistance which was received from consultants.

The other basic component of the foundation, concrete, was specified to match existing practice for compressive strengths. There are a number of tunnels, pits below ground in these plants, and watertightness is desirable. Watertightness in concrete made of local materials is relatively difficult to achieve and special provisions are required in this respect.

An unusual factor in the construction of concrete foundations in reduction plants is the need to prevent short circuits and electrolysis of reinforcing bar. Electric currents are always present where a large amount of electrical energy is being generated and circulated. Special care is required in potroom foundations to prevent connection of the reinforcing bar with exposed metal such as curb angles. It was also necessary to protect reinforcing bar from contact with the external ground water to prevent deterioration of reinforcement by electrolytic action of stray ground currents. Past experience in potrooms has shown that great care in design and inspection is warranted to insulate the internal reinforcement from paths of electrical current and from ground water.

Wind Forces – The poet has said "the wind bloweth where it listeth." He might have added "only more so in the Gulf Area."

During the process of site selection for the first plant in this section, locations throughout the Gulf Area were considered, extending as far south as Corpus Christi. This was during the Korean War, a period of allocations

of critical material, and steel was high on the priority list. It was necessary, therefore, to complete steel design at least to the point of entering mill orders as early as possible. As a result, basic orders of steel for mill rolling had been entered before the final location of the Reduction Plant at Chalmette had been selected.

This, of course, meant that design criteria for wind loading were adopted before the final location of the plant was known. They were developed after due consideration of codes and practices and records throughout the region, and were established on the following basis:

True Maximum Velocity	87 mph
Corrected for Gusts	107 mph

As a composite of existing building codes, and after consideration of wind pressure formulas including the most recent to that time, the following general values were established for design:

Wind loads on vertical projects of all structures:

One-story buildings	25 psf
Conveyor bridges and similar exposed structures 30 feet or more above ground	35 psf

Also the provision of Section 2307 of the Uniform Building Code was adopted. This permitted calculation of wind pressure on circular tanks, towers, or stacks assuming it to act on six-tenths of the projected area.

Other buildings and structures – general:

First 30 feet of height	25 psf
Increasing uniformly to 100 feet high	35 psf
Roofing and purlins proportioned and connected to withstand outward pressure	30 psf
Walls and girts proportioned and connected to withstand outward pressure	25 psf

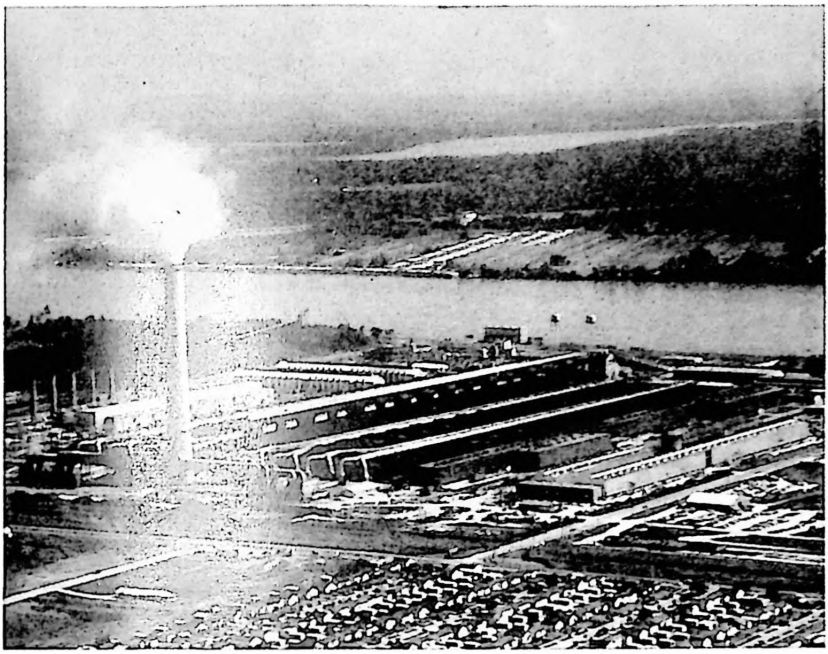
In these cases the vulnerability of the various plant structures was assessed. The factor of safety in proportioning members was considered ample to allow for short time overstressing from forces in excess of those assumed.

There were approximately 1,200,000 square feet of mill type buildings in the Chalmette Reduction Plant. It may not always be fully realized how great a proportion of the steel weight in buildings of this type is in girts and purlins. Where mill buildings are used to cover areas of any magnitude, trial studies to maintain wind loads at a safe minimum, and to space building bents to achieve minimum tonnage of structural members, are well justified by the potential saving and economy in steel purchase.

These criteria sufficed until the design of the 500 foot high stack was undertaken. Obviously this required a special treatment both as to assumed wind velocities and their force against the structure.

The stack was built in the customary manner for these special structures. It was subcontracted for both design and construction. A parallel

basic design was carried out by Kaiser Engineers. There was coordination with the bidders during the period of design and bidding; and detail design was approved before construction.



In the case of this structure it was considered advisable to design for maximum expected wind pressures. From the record in the New Orleans area it was determined that velocities of 120 mph could be expected on a 40-year frequency. Winds higher than this had not been experienced in the area.

There are many formulae for computing wind pressures from a given velocity, and a number of varying results are obtainable. The wind loading on the stack was based on a 120 mph wind and computed in accordance with ACI Manual No. 505-54 "Specifications for Design and Construction of Reinforced Concrete Chimneys."

Working from this method a graduated series of unit pressures were established. These ranged from 28.8 psf on the lowest 50 feet of chimney to approximately 48 psf on the upper 100 feet, i.e. between 400 foot and 500 foot elevation. The summation of these pressures resulted in a total horizontal force of approximately 950 kips acting at a point 256 feet above the chimney base. It is of interest to note that this force would compare with approximately 685 kips computed by 60 per cent of the area subject to a unit pressure of 50 psf uniformly.

There is at present a great deal of activity in developing more accurate forecasts of wind velocities and more scientific methods of translating the

velocities into actual pressures. In an area such as this, the subject of wind forces is still a matter requiring alertness on the part of design engineers to assure safety of structures and yet gain whatever economies there may be.

Design Problems Peculiar to Aluminum Plants — It may be of interest to continue for a moment with the complex duct system which can be seen coming across the plant above the roofs and connecting into the stack. The overhead ducts range in diameter from 4 feet to 16 feet and their total length is approximately 15,000 feet. The full extent of the system is not shown on the photograph. It connects to each individual reduction cell.

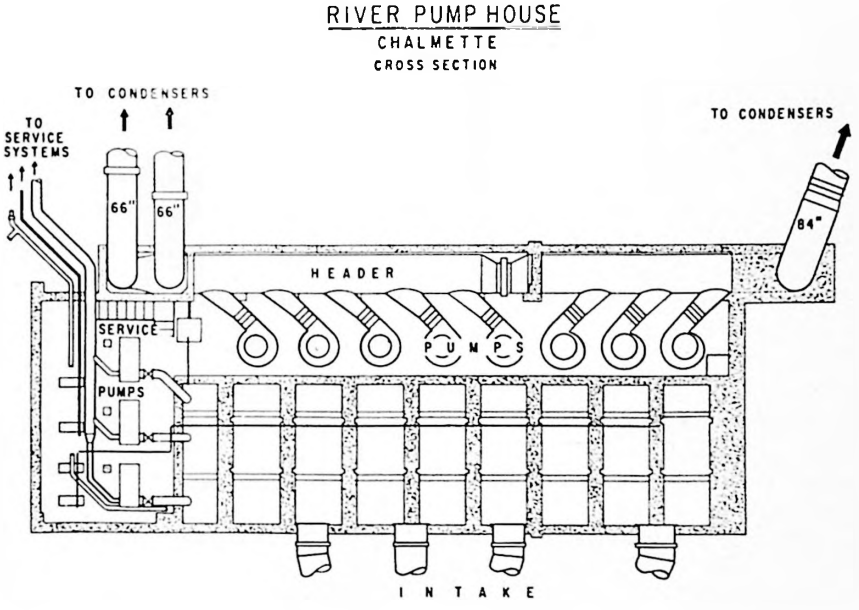
Each of the cells is able to be ventilated by a maximum of 4,000 standard cfm of air. This volume is collected through the duct system and taken by means of fans through an efficient scrubbing process. The clean air is conducted to the stack, and the effluent, practically all air and steam, is released to the upper atmosphere. The maximum flow through the stack is approximately 5,500,000 standard cfm.

An aluminum reduction plant such as Chalmette requires a large block of firm power as a prime essential for its operation. At the time of selecting a site for this plant, the quantity available and cost of energy was a principal factor in guiding site selection. A source of energy in the form of natural gas was available for the reduction plant. It was concluded to generate power from the gas as a part of the plant operation, and facilities

for about 475,000 kw have been provided. Two types of power are generated. Radial type gas engines produce about 105,000 kw of direct current, which is used in the potlines without conversion. Alternating current in the amount of approximately 370,000 kw is produced in 15 steam turbine generators. This quantity is converted to D.C. and used in the remaining six potlines, except for a portion used as alternating current for all plant auxiliaries. The technical and power aspects of these plants have been fully described in published material which is available.

At Gramercy and Baton Rouge where alumina is processed from bauxite, large quantities of steam are required. Since the steam is available it is economical to generate electric energy for plant operation. The electrical demand at these plants, including that for the Caustic Chlorine process at Gramercy which is electrolytic, is supplied by steam turbines.

Outside the fuel conversion and power generation, there was an element in the engineering of the Chalmette steampower plant interesting from a design standpoint. The condensers require as a maximum 10,900 gpm per shell, or a total of 360,000 gpm of cooling water. This is a maximum figure to maintain required turbine efficiency during intervals of high water temperature in the river, and varies downward somewhat throughout the year's operation.

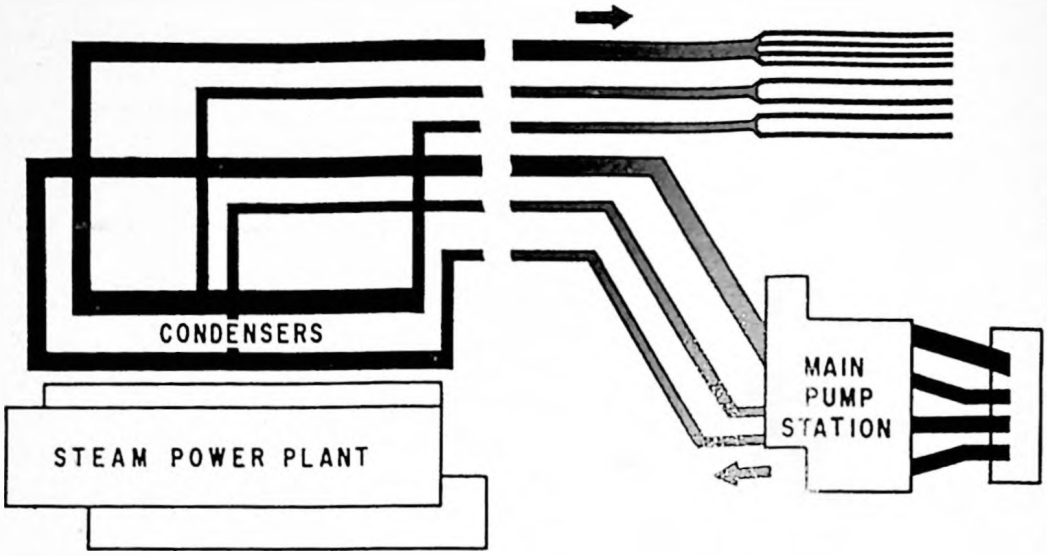


The water is supplied from a pump house which was constructed at the river's edge, with an inlet work further out in the stream. The basic concept of the system is to take the water to and through the turbine condensers and return it to the river with a single pumping operation.

There are installed in the pump house three 42 inch pumps and five 36 inch pumps to provide for maximum volume and spare equipment.

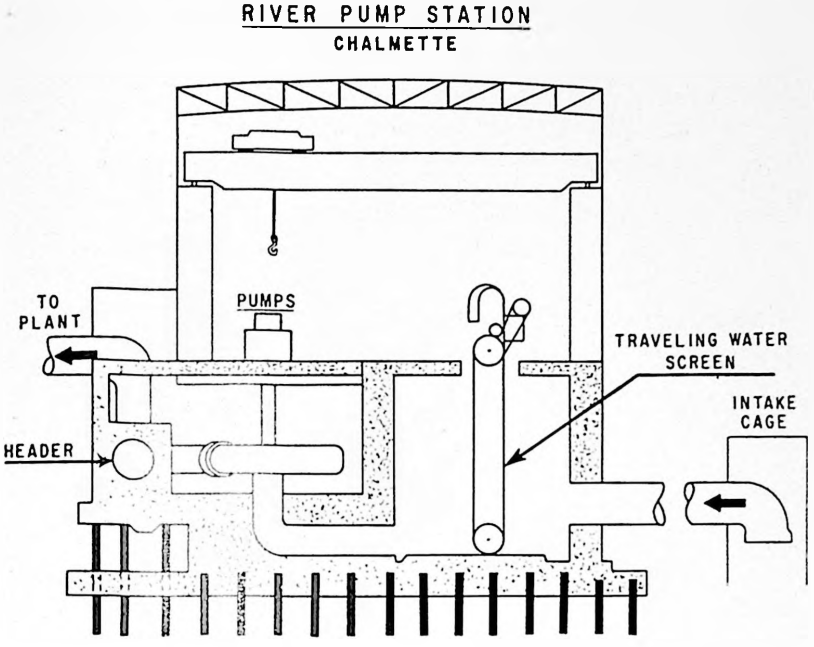
WATER CIRCULATING SYSTEM

CHALMETTE



The pumps discharge into headers which conduct the water to a rather elaborate system of piping to the condensers, and from them back to discharge below the river water surface. Head losses in the system are variable up to a maximum of approximately 78 feet for the total system losses. Of this approximately 28 feet or 36 per cent is friction loss through condensers. The values are from a theoretical curve used to predict expected cooling requirements to maintain required turbine efficiency at all conditions.

The pump house design is along conventional lines with stop logs, travelling screens and then the pumps with the header. The superstructure supports a 15 ton crane and provides shelter and head room for pump maintenance.



During the course of its construction, the pump house was expanded. The size of the reduction plant had been doubled and the power for the addition was to be provided through turbine generators. This expansion called for virtually tripling the original installation.

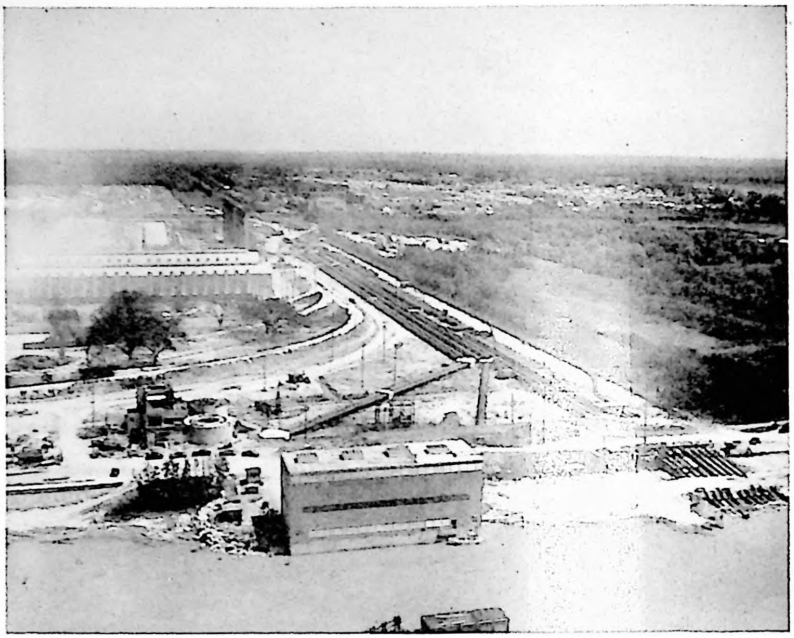
The main 66 inch diameter and 84 inch diameter supply and return lines were designed as long span beams of relatively light shell with adequate stiffening. On this basis pile and concrete supports were required at 80-foot intervals. The pipe loading was carried to the support by means of a roller. The pipes were necessarily anchored at points of direction change. Intermediate expansion joints in straight lengths were provided.

Siphon action was taken into account at the discharge. The discharge ends were set at an elevation to prevent unstable siphon action at low river stage.

At a high point of the siphons, vacuum pumps were installed to maintain full flow. The outflow is carried through eight pipes of smaller diameter. This arrangement was used to maintain controlled flow and volume within the system during seasonal fluctuations in quantities.

The first pumping created a water hammer — and some excitement — and disarranged the outfall pipes. These were securely fastened to timber pile bents and with corrected setting of the release valves and vacuum system, the condition was eliminated.

There are also separate capacities of approximately 10,000 gpm for domestic water, fire, and other systems. The treatment plant converts river water to potable water and supplies boiler make-up, rectifier cooling, and other needs for purified water.



Very important throughout the processes is handling of materials. In the plants considered, there is a wide variety of material used ranging from raw ore to liquified and gaseous chlorine, pitch, coke, alumina. Storage for operating reserve and which will keep materials in optimum condition is required. Means to package and handle materials going out of the plant in different forms are needed.

Bauxite ore is received via ships from Jamaica or South America, unloaded and conveyed to storage. It is processed largely in liquid forms. Steam, starch, sodium sulfide and other additives are introduced into the process by suitable means. Eventually a precipitate is formed which requires drying and calcination and the alumina finally emerges as a material about the appearance of common sugar or salt. It may be shipped by hopper or boxcars or by barge.

In the Caustic Chlorine process the major incoming material is brine or salt which is converted into brine and electrolyzed. Caustic soda is produced and used in the production of alumina or shipped. Chlorine is shipped as a marketable by-product.

Alumina is the basic material in the reduction process in addition to coke, pitch and cryolite and others. Each requires its own method of handling and storing. The aluminum metal is cast as pigs, palletized and prepared for shipment.

It is seen that virtually all types of material handling equipment are involved. These systems are sometimes taken for granted but frequently loom very large from a design standpoint. Clearances, structural support,

protection from the weather, heat, insulation, power, etc. make complicated situations.

Conventional or specially developed equipment and controls are used. The designer works to bring together a combination which suits the material requirement and at the same time results in the most economical installation.

Time Schedule – None of these plants obviously were built overnight. In each case, however, and this is usual in all plant construction, there is an urgent time schedule. This may be dictated as it was six years ago by a great demand for primary aluminum due to near-war conditions. The engineering program including technical design must be keyed to the schedule. Priorities are required in planning and specifying long delivery items of material and equipment. Orders must be placed far enough in advance to be at the job site on time. Plans must be issued to sequence field work to be ready for fabricated items when they are received.

There is no substitute for quality in engineering and certainly sufficient time must be taken to provide a well-reasoned design. However, an engineering program at large to be effective must aim at culmination of the work with all parts brought together to produce an operable facility in minimum time after project authorization.

Design of the Chalmette installation was commenced in November 1950. Ground was broken on the site – which had not been selected when design work started – on February 20, 1951. Ten months later on December 10, 1951 the first metallic aluminum was poured at the opening ceremony by Mr. Kaiser and Mr. Wilson, then Secretary of Defense. This step was the first milestone in aluminum expansion in this area. And it is continuing.

CONCLUSION

Gentlemen, the design and construction in connection with three new and expanded major aluminum facilities in this area presented many problems which were of greater magnitude to us as newcomers to the area. There were the best possible sites to be selected from many, and having found the site, there were conditions in foundations, in drainage, in wind forces, in materials handling, as well as the internal engineering of complex facilities which required sound and timely solutions. There were the attendant problems of coordination to meet stringent schedules. These were met then and they are being met today but not without the generous assistance and guidance from engineers of this area. You who have lived and worked with these conditions, have in great measure helped to bring to this area these major facilities in the aluminum industry.

Engineering Briefs

Electrons Sterilize Sutures—Sterilization of medical instruments with electrons is now being done commercially. A device, called the linac, rated at seven million electron volts, sterilizes five-to-ten dozen catgut sutures a minute as they pass under the beam in a shielded room. —*Electronics*

Aid for Air Traffic—A new electronic development may help control air traffic around busy terminals. A console system has been developed around a tube that simultaneously displays radar or TV images with identifying letters, numbers and symbols superimposed. The traffic controller will see a radar blip of a plane and beside it a series of numbers and letters denoting its identity, type, destination and position. —*Electronics*

In-The-Ear Radio—A truly "wireless" radio which is only a little bigger than a flashlight bulb and can be plugged into the human ear, has been developed by two German engineers. Its inventors make no claims about power or tonal quality of the transistorized radio and have not yet announced plans for manufacture—but they say it will work. —*Product Engineering*

Balloon Helps Erect Homes—Not only are they erecting rubber buildings these days, but they are putting up frame houses with rubber bags. These are "demountable homes," in which walls and roof unfold at the homesite to become four rooms and bath. Erecting them used to call for 16 men and a crane. Now, an inflatable bag does the trick in three minutes. It is put under the roof section, and inflated. The roof is then supported by props, the bag deflated, and down sinks the floor — right into place.
—*Product Engineering*

Too Lazy To Chew?—Americans now eat 24 per cent of their beef as hamburgers. The reason for this: It takes the work out of eating.
—*Food Engineering*

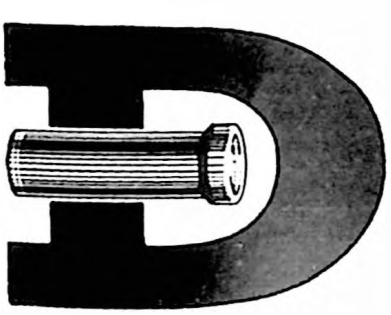
Computers Go To Battle—Meteorology computers, packaged in battlefield consoles, are automatically issuing high-altitude weather reports for the Army. An antenna tracks a weather balloon, while other information is radioed from instruments on the balloon, to the computer, which figures pressure, humidity, temperature and wind readings. —*Electronics*

Sun-Powered Tractors—The sun soon may be used to power tractors, according to a Russian theory. Mirrors in solar generators will direct the heat of the sun's rays at thermal elements that will provide direct conversion of solar energy into electrical energy and propel farm machinery.
—*Product Engineering*

Clay sewer pipe, from the W. S. Dickey Clay Mfg. Co. was installed in 1894 for San Antonio sewers. Line was relocated in 1956 with more Dickey Pipe

Life begins at 62 for Dickey Pipe in San Antonio

Dickey Vitrified Clay Sewer Pipe—in 8″ diameter—was installed on Concho Street, San Antonio in October, 1894. This line gave 62 years of uninterrupted service. Twenty feet of the line was relocated and replaced with more Dickey Pipe. Balance of the 400 ft. line remains in service. Even after 62 years of heavy usage, the original Dickey Clay Pipe is as good as the day it was originally installed—unaffected by years of corrosive wastes it has carried. When you plan your municipal sewers, always specify chemically inert pipe that serves today and tomorrow with equal efficiency—Dickey Salt-Glazed Vitrified Clay Sewer Pipe.



Providing improved sanitation for better living

DICKEY sanitary salt-glazed clay pipe

W. S. DICKEY CLAY MFG. CO.

Birmingham, Ala. Chattanooga, Tenn. Kansas City, Mo. Meridian, Miss.
St. Louis, Mo. San Antonio, Tex. Texarkana, Tex.-Ark.

2015 If it's made of clay it's good . . . if it's made by Dickey it's better

Engineering Day Activities – L. S. U.

The Louisiana State University College of Engineering held its annual Engineering Day Exhibits and corresponding activities from Friday, April 11 through Saturday, April 19 in the engineering buildings on the Baton Rouge campus.

The calendar of events scheduled for this year's activities was such as to make this period the highlight of the engineering students' social and professional year. In addition to exhibits, the activities included the Engineers' Honors Convocation, a barbecue, faculty-student softball game, and the Engineers' Ball.

As in the past years, the responsibility for the direction of the activities fell upon the Engineering Student Council. This group included the student body officers from the College of Engineering, plus the president and one representative from each of the professional and honorary student engineering organizations.

Although several social events were included in the schedule, emphasis was placed on the professional aspects of the activities. As in the past, the purpose of the Engineering Exhibits was twofold. First, it gave the student the opportunity to plan and construct his project for the exhibit, and second, it gave the people outside of the College of Engineering an opportunity to see the student engineers at work.

The students work individually or in groups on their exhibits, which in some instances were in the planning stage weeks before Easter. The planning, developing, and completion of these projects are as important to the student as his studies. The successful completion of his project gives the student the opportunity to be confronted, to a small extent, with actual problems he will face in the professional world.

The exhibits were judged by a group of professional engineers from the Baton Rouge area. Prizes were awarded for first and second places in Individual and Departmental competition. The winners and companies awarding prizes were:

First Place Departmental Award – Civil Engineering – Esso Corp.

First Place Individual Award – Architectural Engineering – Gulf States Utilities

Second Place Departmental – Mechanical Engineering – Ethyl Corp.

Second Place Individual – Mechanical Engineering – Kaiser Aluminum.

One of the highlights of the week was the Engineers' Ball. The Queen of the Ball was Miss Nancy Glisson, an 18-year old freshman from Baton Rouge. Her court consisted of Misses Barbara Purswell, Carolyn Johnson, Maria Dubeux, Doris Booth, Lucia Dubeux, Mary Ann Adcock, and Katherine Roy.

TO ALL 1958 ENGINEERING GRADUATES

Congratulations on your attainment of a degree in Engineering! We take this means to extend a cordial welcome into your chosen profession and to invite you to associate with your fellow-engineers of the Louisiana Engineering Society.

For more than sixty years this society has worked diligently toward the advancement of Engineering in our state, and many important accomplishments have been recorded. Recently we affiliated with the National Society of Professional Engineers and with Engineers' Joint Council in order to cooperate with other state organizations and extend our efforts to the National level.

In recognition of your achievement we offer you the opportunity to join without payment of any dues for the balance of the year. Membership includes the privilege of participation in monthly meetings of both technical and social nature, a subscription to the LOUISIANA ENGINEER, and the knowledge that you are helping to further the best interests of your profession and ultimately your own.

If you are interested, just fill out the lower portion of this page and forward it as indicated. An application form will be forthcoming without delay.

Yours for a greater Engineering Profession,
E. M. FREEMAN
President,
Louisiana Engineering Society

John P. Fernandez, Secretary-Treasurer
522 Crystal Street
New Orleans 24, La.

Yes, I would like to be a member of the Louisiana Engineering Society. Please send an application to

Name_____

Street and No._____

City_____

Graduate of_____
(School)

NEW MEMBERS

MEMBER

George M. Baccich, Jr., Baton Rouge; Henry S. Branch, Jr., Baton Rouge; Miller B. Clarkson, Lake Charles; William A. Cunningham, New Orleans; Earl Stanley Dobbs, New Orleans; Jacob B. M. Goff, Baton Rouge; Roger P. Guissinger, Baton Rouge; William I. Haring, Baton Rouge; Robert G. Hart, Jr., Monroe; Frank N. Harvey, Baton Rouge; Joseph M. Harvey, Baton Rouge; George William Hill, Baton Rouge; Thomas F. Howie, Shreveport; John H. Jurik, Baton Rouge; Richard P. Klopp, Baton Rouge; William F. Lytle, Baton Rouge; Lloyd D. McClatchey, Jr., Baton Rouge; Robert Wayne MacDonald, Baton Rouge; Gerald R. Manning, New Orleans; Henry Evelyn May, DeRidder; Mansel M. Mayeux, Baton Rouge; Robert A. Philibert, New Orleans; Jack Lawrence Pillow, Baton Rouge; Richard J. Sullivan, Lake Charles; Alex F. Watkins, Opelousas.

TRANSFER FROM AFFILIATE TO MEMBER

Charles A. Bragg, Metairie; Louie Leroy Hines, Baton Rouge; Raymond LeRoy McGee, Lake Charles.

TRANSFER FROM JUNIOR TO MEMBER

Claiborne J. Dubon, Jr., Dayton, Ohio; David B. Fried, Jr., New Orleans; Gaudenz Gadmer, Houston, Texas; Glenn D. Garber, Lake Charles; Joseph D. Garon, New Orleans; Gerald M. Gossen, Lafayette; Dan Douglas McDuff, Monroe; Donald J. O'Rourke, Lafayette; Walter C. Vincent, Lafayette.

AFFILIATE MEMBER

Edwin P. Armstrong, Alexandria; Carlos J. Barousse, New Orleans; Earl J. Martel, Baton Rouge; Raymond C. Neigel, Sr., Gretna.

TRANSFER FROM JUNIOR TO AFFILIATE MEMBER

Alexander B. Bell, Broussard.

JUNIOR MEMBER

D. Charles Antrobus, Jr., Baton Rouge; Kenneth J. Daspit, Baton Rouge; Louis H. Fougerousse, Baton Rouge; Robert G. Marbut, Baton Rouge; Curtis J. Mouton, Lake Charles; David E. B. Sanders, Jr., Baton Rouge; Douglas W. Speed, Baton Rouge; Richard K. Snow, New Orleans; Octa J. Thibodeaux, Maplewood.

NSPE CHARTER PRESENTED TO LES

President E. M. Freeman is shown above accepting the Charter from the National Society of Professional Engineers on behalf of the Louisiana Engineering Society. This charter which was granted to the Society on the 14th of February 1958 was presented at the State Sections Conference at Alexandria on March 22, 1958.

Seated in the photograph are (left to right) Dr. Clark Dunn, President-Elect of the NSPE; President Freeman and Roy Sessums, First Vice-President of the LES. Standing behind them are Andrew M. Moore, President of the Alexandria Section; John P. Fernandez, Secretary-Treasurer of the Society and Waldemar Nelson, immediate Past President of the Society.

FIELD NOTES

This is the second issue of THE LOUISIANA ENGINEER that is being sent to all resident Professional Engineers in the state in addition to all LES members. For a long time many engineers have felt that there was the need for a publication reaching all engineers. When the LES affiliated with the National Society of Professional Engineers and the Engineers Joint Council the officers decided that the time had come for us to fill that need. This magazine now publishes articles and material from all engineering groups in the state and will have as its main theme the promotion of the profession of Engineering in the state. Your comments and suggestions are welcome and will be appreciated. This magazine will grow larger in the near future and will be better able to fill its assignment.

The 8th edition of "Who's Who in Engineering" is scheduled for publication at the end of this year. Those engineers who were listed in the 7th edition and who haven't received a clipping for revision or engineers who haven't been listed and feel that they are eligible are advised to contact the editor of the book. Address: "Who's Who in Engineering," 265 W. 45th Street, New York 11, N. Y.

° ° °

The National Association of Corrosion Engineers has honored Robert J. Kuhn, Life Member, with the Frank Newman Speller Award for excellence in the field of corrosion engineering. The award was presented to him recently at the annual convention in San Francisco. Mr. Kuhn spoke at the May meeting of the Society and will honor us with a paper on corrosion in a forthcoming issue.

° ° °

Mr. Harold A. Levey, Sr., was made the first Honorary Senior Fellow of the American Institute of Chemists in the South recently. A copy of his address made at the meeting will appear in a forthcoming issue.

Resolution In Support Of Jenkins-Keogh Proposal

WHEREAS the Internal Revenue Code grants to corporate officials and employees substantial income tax savings on certain amounts contributed to corporate pension or retirement program for the benefit of these officials and employees; and

WHEREAS similar tax savings are not granted under the law to self-employed individuals in connection with amounts contributed by them to their private pension or retirement programs; and

WHEREAS legislation, popularly known as the Jenkins-Keogh bills, to correct this tax inequity and to encourage sound saving practices on the part of self-employed individuals has been before the Congress for the past 6 years; and

WHEREAS during this period the essential equity of the Jenkins-Keogh proposal has been proven by irrefutable evidence and has gained the endorsement of both political parties and of the President of the United States:

THEREFORE, BE IT RESOLVED, that the membership of the Louisiana Engineering Society supports the principle of the Jenkins-Keogh proposal which would entitle self-employed individuals to realize tax savings on specified amounts contributed to voluntary pension or retirement programs comparable to the tax savings enjoyed by corporate officials and employees in connection with their pension or retirement programs; and be it

FURTHER RESOLVED, that the membership of the Louisiana Engineering Society urges the 85th Congress to enact this proposal into law and asks each member of the Louisiana congressional delegation to lend his leadership and influence in the Congress to the achievement of this objective at the earliest possible date.

Passed Unanimously 12 May 1958

This resolution was passed unanimously at the monthly meeting on May 12, 1958 with the added resolution that it be published in THE LOUISIANA ENGINEER and that all members be urged to actively encourage passage of this bill by their legislators.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, Held at the Engineers' Club, N.O. Monday, March 10, 1958

The meeting was called to order by President Freeman with Messrs. Bogard, Janssen, McLellan, Nelson, Scales, Sessums, Sutton, Taylor and Fernandez present. Mr. Harvey Krefft, representing the Cypress Publishing Company, also was present by invitation. Minutes of the board meeting of January 27 were accepted as corrected.

President Freeman annouced that he had attended two NSPE meetings, one at East Lansing, Michigan on February 13-15, and the other at Purdue University, March 7-8. At the first meeting the petition of L.E.S. to affiliate with NSPE was formally accepted and a charter will be presented to us by the president-elect of the national society on the occasion of our State Planning Conference to be held at Alexandria on March 22. The second meeting was a State Presidents' Conference, which was also attended by First Vice-President Sessums.

The secretary read a letter from Mr. Richard F. Ford, Office Manager for NSPE, concerning the handling of present NSPE members in Louisiana. The board authorized the secretary to proceed in the matter as he saw fit.

Mr. Nelson moved that the society's membership certificate be re-designed to show emblems of the national societies with which we are now affiliating. Motion seconded by Mr. Scales and carried. Mr. Nelson also moved that the society's letterhead and membership cards for 1959 also show the affiliated societies, seconded by Mr. Scales and carried.

Mr. Nelson read a proposed contract with Cypress Publishing Company for publishing THE LOUISIANA ENGINEER. Mr. Sessums suggested that a clause be inserted describing the method of adjusting prepaid advertising and stating that advertising contracts will be turned over to the society for its use in the event the contract is terminated. Mr. Nelson then moved that the contract with the suggested clause be adopted and the president authorized to sign same. Motion seconded by Mr. Bogard and carried. Mr. Krefft advised that the letter recently forwarded to the membership requesting suggestions for prospective advertisers had brought excellent response and a number of contracts had been received to date. Mr. Nelson moved that the list of advertisers read by Mr. Krefft be approved, seconded by Mr. McLellan and carried. Mr. Scales then moved that the Publications Committee be delegated the authority to approve or disapprove all future advertising contracts, seconded by Mr. Sessums and carried.

The secretary reported that the cost of addressograph plates for all non-member registered engineers in Louisiana would probably exceed $200, and that the cost of a cabinet for said plates would be approximately $105. Mr. Nelson moved that the secretary be authorized to purchase the plates and cabinet, seconded by Mr. Sessums and carried. The secretary advised that these items would be handled as a capital investment and would not be charged to operating expenses for 1958.

Mr. Sessums moved that the abbreviated title "P.E." be placed after the name of each registered engineer to whom a copy of THE LOUISIANA ENGINEER will be sent, seconded by Mr. Janssen and carried. The secretary advised that he would gradually change the plates of current L.E.S. members to include the title "P.E." after the names of those who are registered.

The secretary read two proposed bills to amend the Engineering Registration Law prepared by the Legislative Committee. Mr. Bogard moved that the bills be approved as written by the committee, seconded by Mr. Nelson and carried.

President Freeman read the agenda of Mr. Paul Robbins of NSPE, tour speaker who will address the Lafayette, Monroe, Baton Rouge, Alexandria and Lake Charles sections on consecutive days, March 24-28.

The secretary read a letter from Mr. M. D. Garrison, Secretary-Treasurer of the Lake Charles Section, reporting on the observance of National Engineers' Week by the section. The following correspondence also was read:

Letter from Joseph Babin, senior engineering student at Louisiana State University, thanking the society for the scholarship awarded to him.

Letter from Mr. Hermann L. Lehmann thanking the board for the honorary membership certificate recently presented to him through the Baton Rouge Section.

Mr. Nelson moved that the date of July 10 suggested by the Outing Committee be approved for the Annual Outing, seconded by Mr. McLellan and carried. The board suggested that the committee use its discretion in the matter of entertainment, and that the complete omission of entertainment would be acceptable.

Mr. Bogard moved that Mr. James Janssen sponsor the Technical Papers Committee for 1958, seconded by Mr. Scales and carried, after which the board meeting was recessed so that the society's regular meeting could begin on time.

Following adjournment of the society's regular meeting the board reconvened and discussion continued on the idea of individual board members sponsoring various activities of the society. It was decided that the First Vice-President would sponsor the annual State Planning Conference and the Second Vice-President would sponsor Engineers' Week, both of these events to be planned in advance for the following year.

Dr. Taylor moved that the resignations of the following be accepted with regret, seconded by Mr. Nelson and carried: Alfred G. Muller, Member, Gulfport, Miss.; John J. Coates, Member, Baton Rouge; Raymond J. Meyer, Junior, Gretna, La.

Mr. Nelson moved that Louis Leroy Hines be reinstated to the grade of Affiliate Member and that Irwin C. Weidig be reinstated to the grade of Member, seconded by Mr. Janssen and carried.

Mr. Nelson moved that the election of Homer L. Chambers (Aff.), Alexandria, be declared void, seconded by Dr. Taylor and carried.

Dr. Taylor moved that the following delinquent members of unknown address be dropped from the rolls, seconded by Mr. Sessums and carried: Milan Babich, Member, Oregon; Sammy Lee Fontenot, Junior, Lake Charles; Curtis F. Hawley, Junior, Texas; Walter H. Pace, Jr., Junior, New Orleans; Theodore L. Pantz, Member, Florida; Tillman J. Tucker, Member, Shreveport; Walter E. Tanner, Member, Texas; Victor J. Tudury, Jr., Junior, New Orleans.

Upon the recommendation of the board, President Freeman appointed Messrs. Wm. J. Drawe, Jr. Chairman and Henri J. Molaison, Vice-Chairman of the state-wide committee on Engineers' Week, and Messrs. Robert H. Grehan, Chairman and Leo L. Holzenthal, Vice-Chairman of the New Orleans Engineers' Week Committee. Likewise Messrs. Tom C. David, Chairman and W. C. Gaddy, Jr., Vice-Chairman of the state-wide Vocational Guidance Committee and Messrs. Elmer May, Chairman and John E. Morehiser, Jr., Vice-Chairman of the New Orleans Vocational Guidance Committee.

President Freeman urged all those present to attend the next meeting of the Board to be held in Alexandria on March 21, when all unfinished business would be discussed, after which the meeting adjourned.

J. P. FERNANDEZ, Secretary-Treasurer

Minutes of Regular Meeting of the Society, Held at the Engineers' Club, New Orleans Monday, March 10, 1958

The meeting was called to order by President Freeman with approximately 100 members and guests present. Reading of minutes of the preceding meeting was dispensed with upon motion duly made and seconded, whereupon the secretary read minutes of a meeting of the Board of Direction held on January 27.

Mr. Lionel J. Cucullu read an obituary of the late Lyman C. Reed. Mr. Grevemberg moved that the obituary be included in the society's records and that copies be sent to the family of the deceased, seconded by Mr. Spence and carried. A moment of silence then was observed in memory of the departed member.

The president then called on Mr. DeWitt Morris, Chairman of the Technical Papers Committee, who in turn called on Mr. Erwin O. Dykes to introduce the principal speaker of the evening, Mr. Arthur J. Naquin, Safety Counsellor, New Orleans Public Service Inc., who spoke on "SOME ENGINEERING ASPECTS OF SAFETY ENGINEERING." Following Mr. Naquin's lecture a panel consisting of the following representatives of local engineering groups discussed specialized aspects of the subject:

Mr. Waldemar S. Nelson	A.S.M.E.
Mr. C. W. Lane	A.S.R.E.
Mr. B. Z. Segall	A.I.E.E.
Mr. Chester Comstock	A.S.C.E.
Mr. Robert Scott	I.E.S.
Mr. O. F. Weideman	A.I.Ch.E.

Following the panel discussion President Freeman made announcement of the speaking tour to be made by Mr. Paul N. Robbins of The National Society of Professional Engineers, who will lecture at consecutive meetings of the Lafayette, Monroe, Baton Rouge, Alexandria and Lake Charles Sections on March 24-28. He also announced the approaching State Planning Conference to be held at Alexandria on March 22 and invited all those present to attend.

The meeting then adjourned and the usual social hour followed.

J. P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction March 21, 1958

The meeting was called to order by President Freeman in the Bentley Hotel, Alexandria, with Messrs. Cambre, Janssen, Malahy, McLellan, Moore, Nelson, Sessums, Smith, Sutton and Fernandez present. Messrs. Melancon, Krefft and Ryan also were present by invitation. Mr. McLellan moved that the reading of minutes of the preceding meeting be dispensed with, seconded by Mr. Sutton and carried.

A letter from Mr. Homer L. Chambers was read. Mr. Chambers, a recently elected Affiliate Member, advised that he has been stationed in the Pacific area and had not received his notice of election, whereupon Mr. McLellan moved that the motion voiding Mr. Chambers' membership be deleted from the minutes of the last meeting, seconded by Mr. Moore and carried. Mr. Malahy moved that the minutes as transmitted to the board members be approved with the above deletion, seconded by Mr. Nelson and carried.

As Chairman of the 1958 Annual Meeting, Mr. McLellan announced that the attendance was as follows:

	Out of Town	Local	Total
Men	140	327	467
Ladies	10	14	24
Total	150	341	491
Students included in count	131		

He also read the treasurer's financial report on the annual meeting, which disclosed a net cost to the society of $184.05. Mr. Sessums moved that the chairman and his committee be complimented for having provided such an exceptionally successful meeting, seconded by Mr. Malahy and carried.

The secretary reported that 2,280 addressograph plates for non-L.E.S. registered engineers residing in Louisiana had been ordered for the purpose of mailing THE LOUISIANA ENGINEER. Mr. Nelson, Chairman of the Publications Committee, announced that the contract with Cypress Publishing Company was being prepared to include a clause pertaining to prepaid advertising. He introduced Messrs. Krefft and Ryan, who were present in the interest of the publication. Mr. Krefft outlined his campaign plan for obtaining new advertising, and Mr. Ryan advised that he would take pictures at the State Planning Conference to be published in the LOUISIANA ENGINEER.

A report on Engineers' Week prepared by Mr. Ed Pavia, Chairman, was read and Mr. McLellan moved that Mr. Pavia be thanked for handling arrangements for the celebration of the occasion, which motion was duly seconded and carried. Messrs. Sutton, Smith, Melancon and Cambre reported on Engineers' Week observances in their respective sections.

A resolution passed by the Monroe Section approving the Louisiana State Board of Education's action whereby the required credits in science and mathematics for high school graduates were raised, was read. Mr. McLellan moved that the Monroe Section be commended for its action, seconded by Mr. Sessums and carried. Mr. Smith reported that a similar resolution had been passed by the Lake Charles Section.

Mr. Nelson moved that Mr. Charles S. Woodruff be appointed as the society's representative to the Louisiana State Council on School Planning and Construction and that the secretary so advise Mr. G. A. Smalling, President of that organization. The motion was duly seconded and carried.

Correspondence concerning the feasibility of establishing a central engineering library at one of the colleges in Louisiana, using surplus funds of the State Board of Registration, was read. A committee consisting of Mr. Roy T. Sessums, Chairman, W. S. Nelson and J. P. Fernandez was appointed to investigate the matter.

President Freeman announced that he would prepare an invitation to engineering graduates to become members of L.E.S., to be inserted in the June issue of the LOUISIANA ENGINEER.

Upon the recommendation of Chairmen and Vice-Chairmen of the various standing committees, the following personnel were appointed:

[*Editor's Note: The committees personnel is given in the front of this issue and is not reprinted here.*]

Discussion followed on the date for the Annual Outing and the secretary was instructed to advise the outing chairman to try to secure accommodations for any Wednesday or Thursday in July if possible. Mr. Sutton announced that the Baton Rouge outing would be held on May 24 instead of June as previously planned.

The Publications Committee was appointed to redesign the society's letterhead and membership certificates to include affiliated national organizations.

Mr. Nelson moved that the following resignations be accepted with regret, seconded by Mr. Sutton and carried: W. J. Hughes, Baton Rouge; W. G. Horstman, Georgia; James J. Farrell, Florida.

The secretary was requested to leave the meeting and during his absence Mr. Sessums moved that the secretary-treasurer's stipend be increased by $50 per month, effective March 1, 1958, seconded by Mr. Nelson and carreid unanimously.

Mr. Nelson moved that the secretary investigate the possibility of having a commercial agency to maintain addressograph plates and of securing commercial service for bulk mailing.

A letter from Mr. Louis Duclos, Chairman of the Legislative Committee, requesting that the proposed amendment to the Engineering Registration Law be revised to include the following sentence: "This injunction will not be subject to be released on bond." Mr. Nelson moved that the recommendation be approved, seconded by Mr. Smith and carried.

The secretary distributed a list of delinquent members to be dropped at the next meeting of the board in accordance with the constitution. Mr. Malahy moved that the list be referred to the membership committee, seconded by Mr. Sutton and carried.

The secretary announced that the Annual Meeting of the National Society of Professional Engineers would be held June 11-14 at St. Louis, Mo.

There being no further business, the meeting adjourned.

J. P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction, held at the Engineers' Club, New Orleans on Monday, April 14, 1958

The meeting was called to order by President Freeman with Messrs. Janssen, Malahy, McLellan, Nelson, Sessums, Taylor and Fernandez present. Mr. Allen H. Jensen also was present by invitation. Dr. Taylor moved that the reading of the minutes be dispensed with insofar as all board members had received copies in advance. Motion seconded by Mr. Janssen and carried.

Mr. Sessums, Chairman of the Finance Committee, presented a quarterly financial report.

The secretary read a report by Mr. Arthur Naquin, Chairman, Professional Civic & Industrial Affairs Committee, on a meeting held at International House on March 24 relative to the formulation of plans for an International Assembly Center for New Orleans. The secretary also read an earlier report by Mr. Nelson on the same subject in order to acquaint new board members with the matter.

Mr. Ed McLellan, Chairman of the 1958 Annual Meeting, submitted his report. Mr. Nelson moved that the board express its appreciation to Mr. McLellan and his committee for its fine work, seconded by Mr. Sessums and carried.

Mr. Allen H. Jensen, Chairman for the 1959 Annual Meeting, reported on the progress of plans for the next annual meeting and recommended the following members to head sub-committees, which the board approved:

Committee	Chairman	Vice-Chairman
Banquet	Ben Louviere	Robert A. Banck
Woman's Auxiliary	Lee H. Johnson	Albert J. Fransen
Program	Marion E. Frater	August H. Douglas, Jr.
Registration	August J. Brodtmann	Clyde J. Cucullu
Student Conference	Frank J. Dalia	John T. Knight, Jr.
Technical Papers	Philip W. Bohne	Forney Fuller

It was decided to hold the Annual Meeting at the St. Charles Hotel on January 15-16-17, 1959.

Correspondence from the American Institute of Industrial Engineers requesting that the Louisiana Registration Law be amended so that Industrial Engineers may be licensed under that branch of engineering was read. Mr. Sessums moved that this be referred to the Legislative Committee, which was duly seconded and carried.

The secretary read minutes of a meeting of the Board of Direction of the National Society of Professional Engineers held on February 13, 1958, wherein the Louisiana Engineering Society was officially recognized as an affiliate state society of NSPE.

The secretary reported that 519 Ballots had been returned in the recent membership election and that all applicants had been elected to their respective grades. A copy of the ballot is attached to these minutes.

Mr. Freeman read a proposed letter of invitation to registered engineers to join L.E.S. The secretary was instructed to forward same to Dr. F. W. Macdonald, Chairman of the Membership Committee.

The secretary presented a report by the Addressograph-Multigraph Company concerning a new system for handling the society's records. President Freeman appointed Mr. Michael C. Abrahm to head a committee of his choice to investigate the matter.

Mr. Nelson moved that Mr. Patrick N. Garner be reinstated to the grade of Member.

A letter of resignation from Mr. Rudolph Hertzberg was read and the secretary was instructed to advise Mr. Hertzberg that the board would like him to reconsider his resignation.

There being no further business the meeting adjourned.

J. P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society held jointly with the New Orleans Section, American Society of Mechanical Engineers Monday, April 14, 1958

The meeting was called to order by President Freeman with approximately 100 members and guests in attendance. President Freeman welcomed members and guests of ASME. Mr. Charles Knost moved that the reading of minutes of the preceding meeting be dispensed with, seconded by Mr. Seymour Cambias and carried, whereupon the secretary read minutes of a meeting of the Board of Direction held at Alexandria on March 21.

Mr. Al Lusch then addressed the gathering in behalf of the membership drive now being conducted by the Engineers' Club.

The chair was relinquished to Mr. Allen Betz, Chairman of the local ASME, who called on Mr. R. P. Lockett, Jr., to introduce the speakers of the evening, Messrs. Lionel J. Cucullu, Vice-President and Chief Engineer; Michael C. Abrahm, Principal Mechanical Engineer; and Malcolm W. Stumpf, Principal Electrical Engineer, of New Orleans Public Service Inc. Their joint illustrated lecture on "The Michoud Steam-Electric Generating Station of New Orleans Public Service Inc. was most interesting and informative and was followed by the usual question period.

The chair then was returned to President Freeman, who adjourned the meeting with a rising vote of thanks to the speakers.

J. P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Alexandria Section, Louisiana Engineering Society

The March meeting of the Alexandria Section of the Louisiana Engineering Society was held at the Community Center at 7:00 P.M. March 27, 1958, with 18 members and three visitors, Mr. Freeman, Mr. Salley and Mr. Paul Robbin present.

The meeting was called to order by President Moore.

Minutes of the February meeting were read and approved.

Mr. O. E. Barron announced that the next Coordination Meeting will be held in Alexandria, Louisiana, March 23, 1959, and urges that plans be made as soon as feasible.

Mr. Melancon expressed his appreciation for the job done by each member in making the Coordination meeting a success.

Mr. David reported on the presentation of the Charter making the Louisiana Engineering Society affiliate member of the National Society of Professional Engineers.

Mr. Smith reported on a very successful achievement day for the Jets.

A motion was made by Mr. Smith and seconded by Mr. David, that $30.00 be appropriated to provide each of the 15 high schools in their section a subscription of the American Engineer. Voted unanimous.

A motion was made by Mr. Smith and seconded by Mr. Melancon, that this section purchase letterhead stationery leaving off the names of officers. Voted unanimous.

President Moore introduced Mr. Paul Robbin, Secretary of National Society of Professional Engineers, who made a very informative and interesting talk on the Philosophy in which the National Society of Professional Engineers is originated.

State President Nelson explained the qualifications for membership and new members also membership grade.

There being no further business the meeting was adjourned.

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society
March 26, 1958; 7:30 P.M.; Agricultural Engineering Auditorium
Louisiana State University

Mr. Paul H. Robbins, Executive Director of the National Society of Professional Engineers, spoke on "The Future of Professional Engineers and Engineering." A very active question and answer session on functions and aims on NSPE and the profession followed the talk.

This was a joint meeting of the American Institute of Industrial Engineers, the

American Institute of Electrical Engineers, and the Louisiana Engineering Society. Total attendance was approximately 75. Refreshments were served after the meeting.

HAROLD F. LEIENDECKER, Secretary-Treasurer

Minutes of Meeting of the Lafayette Section, Louisiana Engineering Society
April, 1958

The regular meeting of April was a joint meeting with the American Institute of Mining Engineers, held at the Petroleum Club, Lafayette, on the 9th at 7:30 p.m. Joint attendance of both organizations was about 130.

The meeting was opened with a welcome by the president of the A.I.M.E. Lafayette Section President Cambre was called on for a few remarks; he expressed the pleasure of L.E.S. members for this occasion of a joint meeting and invited the group for similar meetings in the future. President Cambre also mentioned the need for Professional Engineering Societies to unite together in efforts with common objectives in order to accomplish the purpose of those organizations.

There was no business transacted at this meeting.

The guest speaker was introduced. He was Mr. C. V. Kirkpatrick, Head of the School of Petroleum Engineering, University of Houston, who gave a review of educational standards in the primary, secondary and college level of education. Mr. Kirkpatrick's presentation gave all present a more comprehensive view of science and engineering in education and how to more effectively increase interest among students at the primary and secondary levels.

Following the very interesting talk, a film was shown on petroleum engineering.

The meeting was then adjourned.

GERALD R. DYSON, Secretary-Treasurer

Minutes of the Monroe Section of the Louisiana Engineering Society
March 25, 1958

The Monroe Section of the Louisiana Engineering Society met at Louisiana Tech in Ruston, Louisiana on March 25, 1958. An oyster and shrimp supper was served beginning at 7:30 p.m.

The meeting was called to order by the first vice-president, Mr. James McKinley at 9:10 p.m. President Ropp of Louisiana Tech made a welcoming speech. Mr. Fristo introduced the guest speaker, Mr. Paul Robbins, a representative of the National Society of Professional Engineers. Mr. Robbins made a speech about the philosophy of the Professional Engineering Society.

There were forty-two members, twenty-three guests, and sixteen members of the Shreveport Section present at the meeting.

The meeting was adjourned by the first vice-president at 9:50 p.m.

DAN D. McDUFF, Secretary-Treasurer

Minutes of Meeting, Shreveport Section, Louisiana Engineering Society

Our first meeting of 1958 was held at the Seven Seas' Restaurant, March 18 and was for organizational purposes and appointing active committees. Volunteers and appointments of the various committees were:

Sectional Coordinating Committee — Val Lyons, Chairman, J. C. McLemore; Membership Committee — Rhett Parker, Chairman; (Mr. Parker to secure one from Texas Eastern and United Gas to assist him); Publicity Committee — O. T. Ice, Jr.; Program Committee — W. C. Thurman, Chairman, Chris Demopulas, Gordon A. Marsalis; Science Education Council — George C. Hengy, Chairman, Ralph S. Segall, Q. W. Hargrove.

A vote of the membership showed that the first Tuesday of each month was the best night for all concerned and it was decided to hold our next meeting Tuesday, April 1, 1958.

A conference for Saturday, March 28, 1958 in Alexandria was announced. (Six members of the Shreveport Section attended).

Ben Atchley was complimented on the publicity secured over television and radio for Engineers' Week.

It was learned that a meeting of the Monroe Section was to be held at La. Tech in Ruston, Tuesday, March 25. Eighteen Shreveport members attended and enjoyed a shrimp and oyster supper followed by an interesting talk by Mr. Paul H. Robbins, Executive Secretary of the N.S.P.E. with which L.E.S. officially affiliated February 12.

In view of the Alexandria and Ruston meetings it was decided to have our next meeting May 6.

O. T. ICE, JR., Secretary-Treasurer

THE LOUISIANA ENGINEER

JUNE 1958

"Patronize Our Advertisers"

INDEX TO ADVERTISERS

THE LOUISIANA ENGINEER

Vol. 44 AUGUST, 1958 No. 4

CONTENTS

EDITOR: Chester A. Peyronnin, Jr.

Post Office Station 20, New Orleans, La.

PUBLISHER: Cypress Publishing Company

724 Girod Street, New Orleans, La.

THE LOUISIANA ENGINEER is the official publication of the Louisiana Engineering Society and is published in February, April, June, August, October, and December. Subscription, $3.00 per annum; single copy, 50 cents.

Second Class mail privileges authorized at New Orleans, Louisiana. Acceptance for mailing at special rate of postage provided for in Section 1105, Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

404 Baronne St.

OFFICERS OF THE SOCIETY

ERNEST M. FREEMAN, *President*, 1103 Henry C. Beck Building, Shreveport

ROY T. SESSUMS, *First Vice-President*, P. O. Box 1520, New Orleans 5

EDWARD A. McLELLAN, *Second Vice-President*, P. O. Box 238, New Orleans 3

JOHN P. FERNANDEZ, *Secretary-Treasurer*, 522 Crystal Street, New Orleans 24

BOARD OF DIRECTION OF THE SOCIETY

BEN T. BOGARD, 36 University Drive, Ruston

JAMES S. JANSSEN, 317 Baronne Street, New Orleans 9

WALDEMAR S. NELSON, 1200 St. Charles Avenue, New Orleans 13

WALTER H. SCALES, 1822 Valence Street, New Orleans 15

FRANCIS M. TAYLOR, Tulane University, P. O. Station 20, New Orleans

OFFICERS OF STATE SECTIONS

Alexandria Section:

ANDREW M. MOORE, *President*, 1423 Donahue Ferry Road, Pineville

DALLAS C. ROBERTS, *Secretary-Treasurer*, 825 Murray Street, Alexandria

Baton Rouge Section:

WALTER L. SUTTON, *President*, 9653 Molly Lea Drive, Baton Rouge

HAROLD F. LEIENDECKER, *Secretary-Treasurer*, 657 Carol Marie Drive, Baton Rouge

Lafayette Section:

ROLAND J. CAMBRE, *President*, P. O. Box 898, S.L.I., Lafayette

GERALD R. DYSON, *Secretary-Treasurer*, P. O. Box 723, Lafayette

Lake Charles Section:

GLENDON L. SMITH, *President*, 39 Horseshoe Lane, Maplewood

MARION D. GARRISON, *Secretary-Treasurer*, 1709 Kirkman Street, Lake Charles

Monroe Section:

FARRELL W. ADAMS, *President*, Box 2867, Monroe

DAN D. McDUFF, *Secretary-Treasurer*, 602 Balboa Sereet, Monroe

Shreveport Section:

JOHN S. MALAHY, JR., *President*, 330 E. Kings Highway, Shreveport

ORVILLE T. ICE, JR., *Secretary-Treasurer*, 522 Egan Street, Shreveport

STUDENT CHAPTER NO. 1 SOUTHWESTERN LOUISIANA INSTITUTE

CHARLES R. BAKER, *President*, Box 119, S.L.I., Lafayette

JAMES M. McCLANAHAN, *Secretary*, Gen. Delivery, S.L.I., Lafayette

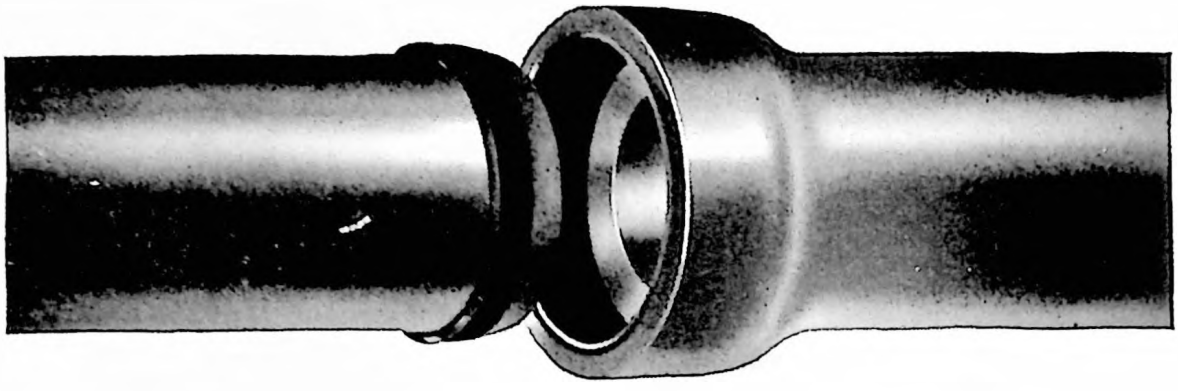
EXHIBIT "B" STATEMENT OF INCOME AND SURPLUS (ON CASH RECEIPTS AND DISBURSEMENTS BASIS) FOR THE YEAR ENDED DECEMBER 31, 1957

INCOME

Dues collected (less rebates to Sections, $3,612.45)	$11,037.80
Advertising revenue	1,502.97
Income from investments and savings accounts	371.04
Miscellaneous — profit sale of certificates, etc.	35.50
Total Income	$12,947.31

EXPENSES

Cost of annual meeting — receipts under disbursements	$ 112.59
Cost of annual outing — excess of receipts over disbursements	(47.00)
Expenses paid in advance — succeeding year's annual meeting	130.89
Salary — secretary — treasurer	3,300.00
Salary — Assistant secretary	1,020.00
Cost of publishing proceedings	3,666.72
Dues	82.00
Refreshments, etc. at meetings (less pro rata receipts from joint meetings held)	296.86
Printing, stationery and supplies	1,416.42
Postage	936.36
Cost of Engineer's week	164.82
Floral offerings	76.80
Medals, awards and trophies	95.14
Present to retiring president	73.45
Social security tax	105.65
Auditing	150.00
General expenses	137.29
Traveling expenses — president and secretary	215.80
Scholarship tuition	400.00
Rent — headquarters	165.00
Vocational Guidance	131.87
Total Expenses	$12,630.66
NET INCOME FOR THE YEAR	$ 316.65
DEDUCT — Capital expenditures — purchase of equipment less $65.00 from sale of chairs	(280.87)
SURPLUS AT JANUARY 1, 1957	15,732.06
SURPLUS AT DECEMBER 31, 1957	$15,767.84



NEW Dickey PVC Coupling stops infiltration

The new Dickey PVC Coupling of polyvinyl chloride, fused to Dickey Clay Pipe at the factory, now permits engineers and municipalities to specify sewer pipe sizes on the basis of actual flow . . . no allowance is necessary to compensate for infiltration because ground water just can't get in. And wastes can't get out, either.

This new Coupling, the first to be wholeheartedly endorsed by the Dickey Co., is completely resistant to root penetration and to the action of oil, gasoline, acids and other chemicals commonly found in sewers. The polyvinyl chloride from which it is made remains flexible for years . . . holds tight even when the pipe is moved slightly during normal back-filling, tamping and settling.

Send today for free fact-filled Bulletin 718

Providing improved sanitation for better living

DICKEY

sanitary salt-glazed clay pipe

W. S. DICKEY CLAY MFG. CO.

Birmingham, Ala. Chattanooga, Tenn. Kansas City, Mo. Meridian, Miss. St. Louis, Mo. San Antonio, Tex. Texarkana, Tex.-Ark.

If it's made of clay it's good . . . if it's made by Dickey it's better

MAIL THIS COUPON TO NEAREST DICKEY OFFICE

W. S. DICKEY CLAY MFG. CO.

Please send me, without cost or obligation, a copy of your illustrated Bulletin 718 — "The New Dickey PVC Coupling."

Name_____

Company_____

Address_____

City_____ Zone___ State____

8018

The Michoud Steam Electric Generating Station of New Orleans Public Service Inc.

Lionel J. Cucullu, Michael C. Abrahm, Malcolm W. Stumpf

In presenting this paper to you, we will give a brief analysis of the factors which governed selection of the station site and then will deal with the structural, mechanical and electrical design features. As my associates are far more familiar with these latter phases of the project than I am, my remarks will be limited to the site selection, and Messrs. Abrahm and Stumpf will take it from there.

When development of a specific new generating station site is decided upon, the decision is usually preceded by a careful study of all other potential sites in the area. This was the pattern leading to the Michoud site selection.

As most of you know, some of the vital engineering considerations in locating a generating station are: An adequate fuel supply at reasonable cost; condensing, service, and boiler feed water in amounts and of suitable quality for the plant's requirements; a strategic location with respect to transmission of the electrical energy to present and future system load areas; and availability of a sufficiently large plot of favorably located land, with subsurface conditions that will permit foundation designs for the support of heavy structures, and with freedom from aerial restrictions up to the heights of large boilers and chimneys. Some corollary features include good rail and water transportation availability, protection from storm tides and bank erosion, etc., and proximity to highways and utilities such as city water supply.

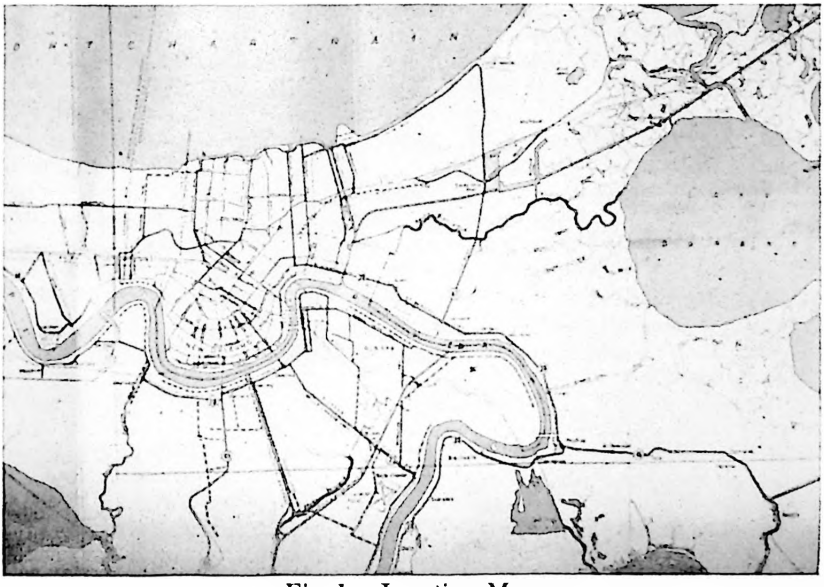


Fig 1. Location Map

Without laboring the advantages or disadvantages of other potential sites which were studied, let us take a brief look at Michoud's qualifications. With respect to fuel, high pressure gas in quantity was avaliable at the property line; oil and possible future coal could be received from the main line of the L & N Railroad, the Intracoastal Waterway and the Tidewater Seaway (when constructed). Condensing water for near-term requirements was available from the Intracoastal Waterway; long term

considerations hinged upon the development of the Seaway channel or other practicable alternatives. Experience with deep water wells in the vicinity gave promise that service water and fire protection requirements could be adequately met from that source, and proximity of city water supply for boiler feed makeup gave further assurance that the water problem could be satisfactorily solved. Electrical transmission distances to present load areas are quite reasonable; there is long range promise that load growth in the eastern area of the city, due to new residential areas and to industrial and other development associated with the Tidewater Seaway, will make the Michoud site a very strategic one from a transmission viewpoint.

The remaining criteria, with one exception, can be quickly reviewed. There was sufficient acreage available at the site; it was traversed by east-west and north-south paved highways; protected from storm tides by a very substantial levee; and not subject to bank erosion or channel shifting except to such extent as wave wash effects from passing vessels might produce. Aerial restrictions imposed no significant limitations, but what about foundation conditions? An extensive soil boring, soil testing and test pile loading program was necessary to provide the answer to this question.

The first group of borings indicated that it would be necessary, for major foundations, to employ piling 75-85 ft. in length, to be bottomed in a Pleistocene clay stratum. It was estimated that the piles could be loaded to 15-20 tons/pile and settlement of as much as 5" was predicted for the heavy structure. In view of the wide variations of subsurface conditions encountered in New Orleans, it was decided to drill additional borings. These paid dividends when certain sand strata were revealed in the southwest portion of the property, underlying an area sufficiently large to accommodate the station proper. In this area 19 test piles (7 timber and 12 cast-in-place) were driven and safe bearing capacity calculated. Four of the cast-in-place piles were each loaded to 80 tons and four of the timber piles were each loaded to 40 tons and resulting net settlements observed. These were substantially less than the amount permitted by the building code. Some of the piles were then loaded to failure.

Based upon the soil boring and test pile data it was recommended that the boiler, turbine and elevated water tank be supported on cast-in-place concrete piles driven to the lower sands at approximately elevation (–)75.0 M.S.L. and that these piles be designed for 40 tons per pile. For certain other foundations, similar piles with tips at approximately (–)60.0 M.S.L. in the upper sands were recommended, with piles designed for 50 tons each. For the balance of the foundations, timber piles embedded in the upper sands with loadings varying from 10-20 tons each were recommended.

EDITOR'S NOTE: This combined paper was presented at the April meeting of the Society in New Orleans, La. It is printed in the narrative form as presented.

MECHANICAL, HYDRAULIC AND ARCHITECTURAL

(Mr. Abrahm)

Thank you, Mr. Cucullu. We have had experience with both a completely indoor plant (Market St.) and a semi-outdoor plant (A. B. Paterson). Just to refresh your knowledge, a semi-outdoor plant has the turbine-generator and principal auxiliaries (with the exception of the fans) enclosed, and the steam generator (boiler) and fans outdoors. Equipment design had progressed to the point that we have confidence in a completely outdoor station, and a decision was made to omit the building completely except that enclosure required for the control room, offices and dressing rooms, etc., and also an enclosure for electrical switchgear that will be described later by Mr. Stumpf.

A second major decision was to place all non-expendable equipment subject to damage by being submerged in water at elevation +10 ft. mean sea level. Tidal waves resulting from hurricanes are known to have reached an elevation of +7'

m.s.l., and although the area now is enclosed by levees, the small incremental cost of using a minimum of +10′ m.s.l. was felt to be justified due to the importance of plant operation and value of the equipment.

These factors led to the adoption of the so-called one-deck design, similar to construction utilized in certain other stations. Actually, although all major equipment is on one deck, elevation 24, there is some equipment located on a mezzanine at +10. The principal objection to the one-deck design appeared to be the large floor area required, and therefore, what initially appeared to be unnecessary building costs. Final costs, however, justified the design with its inherent simplicity of piping layout, and ample space around each piece of equipment for ease of installation. It also permits facility of operation and good housekeeping.

Meanwhile, with the size of the generating unit already decided from previous studies, work was progressing on determining economics of several steam pressure and temperature combinations and also the use of reheat. This work led to the adoption of the nominal 1450 psig, 1000°F steam system and estimated equipment costs showed justification for reheat; but subsequently, actual quotations received on the steam generating unit indicated economics in favor of non-reheat, and this system was adopted.

A study was then undertaken to determine the economic number of extraction points to be used on the turbine, along with characteristics of the feedwater heaters. While normally thought of as a simple bundle of tubes stuck in a shell of the proper gage material for the pressure/temperature involved, actually a heater performs a complex thermal function. A number of heat balances were prepared to determine end results, and estimated heater prices were obtained. From this study, a six-point bleed system was decided upon, employing a drain, or drip pump as it is usually known, as shown by the sketch. Drain from the 5th stage heater cascades to the 8th stage; 8th stage to the 11th; 11th to the 14th, where these accumulated drains are pumped into the feedwater system. The 17th stage heater cascades to the 19th, and these accumulated drains flow by pressure differential into the condenser.

The condenser selected is the deaerating type, that is, the design incorporated a deaerating feature for removal of non-condensible gases. In our other steam systems we have used a deaerating heater for this function. Also, in our other systems, the water in the storage tank of the deaerating heater provided suction for the boiler feed pumps. In the system at Michoud, a large hotwell was provided on the condenser backed up by a cold condensate storage tank. A condensate pump takes water directly from the hotwell, pumps it through 3 low pressure heaters to the suction of a boiler feed pump, which forces the water through 3 high pressure heaters to the steam generator economizer. There are 3 sets of companion pumps, two sets being required for heavy loads, and the other set for automatic standby.

Selection of boiler feed pumps involved two studies, first, the number and size of pumps; and the other, whether or not to use speed control for boiler drum level. Heretofore, we have used constant speed motor drives with an automatic feedwater regulator in the line to the boiler. As to the size of the pumps, two nominal 100% capacity, two nominal 50% capacity, 3-nominal 33 ⅓% capacity, and 3-nominal 50% capacity were studied. From this, it was decided to use the 3 nominal 50% capacity units on the basis of reliability of operation. Variable-speed operation of the boiler feed pumps was decided on based on a definite, but small, economic advantage, this being predicated on omission of the feedwater regulator entirely. At lightest loads, where operating of a variable-speed coupling becomes unstable, a motor-operated valve may be operated from the Control Room. This has proven very satisfactory.

A pressurized furnace steam generating unit offered the following advantages: somewhat higher overall efficiency than a suction unit, omission of the induced-draft fan or fans, and the assurance of a "tight" job. As to the forced-draft fans, a study was made to determine economic capacity control, inlet vanes, variable speed motor, variable speed coupling, and here again the variable speed coupling was selected.

Dollar-wise, there was very little in favor of coupling control, but the obvious advantages of reduced speed operation of the fans with resulting decrease of noise and less wear and tear on equipment swung the decision. Results have been very satisfactory. At light loads, where operation of the coupling becomes unstable, it is set at one point and fan discharge damper is automatically put into operation. There are two complete motor-coupling-fan units. The two stacks are supported on the boiler steel, a suitable arrangement when burning natural gas or oil. The steam generating unit is rated 975,000 lb/hr with superheater, economizer, air preheaters and fans, and is set high, to permit adding furnace and hopper bottom tubes for pulverized coal burning in the future, if required.

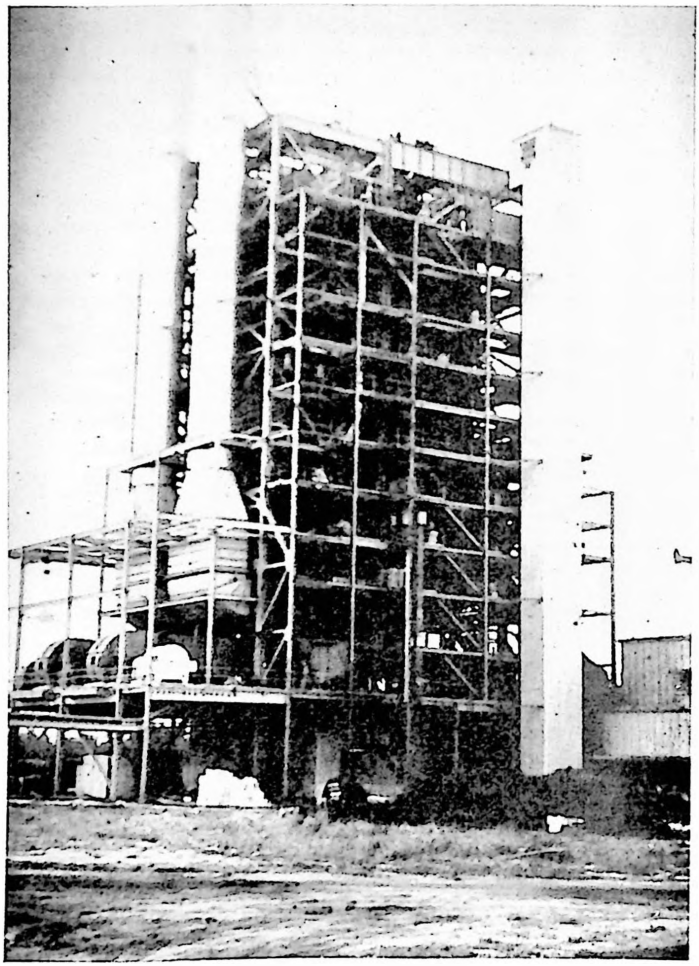


Fig. 2. Boiler

The outside lagging is essentially for weather protection, and an innovation here is that this casing is attached outside the buckstays, making a fairly simple box construction. The space between the main inner casing and the outer lagging is vented. Some control piping is run in this space for protection against freezing.

There are 12 combination gas and oil burners which are controlled in entirety from the Control Room, the gas valve and air register of each burner being motor-controlled. Ignition is effected on each burner by remote control, which, when actuated, operates a spark device to ignite gas at a fairly low pressure. The entire operation may be witnessed in the Control Room by two closed-circuit television units, there being a camera in each rear corner of the furnace, pointing towards the burners. A good picture is also obtained of the gas burners in operation.

Top of the supporting steel of the boiler is +143′ msl, or about 139 feet above ground level. This is as high as one of our higher downtown buildings. Like other boilers this unit is completely suspended, and expands downwards over 4″ when under full load.

Natural gas is the prime fuel, with oil as standby. The gas is reduced in pressure from about 65# down to 35#, then controlled by means of an automatic valve to desired pressure, normally running at full load at about 25# at the burners. Combustion air is introduced at over 600°F, having been heated by 2 Ljungstrom air preheaters, which are rotating cellular devices with spent gasses heating the metal of the cells, which then gives up the heat to the incoming air.

The overall efficiency of the steam generating unit is approximately 86%, using natural gas as the fuel.

The 3600 rpm turbine-generator is a 115,200 kw, 21 stage, 1450#, 1000° turbine unit with a 144,000 kva (@ 30# H_2 pressure) 13,800 volt, generator. It will produce 126,000 gross kw, requiring over 1,000,000 lbs. of steam per hour. The complete unit, including exciter, is 72′ long, and is mounted on a reinforced concrete pedestal. The forming of this pedestal was a sizeable undertaking in itself. Placing the generator stator, which weighs 176 tons, on the pedestal was also a major undertaking.

Erection of a turbine-generator in the field is a long drawn-out job, requiring skill and patience. To facilitate and provide shelter for erection and future maintenance of this unit and possible future units, we decided to install a permanent but moveable aluminum-side house on rails. Usually, a wood-frame shack is built on the pedestal for construction purposes, with removable hatch roof covers for crane hook access.

There are 17 stages in the H.P. section of the turbine, the first being a velocity-compounded stage, and 4 (double) stages in the low pressure section. It is interesting to note that when the turbine is viewed from the side, it gives the impression of being very much larger than it really is, the difference being in the lagging which adds to the appearance besides providing weather protection.

The first portion of the circulating water system to be completed was the discharge canal. This canal was sized for 4 units at the station, and provides a recirculation path to the intake of over 2000′. The intake structure has a coarse trash screen, a revolving fine screen, which is automatically started when set differential in level occurs, a screen washing pump, which starts with the revolving screen, a chlorination system which periodically injects chlorine into the circulating water intake for destruction of marine growths, and two 37,500 gpm vertical circulating water pumps, each having monel turning vanes at the suction. The discharge of the pumps merge in a concrete structure at the levee and from this point to the intake tunnel at the plant the water is carried in a 66″ i.d. reinforced concrete lock-joint pipe. After passage through the condenser, the water goes into a concrete tunnel, then through a 90″ i.d. reinforced-concrete lock-joint pipe to a cast portion on top of the levee, then 90″ pipe again to the discharge structure in the canal mentioned above. Resistance to flow has been somewhat less than design, with consequent greater flow. Normally, this would be all right, except for a probable detrimental effect on the condenser tubes. To reduce this flow would require a restriction in the discharge or trimming the pump impellers. The restriction would result in additional pumping losses. Trimming impellers would mean new impellers when the second unit is put in at Michoud, since a portion of the system, as mentioned above, is common to two units,

and there would be a consequent increased head with two units in operation and reduced flow. To date, no decision has been made in reference to this.

Although the station is equipped with automatic combustion control equipment, automatic feedwater regulation, and automatic superheat control, consistent with normal practice, it is, in reality, a remotely-controlled, manually operated, station. The Control Room is sized for 4 units, the first unit controls being in place. Principal meters, instruments and gages are installed on the vertical boiler-turbine gage board, and control switches, with attendant light indicators, ammeters where required, etc., are located on the control bench board. Practically every major operation in starting-up, operating, and shutting-down may be performed at this board while some auxiliary equipment, such as deep wells, may be controlled from an auxiliary board in the back of the room. The other two boards are electrical boards and will be described by Malcolm Stumpf.

The bench board grouping of switches is functional, for example, each burner set of switches and instruments is in the same relative position as the burner itself on the boiler front. By observation of the two television monitors at the top of the boiler-turbine board, each burner is readily in view of the operator (as mentioned before, there are two cameras, one in each rear corner of the furnace looking towards the burners). If an operator is ready to light up after all other preliminaries have been taken care of, he positions his air register to a pre-determined position then operates the igniter switch. After the igniter flame becomes clearly visible on television, he may open his gas burner cocks and adjust the air register. The igniter may then be turned off. There are three pairs of condensate pump, boiler feed pump sets, usually two being in operation, and upon failure of one or two sets, the third set goes on automatically.

Below the operating room is a low-head cable room, which also houses relaying equipment, combustion control instruments, some air conditioning equipment, etc. First floor houses the superintendent's office, general office, laboratory, first-aid room, dressing rooms, etc.

ELECTRICAL

(Mr. Stumpf)

Before starting an explanation of the electrical features of the plant, it would be desirable to look first at the overall picture which is best conveyed by a one line diagram.

ONE LINE DIAGRAM – The generator supplies power through the generator leads at 13,800 v and about 6,000 amp to the 135,000 kva, 13,800/115,000 v main power transformer and to the 7,500 kva, 13,800/2,400 v auxiliary power transformer. The 115 kv transmission substation consists of the terminal equipment for 115 kv feeders and connections to a distribution substation which was required for customer load near the Michoud Plant. The distribution substation also supplies power to a 5,000 kva 13.8/2.4 kv "starting" transformer which is utilized to supply power to the plant during the starting up operation and during outages of the auxiliary power transformer.

GENERATOR CAPACITY – The generator's capacity depends on the pressure of the hydrogen which is used for cooling. With 30 psi pressure the generator's rating is 144,000 kva of 0.8 pf whereas at 15 psi the rating is reduced 5%. If air is used as the cooling medium, the rating is reduced 50%. This unit could have carried all of the load in New Orleans in 1943. It is ⅓ larger than our previous largest unit which was installed in 1954 and over 2-⅓ times the size of a unit installed in 1950. Because of the rapid growth in the use of electricity it is inevitable that the increase in the size of turbine generators will continue.

GENERATOR COOLING – Since the density of hydrogen is only 1/14 that of air the losses due to windage friction are reduced to a small fraction of their value in

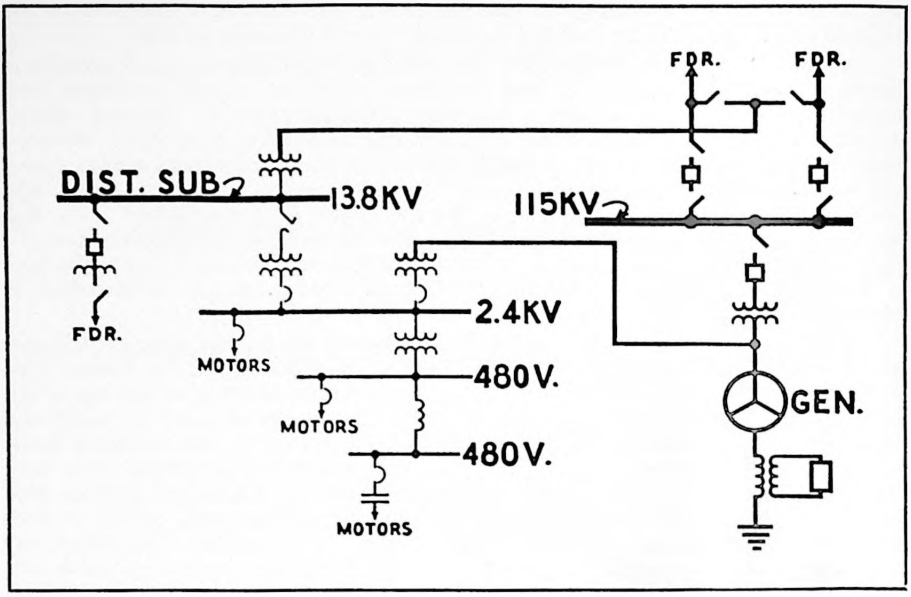


Fig. 3. One line diagram

air. Also, hydrogen has a thermal conductivity seven times greater than air and can remove 50% more heat from surfaces through forced circulation. This results in the generator being about 20% smaller. Fans on the ends of the rotor circulate the hydrogen through the steel core and around the windings of the generator. After absorbing the heat the hydrogen passes through four coolers where the heat is transferred to water. When filling the generator initially with hydrogen the air in the casing is replaced with carbon dioxide. Similarly CO_2 is used when removing the hydrogen before opening the casing to atmosphere.

ROTOR PREHEATING — The rotor must be preheated before it is brought up to full speed. The outer metal of a large solid steel rotor may initially be much hotter than the inner portion, consequently because of thermal expansion radial stresses are developed in resisting the tendency for an imaginary outer ring of steel to pull away from the central portion. This stress acts in the same direction as the centrifugal force. To reduce the centrifugal force and the temperature differential between inner and outer steel the unit is operated at half speed and half voltage while the temperature is slowly increased.

As the generator relay protection does not function satisfactorily at 30 cycles per second, additional relays were provided for protection during the preheating period. Half frequency on the transformers produces double exciting current with resulting increase in heat losses. However, this is compensated for by operation at half voltage. Half speed or 1800 rpm fortunately is not close enough to the critical vibration speed of either the turbine or the generator to be objectionable. The critical vibration speed of the turbine ranges from 2000 to 2300 rpm and of the generator from 1100 to 1300 rpm.

GENERATOR VOLTAGE REGULATOR — The generator voltage and thus the amount of reactive power delivered to the 115,000 v system is controlled by an amplidyne voltage regulator acting on a 375 v d-c generator exciter.

GENERATOR OIL CIRCUIT BREAKER — Because no suitable 6,000 amp oil circuit breaker was available for 13,800 v service, the breaker, which would be re-

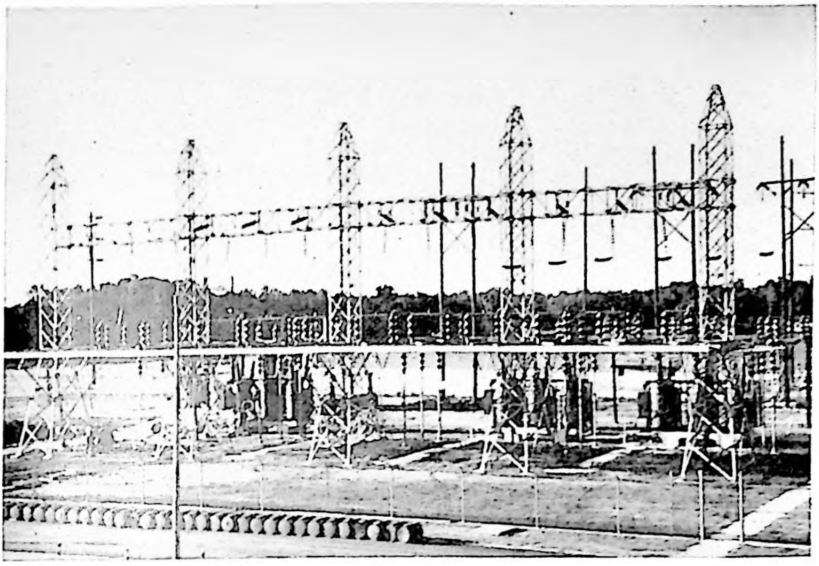


Fig. 4. 115 kv Substation

quired in any event on the 115 kv side of the main power transformer, is used for synchronizing the generator with the rest of the system. It will henceforth be called the generator breaker.

Before abandoning the idea of installing the generator breaker in the 13,800 v generator leads, consideration was given to three plans: First, a 6,000 amp water cooled oil circuit breaker; Second, two oil circuit breakers in parallel; Third, an oil circuit breaker of small current carrying capacity for synchronizing purposes only which would be shorted out by disconnecting switches after synchronizing. The plan chosen was thought to offer definite advantages in reliability and continuity of service over the alternate plans.

The lack of a 13,800 v generator breaker prohibited feeding customer load directly at generated voltage as is done at our Paterson Plant since service would have to be interrupted while the generator is not running. Neither is it possible to carry load on the auxiliary power transformer before the generator is synchronized with the 115 kv system. The distribution substation and the starting transformer filled these needs.

GENERATOR LEADS — Connections are made to the ends of the three 13,800 v stator windings of the generator by means of six porcelain bushings located under the generator. To connect the windings in "Y", three of the bushings are connected through the primary winding of a transformer to the station ground bus. A resistor is connected across the secondary winding to limit the primary current to about 10 amp during ground faults in the generator circuit. If the generator neutral were grounded solidly to the station ground bus a very destructive current amounting to over 60,000 amp would flow during ground faults.

The generator leads from the other three bushings to the main power transformer consist of 10" round aluminum tubing with ½" thick walls. Under the generator and for a short distance away from the operating deck, the round bus is covered with Micarta tubing and the connectors are boxed in with Micarta plates. The insulation level of the porcelain bus supports was selected on the basis of using bare aluminum tubing.

Before deciding on the Micarta covered bus consideration was given to using

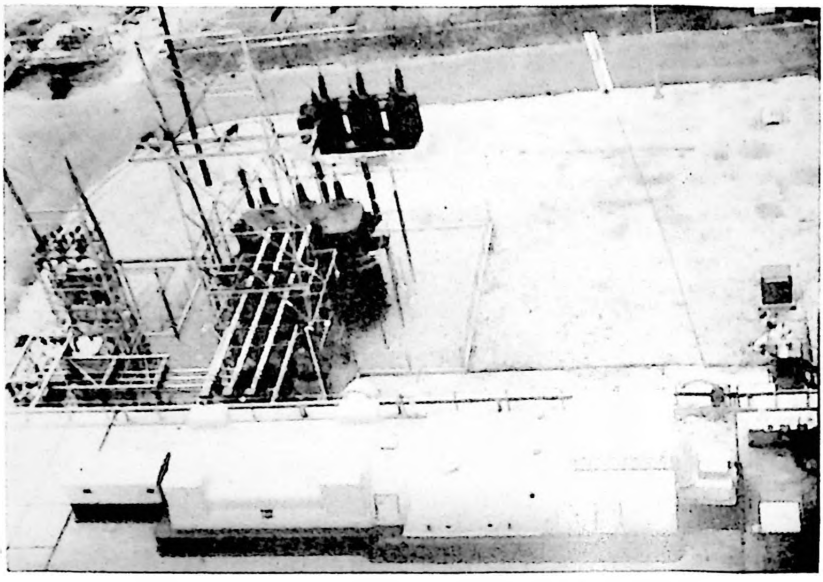


Fig. 5. Turbo-generator, main power transformer and 115 kv circuit breaker

isolated phase metal enclosed construction with each phase enclosed in a grounded metal housing and the three enclosurers separated by air to prevent phase to ground faults from developing into phase-to-phase faults.

In view of the fact that ground faults were limited to 10 amperes, the additional cost of $25,000 for the alternate plan could not be justified.

The 10" diameter aluminum tubing was welded together with the welds being made under a bath of argon gas to prevent oxidation of the aluminum.

Inasmuch as the bus will change its length by over ½" due to thermal expansion, expansion connectors were provided to prevent the generator and transformer bushings from being subjected to large cantilever loads. The channels on which the bus supports are mounted are made of aluminum instead of steel because the 6,000 amp current would cause nearby magnetic materials to heat excessively.

GENERATOR LIGHTNING PROTECTION – Lightning protection of the generator and of the 13,800 v side of the 135,000 kva transformer consists of 12 kv station type lightning arresters in parallel with capacitors which serve to reduce the rate of voltage rise during lightning surges.

GENERATOR RELAY PROTECTION – The generator plus the main power transformer are protected by a differential relay which is actuated when the difference in the incoming and outgoing power exceeds a certain percentage of the total. The relay has harmonic restraint to prevent improper operation during voltage surges in the system when the transformer exciting current would contain large components of current of higher frequencies than 60 cycles.

Additional and separate differential zones of protection are provided for the auxiliary transformer and the generator to obtain greater sensitivity.

A generator neutral current relay is used to detect grounds in the windings and on generator leads. It was considered wise to trip the unit immediately in case of grounds even though current is limited to 10 amperes because of the possibility of a ground developing in a second phase before the ground in the first phase has been removed. The relay is a voltage type connected across the neutral grounding resistor and incorporates a filter to prevent operation by third harmonic currents.

A negative sequence current relay protects the generator against prolonged unbalanced faults which result in excessive heating due to double frequency currents in the rotor.

A loss-of-field relay protects the system against the effect of the very large low power factor current which flows when a large generator runs as an induction motor. The relay is a distance type.

Since neutral current and harmonically restrained relays have filters tuned to 60 cycles, simple overcurrent relays are utilized during periods when the generator is being preheated at 30 cycles. The closing of the generator breaker switches in the normal relays.

MAIN POWER TRANSFORMER — The main power transformer which weighs 184 tons and is 21 feet high is rated 135,000 kva FOA, (Forced Oil and Forced Air Circulation). Eight oil pumps force the oil through eight heat exchangers where sixteen fans remove the heat produced by the transformer losses which amount to about 600 kw at full load. The transformer has no continuous rating without forced cooling. If all cooling were to be lost while carrying full load, the transformer can continue to carry full load for a period of 1-½ hours thereby allowing sufficient time to get another unit on the line somewhere in the system.

Lightning protection for the 115 kv transformer windings is provided in three different ways. A shield wire over the substation minimizes the possibility of direct strokes. Three lightning arresters over 10 feet high rated 97 kv to ground are mounted on the transformer. To back up the lightning arresters rods are spaced to form 20" air gaps which flash over before either the transformer winding or the bushings break down due to a lightning surge.

Fire protection for the 135 mva main power transformer as well as for the auxiliary power transformer, the starting transformer and the distribution substation transformer consists of water spray systems actuated by rate of temperature rise devices installed above the transformers. Large size gravel, 18 inches deep covering the ground in the area of the transformers, is expected in case of a transformer fire to cool and contain the burning oil. A concrete retaining wall prevents the oil from flowing toward the power plant.

2400 V AND 480 V SWITCHGEAR — The switchgear room is located on a mezzanine floor under the operating deck and houses the metal clad indoor type switch gear required for the 2400 v and 480 v motors. Cables from the 2400 v bus feed a 1500 kva sealed dry type transformer which supplies power to the 480 v Power Center and the 480 v Motor Control Center. The 2400 v switchgear, for 250 hp to 1750 hp motors and the 480 v Power Center for 60 hp to 150 hp motors, consists of air circuit breakers most of which are remotely manually controlled from the Control Room. The sealed dry type transformer is twice as large as a conventional oil filled 1500 kva transformer. Notwithstanding this disadvantage it was selected to avoid a fire hazard.

The smaller motors, ¾ hp to 40 hp in size, are served from the 480 v Motor Control Center. The latter consists of manually operated air circuit breakers which trip automatically to clear short circuits plus full voltage line starters which are either remotely manually controlled from the Control Room or are automatically controlled. A current limiting reactor is provided to permit the use of less expensive air circuit breakers in the Motor Control Center.

An extensive study of the relative costs and operating advantages of 2400 v vs 4000 v showed about $4000 difference favoring 2400 v. 4000 v motors cost about $21,000 more but smaller size motor leads and busses in the switchgear reduce this by about $17,000. 2400 v was chosen not only because of the $4000 saving but also because there is a greater margin of safety in the insulation of 2400 v motors.

MOTORS — Motors for a power plant must be carefully selected to provide an even greater degree of reliability than is usually required by an industry. 2400 v motors of a design called "Weather Protected Type II" were purchased. This design

permits wind driven rain to pass straight through from the air inlet opening on one side of the motor to the opening on the opposite side. The air required to cool the stator and rator is drawn by blades on the rotor through passages provided with baffles which remove the air borne water particles. Practically all of the 480 v motors are of the "totally enclosed fan cooled" type.

When a 2400 v motor is idle the air circuit breaker auxiliary switch energizes heaters within the motor to prevent water condensation on the coils. To heat an idle 480 v motor 30 v single phase is applied to two 480 v windings while the third phase is shorted. This is accomplished automatically by means of a line starter auxiliary switch acting through a time delayed contactor.

CABLES – The performance of cables vitally affects power plant operation. At Michoud 2400 v circuits consist of single conductor cables with ozone resistant rubber base compound insulation with a bronze shielding tape and a neoprene jacket. The 480 v cables are similar but the shielding tape is omitted. Control cables with from one to nine conductors were purchased having 24 mil polyethylene conductor insulation, a 4 mil nylon conductor jacket to prevent the polyethylene from supporting combustion, and a polyvinyl chloride sheath. Mineral insulated cables, which can stand any temperature that does not melt the copper sheaths are used in many locations for small 480 v motors, control cables, lighting, and heating cables. The latter prevent freezing in exposed piping.

Indoors the power cables are installed in steel conduit while the control and lighting cables are installed in expanded metal trays. Outdoors the cables are either buried or they are placed in concrete trenches with removable covers.

PUBLIC ADDRESS SYSTEM – The public address system incorporates a general or paging system which includes about 50 speakers covering the entire plant plus a private or party line system. A switch at each station permits changing from one to the other system. The private system gives ordinary telephone communication for as many as five stations on the line at one time.

CONTROL ROOM – The air conditioned and sound proofed Control Room is the nerve center of the plant. Here, instruments and lights indicate how the equipment is functioning and an array of control switches enable the operator to exercise control over the entire plant.

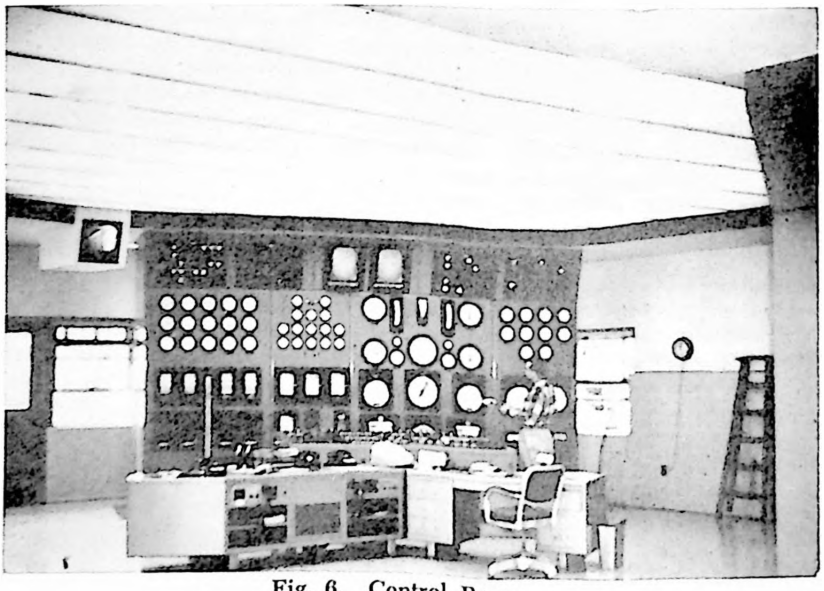


Fig. 6. Control Room

The boiler-turbine gage board and the control bench board were previously described by Mike Abrahm. Above the boiler-turbine gage board are located four annunciators which provide additional information on the functioning of nearly 200 vital elements of the plant. The operating sequence of the annunciator is as follows: 1. Lights are dim normally. 2. Lights flash bright at fast rate for abnormal condition and bell rings. 3. Lights are steady bright and bell stops when the alarm is acknowledged by pressing the reset button. 4. Lights flash bright at slower rate when abnormal condition returns to normal, and buzzer sounds. 5. Lights return to steady dim and buzzer stops when reset buzzer is operated.

Lighting free of specular reflection on the instruments is provided by means of a continuous luminous ceiling.

Obituary of Lyman C. Reed

We record with sorrow the passing of a man who left his mark as one of the pioneers of the electrical industry in Louisiana and a member of the Louisiana Engineering Society for half a century. This man was Lyman Coleman Reed, whose death on November 6, 1957, at Waynesville, N.C., terminated a well-earned retirement which followed a fruitful and active career.

Mr. Reed was born in Jeffersonville, Indiana, July 5, 1875, but he spent most of his life in New Orleans. As a young man he served as Superintendent of the Meter Department of the Edison Electric Light and Power Co. During this period he wrote and published a book, American Meter Practice, which won national acceptance as a standard work on electric meters, both chemical and mechanical. About 1900, Mr. Reed organized the Safety Electric Co. and later he entered into the partnership of Spranley and Reed, wholesale electric distributors. Following this connection, Mr. Reed operated an electrical sign and switchboard manufacturing business and then he established a manufacturers' representative firm, Lyman C. Reed Inc. which is still in operation.

Mr. Reed was an inventor and was holder of many patents. Among other things, he developed the Reed Window Fans and organized Reed Unit Fans Inc. to manufacture them. He was a past president of the Electrical Association of New Orleans and of the Propeller Fan Manufacturers Association.

Mr. Reed was married to Miss Lillian Burdeau Espy, who preceded him in death. He is survived by two daughters, Mrs. William M. Wiepert and Mrs. Stuart P. Atkins; a son, Mr. Charles Espy Reed, and two sisters, Mrs. Mercellus Whaley and Miss Evelyn Reed.

Be it resolved that this obituary be read at a meeting of the Louisiana Engineering Society, entered into the minutes and published in the Proceedings of the Society, and that copies be sent to the members of the family.

LIONEL J. CUCULLU

Engineering Briefs

Almost Everybody Has One — Television's market for first black and white sets is rapidly approaching 100 per cent saturation. At the heginning of 1958 there were 41.8 million television homes out of a total of 48.6 million wired homes in the U. S. or 86 per cent of the total. *—Electronics*

° ° ° °

Eat Bags — Save Ash Cans — Packages for food and other supplies will soon be edible, probably in the form of vitamin-loaded chemical films. Big consideration here is for weight reduction in space travel. *—Product Engineering*

° ° ° °

Relief From Burns — Patients in agony from heat burns can now enjoy peaceful sleep without the need of sedatives after breathing negatively charged air. The new healing method has shown dramatic results in certain types of burn cases. *—Electronics*

° ° ° °

Remote Control Coal Mine — Russia is planning a remote-control coal mine for the Donets basin. The Russians say that all coal-cutting machinery will be controlled from a single panel. No miners will work at the coal face. All operations will be done automatically by a single operator watching the machinery by television. Work on the mine will start this year. *—Purchasing Week*

° ° ° °

Permanent Crease — A high-grade suit manufacturer is experimenting with a chemical that will give a permanent crease to men's pants. The effect is created by the local application of a chemical called ammonium thioglycolate, followed by pressing to set the crease. *—Textile World*

° ° ° °

Powerful Magnifier — A new electron microscope has been developed that will magnify the size of a specimen 100,000 times. It will also magnify items one million times photographically. *—Electronics*

° ° ° °

Nylon Propellers — Propellers for trawlers and other small boats are being coated with nylon in Denmark. The advantages are that they are light in weight, resistant to fouling and to cavitation erosion. *—Product Engineering*

———————

1958

MEMBERSHIP LIST

C. M.—Charter Member
H. M.—Honorary Member
L. M.—Life Member
A.—Affiliate Member
J.—Junior Member

C. E.—Civil Engineer
Ch. E.—Chemical Engineer
E. E.—Electrical Engineer
M. E.—Mechanical Engineer
R.—Registered, La.

A

ALFRED E. ABAUNZA, C. E., R., Ajax Machine Works, 3133 Tchoupitoulas St., New Orleans 13.
CARL E. ABRAHAMSON, C. E., R., Department of Highways, State of Louisiana, 1644 Carl Ave., Baton Rouge 8.
N. C. C. ABRAHAMSON, C. E., R., Department of Highways, State of Louisiana, 1644 Carl Ave., Baton Rouge 8.
MICHAEL C. ABRAHM, M. E., E. E., R., New Orleans Public Service Inc., 317 Baronne St., New Orleans 9.
AARON ABRAMSON, M. E., Ch. E., R., Petrolane Gas Co., Inc., 1611 Audubon St., New Orleans 18.
VERDI ADAM (J), C. E., R., Louisiana Department of Highways, Testing & Research Section, Baton Rouge.
FARRELL W. ADAMS, M. E., R., United Gas Corp., Box 2867, Monroe.
FRED R. ADAMS, E. E., R., Southern Bell Tel. & Tel Co., 1605 15th St., Lake Charles.
GEORGE C. ADAMS, M. E, R., R. J. Jones & Sons, 2236 Paris St., Alexandria.
JAMES O. ADAMS, Ch. E., R., La., Tex., Dow Chemical Co., 1235 Carolyn Sue Drive, Baton Rouge.
SAMUEL L. ADAMS, S. E., R., Tex., Gulf States Utilities Co., 2804 Zeeland Ave., Baton Rouge.
JERRY W. AFFOLTER, JR., Ch. E., Esso Standard Oil Co., 745 Parlange Drive, Baton Rouge.
WM. E. AICKLEN, JR., E. E., R., Kaiser Aluminum & Chemical Corp., 312 Maple Ridge Drive, Metairie.
FELIX L. ALCUS, M. E., E. E. R., La., Miss., self employed, 511 Pan American Bldg., Camp and Poydras Sts., New Orleans 12.
HENRY ALCUS, JR., C. E., Hinderer's Iron Works, 1780 Prytania St., New Orleans 13.
L. S. ALCUS, (L. M.), M. E., R., 474 Audubon St., New Orleans 18.
ALBERT M. ALEXANDER, C E., R., La, Miss., Fla., self employed, 1831 Marengo St., New Orleans 15.
TOM E. ALEXANDER, M. E., E. E., R., Creole Engineering Co., 344 W. Ardenwood St., Baton Rouge.
HUNTER S. ALLEN, (A), C. E., R., Maryland Casualty Co., 7236 Goodwood Ave., Baton Rouge.
JACK W. ALLEN, M. E., E. E., R., The Celotex Corp, 236 Ridgewood Drive, Metairie.
JAMES E. ALLEN, C. E., R., The Allen Construction Co., P. O. Box 3044, Shreveport.
ROBERT D. ALLEN, M. E., R., Gulf Engineering Co., 1000 S. Peters St., New Orleans 13.
LIONEL C. ALLMAND, JR., (J), M E., Foster Grant Co., Inc., 8755 Syble Drive, Baton Rouge.
W. W. ALSUP, C. E., R., The J. B. Beaird Co., Inc., P. O. Box 1115, Shreveport.
ROBT. W. AMMON, M. E., Esso Standard Oil Co., 732 Nelson Drive, Baton Rouge.
WALTER J. AMOSS, (L. M.), C. E., Apartado 1715, Havana, Cuba.
PAUL K. ANDERSON, E. E., Esso Standard Oil Co., 310 Ingleside Drive, Baton Rouge 6.
HERMAN M. ANDREAS, Texas-Bitulithic Co., P. O. Box 8044, Burma Road, New Orleans 22.
WILBUR ANDREPONT, (Jr. Member), Graduate of S. L. I., 541 W. Laurel Ave., Eunice.
ALVIN P. ANDREWS, C. E., R., La. Dept of Public Works, Box 1206, Monroe.
PAUL L. ANDRY, JR., M. E., E. E., R., La., N. Y., Bedell & Nelson Engineers, Inc., 5238 Pitt St., New Orleans 15.
PHILIP P. ANGIER, C. E., R., La. Dept. of Highways, 113 Sidney St., Natchitoches.
D. CHARLES ANTROBUS, JR., (J), Met. E., Esso Standard Oil Co., 737 Carol Marie Drive, Apt. 4; Baton Rouge.
JULIUS B. ARBOUR, M. E., Esso Standard Oil Co., 2952 Belmont Ave., Baton Rouge.
ROBT. L. ARGUS, M. E., R., American Oil Co., Destrehan.
WILBERT L. ARGUS, C. E., R., Alumaglass Bldg. Products Inc., 916 S. Beach Drive, Bay St. Louis, Miss.
HY. G. ARMATIS, C. E., M. E., R., La., Neb., Welding & Mfg. Co., 3650 Fairmont Drive, New Orleans 22.
EDWIN P. ARMSTRONG, (A), Southern Bell Tel. & Tel. Co., 825 Murray St., Alexandria.
RICHARD ARNAUD, (Jr. Member), Graduate of S. L. I., 224 E. 4th St., Crowley.
M. GEO. ARNETT, M. E., E. E., R., Central Electric Co., Rt. 1, Box 435, Opelousas.
ALANSON J. ARNOLD, M. E., R., American Radiator and Standard Sanitary Corp., 1933 Wilton Drive, New Orleans 22.
THOS. H. ARNOLD, JR., Ch. E., McGraw-Hill Pub. Co., 13 Fairview Ave., Darien, Conn.
VERNON W. ASHWORTH, (J), M. E., R., The California Co., 101 Lemon St., Ferriday.
BEN D. ATCHLEY, SR., C. E., R., La., Tex., McLemore & Atchley, 1830 Jenkins St., Shreveport.
ROBT. J. ATKINSON, JR., C. E., Eustis Engineering Co., 3635 Airline Highway, Metairie.
JAMES G. ATTEBERRY, C. E., R., City-Parish Dept. of Public Works, 2617 Rittiner Drive, Baton Rouge.
B. A. AXELRAD, Ch. E., R., La., Tex., Freeport Sulphur Co., P. O. Box 335, Port Sulphur.
JAMES K. AYMOND, (A), U. S. Air Force, 35 Gordon Ave., Alexandria.
SAUNDERS AYMOND, (A), Pan-American Engineers, 1022 Tenth St., Alexandria.

B

B. P. BABIN, E. E., R., Westinghouse Electric Corp., 1226 Dauphine St., New Orleans 16.
LIONEL J. BABIN, JR., (J), M. E., B & M Corp., P. O. Box 6, Houma.
W. M. BABINGTON, JR., (J), M. E., R., Crown Zellerbach Corp., St. Francisville.
GEORGE M. BACCICH, JR., M. E., A. M. Lockett & Co., 2987 Government St., Baton Rouge.
JEROME C. BAEHR, C. E., R., U. S. Engineer Corps, 7407 St. Charles Ave., New Orleans 18.
RAYMOND V. BAILEY, Ch. E., R., Tulane University, Dept. of Chem. Eng., New Orleans 18.
ROBT. E. BAILEY, (J), M. E., R., Gaylord Container Corp., 702 Avenue H., Bogalusa.
CHARLES BAKER, (J), E. E., R., Land-Air, Inc., 1313 Seventh St., Alamagordo, N. M.
JOE M. BAKER, Union Sulphur Co., 3819 Drake St., Houston 5, Texas.
OREN BAKER, C. E., R., Louisiana Department of Highways, Box 872, Alexandria.
WM. E. BAKER, (J), 59-9 Drexelbrook Drive, Drexel Hill, Pa.
ROBT. A. BANCK, M. E., R., Mich., Riley-Stoker Corp., 5534 Canal Blvd., New Orleans 24.
LEO V. BANKSTON, Baton Rouge Water Works Co., Box 2391, 131 Lafayette St., Baton Rouge.
WARREN K. BANKSTON, M. E., N. O. Public Service Inc., 5958 Argonne St., New Orleans 24.
PAUL M. BARBER, 3541 N. Market St., Shreveport.
JAMES R. BARFIELD, (J), Ind. E., Esso Standard Oil Co., 4859 Abelia Drive, Baton Rouge.
JOHN M. BARKSDALE, I. E., Central Foundry Co., 121 Beverly Drive, Baton Rouge.
CHAS. C. BARNARD, C. E., R., La., Del., Ga., Tenn., N. C., S. C., Ala., Ky., Idaho, Fla., Barnard & Burk, Inc., P. O. Box 1470, Baton Rouge.
CHAS. P. BARNARD, (J), C. E., R., Barnard & Burk, Inc., P. O. Box 1470, Baton Rouge.
BEN BARNES, (A), C. E., R., 110 Germantown Road, Minden.
R. L. BARNES, C. E., R., Louisiana Department of Highways, Fordoche.
JAMES V. BARNETT, C. E., R., Barnett & Barnett, Room 424, Commercial Bldg., Shreveport.
VAN A. BARNETT, C. E., R., Barnett & Barnett, 424 Old Commercial Bldg., Shreveport.
JOSEPH H. BARNWELL, M. E., R., General Electric Co., 701 Gilman St., Ruston.
WM. A. BARNWELL, JR., (J), Ch. E., Dow Chemical Corp., 412 Centerway, Lake Jackson, Texas.
WM. C. BARNWELL, M. E., E. E., R., Gaylord Container Corp., 823 N. Border Drive, Bogalusa.
CARLOS J. BAROUSSE, (A), M. E., V. A. Hospital, Eng. Div., 1446 Leda St., New Orleans 19.
HAROLD T. BARR, Agri. E., R., La. State University, 409 Cornell Ave., Baton Rouge.
OTHA E. BARRON, E. E., R., Southern Bell Tel. & Tel. Co., 825 Murray St., Alexandria.
OTHA E. BARRON, JR., E. E., Robbins & Meyers, Inc., 6731 General Diaz St., New Orleans 24.
ANTHONY J. BARTLETT, E. E., R., New Orleans Public Service Inc., 1600 S. Peters St., New Orleans 13.
Z. W. BARTLETT, Mning E., R., La., Tex., Freeport Sulphur Co., P. O. Box 1520, New Orleans 5.
JOHN C. BARTLEY, C. E., R., Bartley & Binnings, 433 Gravier St., New Orleans 12.
RAYMOND P. BASSICH, (L. M.), N. O. Blue Print & Supply Co., 826 Union St., New Orleans 12.
A. P. BATCHELOR, M. E., R., Delta Tank Mfg. Co., Inc., 2305 Spain St., Baton Rouge.
ERVIN BAUDOIN, (Jr. Member), Graduate of S. L. I., 808 St. Valerie, Abbeville.
JOHANNA O. BAUMAN, (A), Gulf States Utilities Co., 3126 Monroe Ave., Baton Rouge.
GROVER C. BAYLES, Elliott Co., 256 Lee Circle Bldg., New Orleans 13.
CLAYTON M. BEAMER, Ct. E., Imperial Oil Limited, 4 Princess Ann Crescent, Toronto 18, Ontario, Canada.
THELBERT C. BEASLEY, M. E., Mayor, City of Ruston, 507 Texas St., Box 485, Ruston.
HAL C. BECKER, E. E., R., Tulane U. School of Medicine, Room A-231, 1430 Tulane Ave., New Orleans 12.
RICHARD O. BECKHAM, JR., E. E., R., Southern Bell Tel. & Tel. Co., 2824 State St., New Orleans.
WM. K. BECNEL, C. E., R., Bedell & Nelson Engineers Inc., 2702 Manley Ave, Metairie.
CAPT. DUDLEY C. BEENE, (A), Pet. Geologist, U. S. Corps of Engineers, 840 Deer Park Road, Shreveport.
ELLIS L. BEGNAUD, (J), address unknown.
ALEXANDER B. BELL, (A), Southern Bell Tel. & Tel. Co., Broussard.
BEN H. BELL, (L. M.), E. E., R., N. O. Public Service Inc., 4604 S. Derbigny St., New Orleans 15.
PHILIP L. BENFIELD, Agri. E., R., Douglas Fir Plywood Assn., Old Fort Mill Road, Pineville, N. C.
LT. FRANK W. BENNETT, JR., (J), C. E., R., U. S. Air Force, 725th A C & W Sq., Walnut Ridge, Ark.
R. F. A. BENSON, M. E., Retired, Box 76-A, Military Road, Covington.
JOSEPH H. BENTON, C. E., Esso Standard Oil Co., 4913 Abelia Drive, Baton Rouge.
C. C. BERNARD, C. E., R., La., Miss., Louisiana Dept. of Highways, 2040 Oleander St., Baton Rouge 6.
JOHN H. BERNHARD, (L. M.), Retired, 519 Nineteenth Ave. N., Clinton, Iowa.
DUDLEY J. BERTRAND, (Jr. Member), Graduate of S. L. I., 506 N. Bailey Ave., Abbeville.
CHESTER R. BEST, E. E., R., College of Engineering, Louisiana State University, Baton Rouge 3.
ALLEN W. BETZ, Ch. E., R., Betz Engr. Sales Co., 6 Wavertree Court, Metairie.
ARTHUR E. BIGLER, E. E., R., La. Power & Light Co., 230 Douglas Drive, New Orleans 23.
FRED N. BILLINGSLEY, (H.M., L.M.), C. E., E. E., M. E., R., Billingsley Engineering Corp., 2122 Jefferson Ave., New Orleans 15.
ROGER BISSINGER, E. E., R., Electrical Sales Co., 7623 Maple St., New Orleans 25.
CMDR. CHAS. BITTENBRING, III, C. E., R., La., Ga., DPWO 8 ND Bldg. 16, U. S. Naval Station, New Orleans 14.
DANIEL E. BIVINS, JR., E. E., R., Olin Matheison Chemical Corp., 3704 Cypress St., West Monroe.
GEORGE L. BIVANS, (Jr. Member), Graduate of S. L. I., 2103 Lee St., Lafayette.
HUGH M. BLAIN, JR., M. E., Ch. E., R., New Orleans Public Service Inc., 527 Magnolia St., New Orleans 13.
GLENNY P. BLANCHARD, M. E., C. B. Construction Co., 455 Summit Ridge Drive, Baton Rouge.
JOHN G. BLANCHE, M. E., R., L. S. U., 3239 Morning Glory Ave., Baton Rouge.
ROBT. F. BLAND, (J), C. E., R., R. P. Farnsworth & Co., Goysa-Oman-Farnsworth-Wright, Edificio Espana, Madrid, Spain.

WALTER E. BLESSEY, C. E., R., College of Engineering, Tulane University, 11 Forest Ave, Metairie.

ALBERT R. BOELTE, C. E., R., Board of Commissioners, Port of New Orleans, 5624 Canal Blvd., New Orleans 24.

J. EDWIN BOELTE, (A), M. E., E. E., R., Sperry Gyroscope Co., Inc., 19 Maryland Drive, New Orleans 24.

BEN T. BOGARD, M. E., E. E., R., Louisiana Polytechnic Institute, 36 University Drive, Ruston.

HENRY BOH, Boh Brothers Construction Co., 10 Swan St., New Orleans 24.

ROBERT H. BOH, C. E., R., Boh Brothers Construction Co., 3129 Nashville Ave., New Orleans 25.

PHILIP W. BOHNE, Ch. E., R., Kaiser Aluminum & Chemical Corp., 21-A Fontainebleau Drive, New Orleans 25.

WM. H. BOHNE, C. E., R., R. P. Farnsworth Co., 625 Madison Ave., New York 22, N. Y.

EARL G. BOND, (J), E. E., General Electric Co., 2511 Seminole Drive, Owensboro, Ky.

THOS. A. BONNET, E. E., R., Central La. Electric Co., 623 St. Louis St., Lafayette.

JAMES H. BOOKSH, JR., C. E., R., United Gas Corp., Rt. 1, Box E-30, New Iberia.

W. RAY BOOTH, Ch. E., Olin Gas Transmission Corp., P. O. Box 1482, Monroe.

HENRY BORDELON, City of Alexandria, City Hall, Alexandria.

THEODORE J. BORGMAN, E. E., R., Southern Bell Tel. & Tel. Co., Lafayette.

LEONARD H. BOSSIER, M. E., R., L. H. Bossier, Contractor, 212 Maryland Ave., Alexandria.

CLARENCE N. BOTT, (L.M.), C. E., R., 2551 Metairie Road, Metairie.

THOMAS A. BOUDREAU, (J), E. E., R., La. Power & Light Co., 6608 Camphor St., Metairie.

DONALD P. BOUDREAUX, (J), C. E., 2528 Gallier St., New Orleans 17.

HAMILTON J. BOUDREAUX, JR., M. E., R., National Sugar Refining Co., Box 422, Reserve.

PAUL C. BOUDREAUX, C. E., R., 1752 Spain St., Baton Rouge.

JAMES B. BOULET, (J), E. E., Petroleum Chemicals Inc., 1509 Shaw St., Lake Charles.

BENJAMIN F. BOUSER, (J), C. E., Esso Standard Oil Co., 936 North 5th St., Baton Rouge.

CLAUDE W. BOUTTE, JR., M. E., R., Self employed, P. O. Box 1423, Alexandria.

ROSCOE H. BOWERS, E. E., R., Mass., Connelly Containers Inc., 8 Princeton Road, Wayne, Pa.

JAMES A. BOX, JR., Ch. E., Gaylord Container Corp., P. O. Box 647, Bogalusa.

BERTELL W. BOXX, E. E., Southern Bell Tel. & Tel. Co., 517 N. Bengal Road, Metairie.

CLIFTON C. BOYD, Agr. E., Portland Cement Ass'n, 504 Cole Ave., Monroe.

RAYMOND L. BOYD, (A), KNOE-TV, 1400 Roselawn Ave., Monroe.

DAVID L. BRACEWELL, (J), C. E., R., Ethyl Corp., Box 341, Baton Rouge.

AUBRA A. BRADDOCK, (A), C. E., R., La. Dept. of Highways, P. O. Box 545, Columbia.

JAMES H. BRADLEY, C. E., R., E. M. Freeman & Asso., 446 Chickasaw Trail, Shreveport.

CHAS. A. BRAGG, (A), C. E., Eustis Engineering Co., 3635 Airline Highway, Metairie.

HENRY S. BRANCH, JR., E. E., R., Esso Standard Oil Co., 9434 W. Van Place, Baton Rouge.

WM. G. BRANCH, C. E., R., La. Dept. of Highways, 2043 Perkins Road, Baton Rouge.

MERLIN X. BRAQUET, (J), E. E., R., Central Louisiana Electric Co., 110 Desire St., New Iberia.

S. C. BRASELMAN, American Creosote Works, Post Office Station F, New Orleans 18.

ALFRED A. BREAUD, (J), M. E., R., U. S. A. F., 105 Maurice St., Lafayette.

ROBT. J. BREAUX, (J), E. E., R., Central Louisiana Electric Co., Route B, Box 133, New Iberia.

VAL D. BREAUX, C. F. Braun & Co., Gueydan.

JOHN O'R. BREEDEN, M. E., R., Avondale Marineways, 1315 Sylvia St., Metairie.

DAVID W. BREEDLOVE, (J), E. E., R., Southern Bell Tel. & Tel. Co., Gen. Delivery, Mandeville.

MAJOR GEN. EDWARD S. BRES, (H. M.), C. E., R., La., District of Columbia, 5325 38th St., N. W., Chevy Chase, Washington 15, D. C.

JAMES R. BRES, JR., E. E., Southern Bell Tel. & Tel. Co., 338 Main St., Bay St. Louis, Miss.

RICHARD H. BRETZ, C. E., Esso Standard Oil Co., 1365 Thibodaux Ave., Baton Rouge.

JEWEL H. BREWER, M. E., R., La. Dept. of Highways, 1825 Oak St., Baton Rouge.

JOHN F. BREWER, Copolymer Rubber & Chemical Corp., 4950 Hyacinth St., Baton Rouge.

BARNET BREZNER, C. E., R., La., Mich., Self employed, P. O. Drawer 1030, Alexandria.

SAM J. BROCATO, (A), Central Louisiana Electric Co., Inc., Box 329, Bunkie.

E. N. BRODNAX, (R. Sur.), La. Dept. of Highways, 502 McCreight St., Bastrop.

ALBERT W. BRODTMAN, C. E., R., Gurtler, Hebert & Co., Inc., 994 Bragg St., New Orleans 24.

A. J. BRODTMANN, New Orleans Public Service Inc., 317 Baronne St., New Orleans 9.

CARL D. BROOKS, Louisiana Power & Light Co., Box 36, Sterlington, La.

DUGAL A. BROOKS, Mi. E., R., La., Tex., Freeport Sulphur Co., 3429 Cypress St., Metairie.

ROBT. T. BROOKS, C. E., R., La. Dept. of Highways, P. O. Box 232, Hammond.

AMABE J. BROUILLETTE, (J), (R. Sur.), Self employed, 641 Bossier St., Natchitoches.

FREDERICK D. BROUSSARD, Esso Standard Oil Co., (La. Div.), Baton Rouge.

GAYLE K. BROUSSARD, Pacific Pumps, Inc., P. O. Box 59, Baton Rouge.

JOHNNIE J. BROUSSARD, M. E., Sales Engineer, Box 5212, Lake Charles.

JOSEPH CURTIS BROUSSARD, (Jr. member), Graduate of S. L. I., P. O. Box 512, Abbeville.

OLIVIER BROUSSARD, III, C. E., R., La. Dept. of Highways, Box 481, Westlake, La.

A. R. BROUSSEAU, Manufacturers Agent, 822 Perdido St., New Orleans 12.

CHARLES D. BROWN, C. E., R., La. Dept. of Highways, 1265 S. Market St., Opelousas.

DONALD Q. BROWN, Esso Standard Oil Co., 9525 S. River Oaks Drive, Baton Rouge.

HARWOOD I. BROWN, M. E., E. E., R., Self employed, 319 Warrington Drive, New Orleans 22.

HENRY N. BROWN, C. E., R., La. Dept. of Highways, Box 260, Shreveport.

JAMES W. BROWN, C. E., R., Miss., State of California, 206 Warrenton Drive, New Orleans.

NELSON K. BROWN, C. E., R., Bodman & Murvell & Smith, Architects, Route 2, Box 75, Pineville.

RALPH H. BROWN, (J), E. M. Freeman & Associates, 3013 Hoyte Drive, Shreveport.

VERNON M. BROWN, Columbia Southern Chemical Corp., 1324 Rosetta St., Lake Charles.

WALTER BROWN, M. E., R., La., Tex., Paramount Textile Machinery Corp., 610 E. Gilmore, Angola, Ind.

JOHN H. BROWNE, JR., M. E., R., Columbian Carbon Co., P. O. Drawer 1562, Monroe.

FRED C. BROWNLEE, M. E., R., M. Kaplan & Son, Inc., P. O. Box 188, Monroe.

JOHN S. BROYLES, C. E., R., La., Tex., 156 Fremont St., Shreveport.

THOS. S. BROYLES, Texas Bitulithic Co. & Delta Paving Co., 209 Opal St., New Orleans 24.

ROBERT BRUCE, JR., (J), C. E., R., Raymond Concrete Pile Co., 502 Pine St., New Orleans 18.

L. C. BRUNE, M. E., E. E., U. S. Engineer Corps, 4625 Spain St., New Orleans.

THOMAS C. BRUNS, C. E., R., Keller Construction Corp., 526 St. Peter St., New Orleans 16.

BROADUS M. BRYANT, Ind. E., R., Ala., Ethyl Corp., 3576 Donaldson Drive, Baton Rouge.
MARION C. BUBENZER, P. E., R., La., Tex., Southwest Natural Gas Co., 636 Rutherford St. Shreveport.
FREEMAN C. BUCKLEY, E. E., R., Southern Bell Tel. & Tel. Co., 1807 Seventh St., Lake Charles.
LOUIS M. BUJA, C. E., R., City of New Orleans, Room 6 WO 2 — City Hall, Civic Center, New Orleans 12.
A. M. BUJARD, M. E., E. E., R., United Gas Corp., 401 Parkview Drive., New Iberia.
WALLACE C. BUJOL, P. E., R., U. S. Air Force, 1901 Fourteenth St., Lake Charles.
DEWEY E. BURCHETT, C. E., R., Parish Engineer, Bossier Parish, Box 92, Benton.
JOSEPH R. BURDETTE, M. E., R., La., Tex., Dow Chemical Co., Route 1, Baker.
RAY E. BURGESS, C. E., R., La., Tex., Cities Service Refining Corp., 3939 Ryan St., Lake Charles.
RAY W. BURGESS, C. E., M. E., R., East Baton Rouge Parish, 4822 Mohican St., Baton Rouge.
ERNEST A. BURGUIERES, JR., M. E., R., Apartado 892 Managua, Nicaragua.
JACK S. BURK, C. E., R., La., Miss., Barnard & Burk, P. O. Box 1470, Baton Rouge.
JOHN S. BURKE, M. E., R., New Orleans Public Service Inc., 317 Baronne St., New Orleans 9.
PEARL PIERCE BURKE, Geologist, U. S. Corps of Engineers, 8005 Plum St., New Orleans 18.
DANIEL F. BURKHALTER, E. E., R., Self employed, 2400 Louisville St., Monroe.
DAVID J. BURNETT, Ingersoll Rand Co., R.F.D. No. 2, Box 930, Marrero.
JOHN O. BURNETT, Burnett & Lambert, Inc., Box 386, Denham Springs.
CHARLES A. BURTON, M. E., Monsanto Chemical Company, Texas City, Texas
JOHN S. BURWELL, M. E., R., Flintkote Co., 2325 Palmer Ave., New Orleans 18.
LT. COURTNEY C. BUSCH, (J), M. E., R., H & S Btry., 1st AW Bn. MCB, Twenty-nine Palms, Calif.
HY. W. BUSCH, E. E., R., Mike Baker Brick Co., Box 1234 — Oil Center Sta., Lafayette.
HENRY G. BUSE, E. E., R., La., Miss., Tex., Buse-Quartana & Associates, 4424 C. Earhart Blvd., New Orleans 25.
SOULE BUTLER, C. E., City of Alexandria, City Hall, Alexandria.
WALTER C. BYRNE, JR., M. E., E. E., Motorola, Inc., 1115 S. Valley Road, Lake Forest, Ill.

C

MICHAEL J. CADE, E. E., New Orleans Public Service Inc., 317 Baronne St., New Orleans 9.
D. RALPH CAFFERY, C. E., R., La., Tex., Gulf Oil Corp., 2935 19th St., Beaumont, Texas.
JOHN E. CAGLE, JR., C. E., R., E. M. Freeman & Associates, 6715 Canal Blvd., Shreveport.
JOHN D. CALHOUN, M. E., R., Louisiana Polytechnic Institute, Box 307, Tech Station, Ruston.
SEYMOUR CAMBIAS, JR., E. E., R., New Orleans Public Service Inc., 1606 Charlton Drive, New Orleans 22.
ROLAND J. CAMBRE, M. E., Southwestern La. Institute, Box 898, S. L. I., Lafayette.
SALVADOR J. CAMPAGNA, M. E., R., Kaiser Aluminum & Chemical Corp., Route 1, Box 522, 200 Chetta Drive, Chalmette.
JAMES L. CAMPBELL, E. E., New Orleans Public Service Inc., 317 Baronne St., New Orleans 9.
PHILIP H. CAMPBELL, (L.M.), C. E., Union Industrial & Astilleros Barranquilla, Apartado Aereo No. 319, Barranquilla, Colombia, S. A.
KOHLMAN CAMPBELL, Ch.E., R., International Lubricant Corp., 117 Melody Drive, Metairie.
HALSEL A. CANAVIER, SR., (A), Ebasco Services Inc., 413 Wilmuth St., Monroe.
GEO. S. CANNON, E. E., R., Tex., Gulf States Utilities Co., 4620 Delwood Lane, Beaumont, Texas.
CHAS. K. CAPDEPON, (J), M. E., R., Kaiser Aluminum & Chemical Corp., 6038 Mandeville St., New Orleans.
DR. LOUIS J. CAPOZZOLI, JR., C. E., R., Ala., La., Miss., N. J., N. Y., Tex., Engineers Testing Laboratory, Inc., P. O. Box 544, Baton Rouge.
C. G. CAPPEL, (H. M., L. M.), C. E., R., La., Fla., Tex., W. Horace Williams Co., 833 Howard Ave., New Orleans 12.
ROY GLENN CAPPEL, C. E., R., La., Tex., Ala., Miss., Fla., W. Horace Williams Co., 114 Mulberry Drive, Metairie.
THORNTON L. CAPPEL, JR., E. E., R., Standard Oil Co., 2026 Avondale St., Baton Rouge 6.
M. H. CARAWAY, (A), M. H. Caraway Co., Inc., 2721 S. Broad Ave., New Orleans 15.
FRANK C. CAREY, C. E., R., TAMS c/o ICA MSM/C, APO 63, San Francisco, Calif.
M. B. CARMICHAEL, M. E., 224 Kimbro Dr., Baton Rouge.
S. STEVE CARNEGIE, C. E., R., Carnegie & Smith, 3000-A Dalrymple Drive, Baton Rouge.
JAMES L. CARTER, C. E., R., La., Tex., Southwest Gas Producing Co., 607 S. Fourth St., West Monroe.
JOHN B. CARTER, C. E., R., La. Dept. of Highways, 302 Amherst Ave., Baton Rouge 2.
LELAND H. CARTER, C. E., R., E. M. Freeman & Associates, 1103 Henry C. Beck Bldg., Shreveport.
PROF. W. H. CARTER, Agr. E., Louisiana State University, 113 Atkinson Hall, University Station, Baton Rouge.
GERARD P. CARUSO, Ch. E., R., International Lubricant Corp., 3709 Dumaine St. New Orleans 19.
DALE R. CARVER, C. E., Louisiana State University, 1733 Cherrydale Ave., Baton Rouge.
DAVID J. CARVILLE, M. E., R., Barnard & Burk, Inc., P. O. Box 1470, Baton Rouge.
JULES A. CARVILLE, JR., E. E., R., Tex., Shell Oil Co., Norco.
N. S. CATCHINGS, C. E., R., Miss., La. Metal Culvert Co., Box 2427, Baton Rouge 2.
JOSEPH J. CEFALU, M. E., E. E., R., Municipal Water Plant, 808 Florence St., Morgan City.
D. B. H. CHAFFE, JR., (L. M.), M. E., E. E., Southern States Equipment Co., Inc., 425 Celeste St., New Orleans 13.
HOMER L. CHAMBERS, (A), U. S. Government, 134 Waianae Circle, Honolulu 18, Hawaii.
ARTHUR E. CHAMPEAU, Marine E., Koch-Ellis Marine Contractors, Inc., 224 Beverly Drive, Metairie.
HOWARD CHANEY, Marine E., Gulf States Utilities Co., 3105 Washington Ave., Baton Rouge.
A. WATSON CHAPMAN, Ch. E., The Celotex Corp, 1211 N. LaSalle St., Chicago 10, Ill.
ROBT. E. CHAPPUIS, M. E., R., Central Louisiana Electric Co., Inc., 1104 W. Marshall Blvd., Bunkie, La.

JOHN D. CHARBONNET, (J), C. E., No. 2 Versailles Blvd., New Orleans.
FREDERICK E. CHARLES, Ch. E., Cities Service Refining Corp., 71 Horseshoe Lane, Magnolia Forest, Maplewood.
F. M. CHATRY, E. E., U. S. Engineers Corps, N. O. District, 4653 Gaines St., New Orleans 22.
THEO. T. CHENET, (L. M.), C. E., R., La. Dept. of Highways, 707 Eleventh St., Lake Charles.
ROGER E. CHESNUT, M. E., Bedell & Nelson Engineers Inc., Melody Lane, Bay St. Louis, Miss.
WOODROW W. CHEW, Ch. E., R., La. Polytechnic Institute, Box 285, Tech Station, Ruston.
DR. P. A. CHIERI, M. E., R., La., N. J., Southwestern La. Institute, Box 274, S. L. I., Lafayette.
CLYDE S. CHILDERS, (A), Olin Matheison Chemical Corp., P. O. Box 334, Orange, Texas.
KENNETH R. CHITTY, (J), United Gas Corporation, Lake Charles.
DR. A. R. CHOPPIN, Ch. E., R., College of Chemistry & Physics, La. State University, Baton Rouge 1.
LOUIS C. CHRISTIAN, JR., E. E., R., Gulf States Utilities Co., 446 North Blvd., Baton Rouge.
JACK H. CLABAUGH, M. E., R., La., Tex., Okla., The Dow Chemical Co., P. O. Box 284, Plaquemine.
BYRON E. CLARK, (A), C. E., R., La. Dept. of Highways, P. O. Box 751, New Iberia.
RUSSELL S. CLARK, M. E., R., Ohio, Southern Alkali Corp., 216 Wilson Ave., Lake Charles.
F. T. CLARKE, C. E., R., La., Tex., Union Oil & Gas Corp. of La., 1685 Houston Club Bldg., Houston 2, Texas.
MILLER B. CLARKSON, Professor of Science, McNeese State College, Lake Charles.
VERNE CLAWSON, Ebasco Services, Inc., 6429 Vicksburg St., New Orleans.
J. E. CLEMENT, JR., (J), C. E., R., Nichols Construction Co., Route No. 1, Box 98, Denham Springs.
JESSE COATES, Ch. E., R., Dept. Chem. Eng., L. S. U., Baton Rouge 3.
DARWAYNE W. COBURN, (J), Ch. E., 5359 Magazine St., New Orleans 15.
C. M. COCKRELL, M. E., R., La., Tex., Freeport Sulphur Co., 6539 General Diaz St., New Orleans 24.
AUBREY G. CODE, C. E., M. E., E. E., R., Curtis & Davis, Architects & Engineers, 4936 Mandeville St., New Orleans 22.
JOHN B. COFFER, (J), C. E., Active duty, armed services, 1935 Napoleon Ave., New Orleans 15.
TOM F. COLBERT, C. E., R., La. Dept. of Highways, P. O. Box 523, Alexandria.
JULIUS W. COLE, C. E., R., Harvey-Cole & Associates, 818 North Blvd., Baton Rouge.
AUBIN J. COLEMAN, JR., E. E., General Electric Co., Drawer 352, Morgan City.
J. H. COLLINS, M. E., E. E., R., La., Ebasco Services, Inc., 1310 Short St., New Orleans 18.
JEFFREY H. COLLINS, SR., M. E., R., New Orleans Public Service Inc., 317 Baronne St., New Orleans 9.
OSCAR H. COLLINS, C. E., R., La. Dept. of Highways, 1711 Cole Ave., Monroe.
JOE C. COLVIN, M. & E. E., U. S. Dept. Agriculture, Soil Conservation Service, Room G-1, Court House, Shreveport.
RALPH E. COMPAGNO, C. E., R., Ala., La., Miss., Farmer Construction Co., Inc., 2152 Halls Mill Road, Mobile, Ala.
RUSSELL G. CONE, C. E., Mason & Hanger-Silas Mason Co., Inc., 169 Mountain View, Vallejo, Calif.
BOBBY J. CONERLY, (J), E. E., R., Schlumberger Well Surveying Co., 811 N. Union St., Opelousas.
J. S. CONNER, E. E., R., La. State University, Box 5291, University Station, Baton Rouge 3.
FRED A. CONSTERDINE, C. E., R., La. Dept. of Highways, 100 Highland St., Lafayette.
J. B. CONVERSE, (L. M.), C. E., R., La., Ala., Miss., Fla., Ga., Tex., J. B. Converse & Co., Inc., P. O. Box 1084, Mobile, Ala.
CHAS. W. COOK, C. E., R., La., Tex., City of Alexandria, P. O. Box 71, Alexandria.
ROBT. M. COOK, (J), M. E., R., N. O. Public Service Inc., 7732 Hampson St., New Orleans 18.
WALTER COOKE, M. E., E. E., R., Private Consultant, 305 Jahncke Bldg., 816 Howard Ave., New Orleans.
ROBERT COOPER, JR, (A), C. E., R., La. Dept of Highways, P. O. Box 754, Hammond.
CLARENCE E. COPELAND, Project Engr., United Gas Pipe Line Co., P. O. Box 1407, Shreveport.
JOHN C. COPES III, M. E., R., La., Tex., Consulting Mechanical Engineer, 1435 New York St., New Orleans 22.
STEPHEN H. CORDILL, Pet. E., Union Oil & Gas Corp. of La., 1806 17th St., Lake Charles.
ROBERT D. COSGROVE, M. E., R., La. Elevator Corp., 604 Tchoupitoulas St., New Orleans.
HILTON I. COTTEN, JR., Ch. E., R., Olin-Matheison Chem. Corp., P. O. Box 896, Lake Charles.
F. H. COUGHLIN, C. E., M. E., E. E., R., La., Tex., Central La. Electric Co., Inc., Box 111, Alexandria.
MARION E. COUNCIL, (J), E. E., Gulf States Utilities Co., 1500-1600 Government St. Baton Rouge.
PAUL R. COURREGE, M. E., Copolymer Corp., 1447 Hood Ave, Baton Rouge.
JOHN C. COURTNEY, C. E., R., La. Dept. of Highways, 2771 Amherst St., Shreveport.
JOSEPH F. COURTNEY, M. E., International Harvester Co., 1403 Louisiana Ave., New Orleans 15.
E. R. COUSINS, Ch. E., R., U. S. Dept. of Agriculture, Southern Research Lab., 120 Hathway Place, New Orleans 19.
GEORGE S. COVERT, C. E., R., Geo. Covert & Associates, Inc., P. O. Box 1691, Baton Rouge.
JOHN E. COYNE, C. E., R., Coyne Construction & Engineering Corp., 201 Richard St., Gretna.
WM. O. CRABTREE, (J), C. E., Esso Standard Oil Co., 5073 Abelia Dr., Baton Rouge.
BENJAMIN C. CRAFT, Pet. E., R., La., Tex., Louisiana State University, Baton Rouge 3.
CHAS. E. CRAIG, JR., M. E., R., H. E. Bovay, Jr., 5217 Government St., Baton Rouge.
BYRON E. CRAWFORD, E. E., Esso Standard Oil Co., 725 Woodhaven, Baton Rouge.
CHAS. C. CRAWFORD, (L.M.), M. E., R., La., Tex., A. M. Lockett & Co., Ltd., 308 Whitney Bldg., New Orleans 12.
JAMES C. CRAWFORD, C. E., R., State of Louisiana, 404 North 7th St., West Monroe.
DANIEL V. CRESAP, C. E., R., La. Dept. of Public Works, 3811 Brenda St., Alexandria.
RONALD P. CRESSY, (J), C. E., R., B. M. Domblatt & Associates, Inc., 6417 Ruth St., Metairie.
MARCEL E. CRETTET, SR., M. E., E. E., R., U. S. Dept. of Defense, P. O. Box 515, Randolph Air Force Base, Texas.
ROBERT N. CREWS, C. E., R., La., Tex., J. Ray McDermott Co., Inc., 51 Oriole St., New Orleans 24.

THOMAS B. CROWELL, Ch. E., Copolymer Rubber & Chemical Corp., 8814 Brookwood Drive, Baton Rouge.
FLOYD M. CRUM, E. E., R., La., Tex., Lamar State College of Technology, 1905 Prairie Ave., Beaumont, Texas.
HORACE E. CRUMP, (L. M.), C. E., R., Board of Commissioners, Port of New Orleans, 1422 Peniston St., New Orleans 15.
CORNELIUS C. CRUSEL, C. E., R., A. M. Lockett & Co., Ltd., 308 Whitney Bldg., New Orleans 12.
EARL CRYAR, C. E., R., La. Dept. of Highways, Box 872, Alexandria.
CLYDE J. CUCULLU, E. E., N. O. Public Service Inc., 4638 Arts St., New Orleans 17.
LIONEL J. CUCULLU, M. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
DAVID L. CULLOM, (L. M.), C. E., Retired, Box 5272 Station B., New Orleans, 15.
LEE VAN CUNNINGHAM, JR., M. E., E. E., R., Esso Standard Oil Co., 418 Croydon St., Baton Rouge.
WM. A. CUNNINGHAM, C. E., R., Ohio, Raymond Concrete Pile Co., 407 Pere Marquette Bldg., New Orleans.

D

CARL F. DAHLBERG, (J), C. E., 199 Audubon Blvd., New Orleans.
LOUIS J. DAIGRE, C. E., R., Private consultant, 925 Seventh St., Alexandria.
FRANK J. DALIA, C. E., R., La., Tex., Tulane University, 274 Carolyn Drive, Harahan.
JOSEPH V. D'AMICO, JR., (A), Louisiana Steam Equipment Co., 1118 Tchoupitoulas St., New Orleans.
LAWRENCE R. DANIEL, JR., C. E., M. E., R., Louisiana Polytechnic Institute, 2756 E. Grand River, East Lansing, Mich.
ELVIN J. DANTIN, C. E., R., Louisiana State University, 2082 Hollydale Ave., Baton Rouge.
JULIAN A. DARDEN, E. E., Esso Standard Oil Co., 555 E. River Oaks Drive, Baton Rouge 6.
KENNETH J. DASPIT, (J), M. E., W. R. Grace & Co., 3045 Addison St., Baton Rouge.
RALPH L. DAVENPORT, C. E., R., Shell Oil Co., 2805 Green Acres Road, Metairie.
FRANCIS E. DAVID, JR., C. E., R., Pan American Engineers, 5711 Navajo Trail, Alexandria.
THOS. C. DAVID, C. E., R., Pan American Engineers, 1022 Tenth St., Alexandria.
HENRY R. DAVIES, JR., M. E., R., Bedell & Nelson Engineers, Inc., 310 Brockenbraugh Court, Metairie.
ALBERT B. DAVIS, JR., C. E., U. S. Corps of Engineers, 5028 Avenue S, Galveston, Texas.
EDWIN A. DAVIS, C. E., R., La. Dept. of Highways, 604 Laurel St., Baton Rouge 2.
GEO. B. DAVIS, C. E., R., Boh Bros. Construction Co., 4924 S. Galvez St., New Orleans 15.
JOHN F. DAVIS, JR., (J), E. E., R., The Carter Oil Co., c/o International Petroleum Co., Apartado Aero 3533, Bogota, Colombia.
LEWIS B. DAVIS, E. E., Westinghouse Electric Corp., 1226 Whitney Bldg., New Orleans 12.
ROBERT L. DAVIS, M. E., R., Ohio, Libbey-Owens-Ford Glass Co., 845 Lark Ave., Shreveport.
SAMUEL G. DAVIS, M. E., R., Self employed, P. O. Box 9053, Metairie.
WM. M. DAVIS, C. E., R., Cities Service Refining Corp., Box 2583, Maplewood.
RAY L. DAY, M. E., C. E., R., A. C. Volk & R. L. Day, 109 W. Jefferson Ave., Bastrop.
HAROLD J. DeBRAY, (A), C. E., R., Olin Gas Transmission Co., P. O. Box 1482, Monroe.
RATHBONE DeBUYS, (C. M.), C. E., R., Rathbone DeBuys & Associates, 1921 Joseph St., New Orleans.
FREDERICK A. DECKBAR, JR., (J), Ch. E., R., American Cyanamid Co., 620 Airline Park Blvd., Metairie.
KENNETH M. DECOSSAS, Ch. E., R., U. S. Dept. Agriculture, Southern Utilization Research & Development Div., 6529 General Diaz St., New Orleans 24.
LAURENT J. DECOURT, E. E., R., Central La. Electric Co., 109 Boas St., New Iberia.
A. A. DeFRAITES, JR., (J), C. E., R., Walter E. Blessey, Consulting Engr., 8002 Jeannette Place, New Orleans 18.
RAGAN C. DEFREESE, E. E., Southern Bell Tel. & Tel. Co., 5126 Prytania St., New Orleans 15.
WALLACE V. deGRUY, E. E., R., N. O. Public Service Inc., 1524 Filmore Ave., New Orleans 22.
HARRY DeKERLEGAND, (J), C. E., R., La. Dept. of Highways, P. O. Box 221, Livingston.
DONALD C. DELAUNE, E. E., Esso Standard Oil Co., 3312 Myrtle Ave., Baton Rouge.
JOHN M. DeMARCHE, C. E., R., La. State University, 6856 LaSalle Ave., Baton Rouge.
A. H. DEMERS, E. E., Gulf States Utilities Co., 1915 Walnut St., Baton Rouge.
CHRIS DEMOPULOS, C. E., R., La., Tex., Ark., Demopulos & Ferguson, 522 Johnson Bldg., Shreveport.
EDWIN L. DENNIS, Ch. E., M. E., R., E. L. Dennis Engineering Co., 5534 Canal Blvd., New Orleans 24.
ROBT. R. DENNIS, JR., Ch. E., Copolymer Rubber & Chem. Corp., 1525 Hood Ave., Baton Rouge.
CURTIS LEE DENSON, M. E., La. Power & Light Co., Box 356, Sterlington.
L. L. DENSON, M. E., R., La., Fla., Miss., B. M. Dornblatt & Associates, Inc., 826 Lafayette St., New Orleans 12.
WALLACE P. DeNUX, La. State Dept. of Public Works, 1907 White St., Alexandria.
DONALD DERICKSON, (L. M., H. M.), C. E., R., Emeritus Professor of Civil Engineering and Head of School of Civil Engineering, Tulane University, 1311 Henry Clay Ave, New Orleans 15.
JAMES H. DERR, JR., M. E., Gulf States Utilities Co., 322 Jefferson Drive, Lake Charles.
L. L. deSALIGNAC, C. E., R., Ala., La., Miss., Tenn., Retired, 5122 Baronne St., New Orleans 15.
DUDLEY J. DEVILLE, (Jr. Member), Graduate of S. L. I., 8 Park View, Ville Platte.
GEO. A. DeWOLF, Surveyor, R., State of La., Dept. of Public Works, Box 1693, Alexandria.
ALFRED J. DIAMOND, C. E., R., A. W. Thompson & Associates, 2835 Castiglione St., New Orleans.
HERBERT E. DICKARD, M. E., R., Herbert E. Dickard & Co., P. O. Box 1173, Monroe.
JERRY L. DICKSON, Ch. E., R., Kaiser Aluminum & Chem. Corp., 2024 Gen. Pershing St., New Orleans 15.

THEODORE W. DIETZE, E. E., R., N. Y., General Electric Co., 1912 Townsend Road, Schenectady, N. Y.
PAUL A. DI GIOVANNI, C. E., R., Petroleum Chemicals Inc., 3532 Columbus St., Lake Charles.
RODERICK E DILLON, JR., (J), C. E., R., La. Dept. of Highways, Box 613, Homer.
STANLEY G. DINKEL, E. E., R., La., Miss., General Electric Co., 5945 Argonne St., New Orleans.
SALVADOR DISTEFANO, M. E., R., Kaiser Aluminum & Chem. Corp., 9733 Van Drive, Baton Rouge.
JOHN E. DIXON, (Jr. Member), Graduate of S. L. I., 5418 Gen. Diaz, New Orleans.
EARL S. DOBBS, E. E., R., 6060 Pratt Drive, New Orleans 22.
FARRAR R. DODGE, C. E., California Div. of Highways, 650-A 45th Ave., San Francisco, Calif.
EMERY DOMINGUE, C. E., R., Southwestern La. Institute, Box 485, S. L. I., Lafayette.
PATRICK P. DONAHUE, M. E., R., 1462 N. Rocheblave St., New Orleans.
THOS. F. DONLON, USN, C. E., R., U. S. Navy, Public Works Office, Naval Air Station, Quonset Point, R. I.
EDWIN B. DORAN, Agri. E., R., Retried, 856 Moore St., Baton Rouge 6.
B. M. DORNBLATT, C. E., M. E., R., B. M. Dornblatt & Associates, P. O. Box 254, New Orleans 9.
JOHN A. DOUCET, (Jr. Member), Graduate of S. L. I., 3201 Johnston, Lafayette.
AUGUST H. DOUGLAS, JR., (J), M. E., R., American Creosote Works, 5533 S. Tonti St., New Orleans 25.
DAVID G. DOUGLAS, (J), M. E., R., Rocketdyne, 22044 Independencia St., Woodland Hills, Calif.
WALTER E. DOUGLAS, JR., C. E., R., U. S. Navy Public Works Office Hqtrs. 8 N/D., 6807 Vicksburg St., New Orleans 24.
CARLYLE B. DOUPE, M. E., R., Paul O. Rottman & Associates, 211 Hunter Bldg, Shreveport.
JAMES M. DOYLE, JR., C. E., E. E., R., La., Tex., La. Dept. of Highways, P. O. Box 687, Ferriday.
CHAS. R. DRAUGHON, JR., M. E., R., Esso Standard Oil Co., Route 1, Box 242, Zachary.
WM. J. DRAWE, JR., E. E., M. E., R., N. O. Public Service Inc., 2611 Burdette St., New Orleans 18.
ROBT. J. DREUDING, (L. M.), C. E., R., Boh Bros. Construction Co., 4455 Lafaye St., New Orleans 22.
JOHN D. DUBOIS, (Jr. Member), Graduate of S. L. I., Gen. Del, Avery Island.
PAUL E. DUBOIS, C. E., R., La., Okla., Coston-Frankfurt-Short Architects & Engineers, 323 E. Madison St., Oklahoma City 5, Okla.
RODERICK C. DUCHESNE, C. E., R., La. Polytechnic Institute, Route 1, Ruston.
LOUIS DUCLOS, M. E., E. E., R., La. Dept. of Highways, 4328 Hyacinth Ave., Baton Rouge.
WM. H. DUDLEY III, (J), M. E., R., Jos. E. Leininger & Associates, 1456 Madrid St., New Orleans 22.
RAYMOND E. DUFRECHOU, C. E., Liberty Welding & Iron Works, 3001 Airline Highway, Metairie.
JOHN V. DUGAN, JR., (A), M. E., Edgar Murray Supply Co., Inc., P. O. Box 74, New Orleans 6.
KENNEDY J. DUGAS, M. E., R., The Texas Co., Route 1, Box 123, Erath.
JOHN S. DUHE, M. E., R., Walter Kidde Engineers S. W. Inc., 9849 Damuth Drive, Baton Rouge.
CLAIBORNE J. DUHON, JR., U. S. Air Force, Box 8431, W. A. D. C., WPAFB, Dayton, Ohio.
HARRY L. DULA, C. E., Barnard & Burk, P. O. Box 1711, Oil Center Sta., Lafayette.
CRAWFORD K. DUNBAR, C. E., R., La., Ala., City-Parish Dept. of Public Works, P. O. Box 155, Baton Rouge 1.
A. L. DUNLAP, (L. M.), M. E., R., Tulane University, 935 Pine St., New Orleans 18.
C. MONROE DUNLAP, C. E., R., La. Dept. of Highways, 1205 N. McGuire St., Monroe.
ALBERT J. DUNN, JR., C. E., R., La. Dept. of Highways, 104 E. Union St., Leesville.
EDGAR M. DUNN, E. E., M. E., R., Board of Commissioners, Port of New Orleans, 934 Howard Ave., New Orleans.
EDMOND E. DUPRE, (J), C. E., R., City of Lafayette, Sewer Dept., P. O. Box 621, Abbeville.
RICHARD A. DUPUIS, (J), C. E., Route 1, Box 182, St. Martinville.
LEONCE F. DUPUY, (J), C. E., R., Dow Chemical Co., 1325 W. Chimes St., Baton Rouge.
A. W. DURNING, Ch. E., M. E., R., La. Power & Light Co., 12 Forest Ave., Metairie.
JOSEPH S. DURRETT, (J), Esso Standard Oil Co., 4855 Government St., House No. 1, Baton Rouge.
ALLAN T. DUSENBURY, (L. M), C. E., R., Self employed, 1213 American Bank Bldg., New Orleans 12.
JAMES T. DWYER, JR., Ch. E., University of Houston, Apt. 5, Branard Court E., Wilshire Village, Houston, Texas.
WM. H. DYER, JR., E. E., R., La., Miss., Ogden, Woodruff & Dyer, Inc., 1645 Nicholson Drive, Baton Rouge.
OSBORN J. DYKES, JR., M. E., R., The Dykes Co., Inc., P. O. Box 1763, Shreveport.
GERALD R. DYSON, C. E., R., La., Tex., La. Dept. of Public Works, P. O. Box 723, Lafayette.
LESLIE M. DYSON, E. E., R., 80 W. Stephen Drive, Newark, Del.

E

HOLMES EARL, C. E., R., Earl & Indest, 1639 Gentilly Blvd., New Orleans.
RALPH EARL, (L. M.), C. E., M. E., E. E., R., City of N. O., Div. of Regulatory Inspection, 2125 Leonidas St., New Orleans 18.
RICHARD H. EARL, C. E., M. E., Mining E., R., La., Tex., Freeport Sulphur Co., P. O. Box 1520, New Orleans 5.
C. C. EDWARDS, JR., C. E., R., La. Dept. of Highways, P. O. Box 872, Alexandria.
CHAS. H. EDWARDS, JR., C. E., R., Dept. of C. E., La. Polytechnic Institute, Ruston.
JOHN P. EGAN, (A), N. O. Public Service Inc., 5436 S. Claiborne Ave., New Orleans 15.
JOSEPH F. EGAN, JR., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
S. W. ELBERSON, (L. M.), M. E., E. E., Retired, 360 Duperier Ave., New Iberia.
JAMES ELDRED, (J), Walter Kiddie Consulting Engr., 3419 Riley St., Baton Rouge.
M. H. ELISSALDE, E. E., R., Tex., Gulf States Utilities Co., 2645 Ashley Ave., Beaumont, Texas.
D. X. ELLETT, C. E., R., Ford, Bacon & Davis Constr. Corp., Box 1762, Monroe.
CHAS. H. ELLIOTT, E. E., Kaiser Aluminum & Chem. Corp., 1110 State St., New Orleans 18.

RALPH C. ELLIOTT, (A), M. E., R., Petroleum Chemicals, Inc., 534 E. Wm. David Pkwy., Metairie.
RUSSELL N. ELLIOTT, E. E., The Texas Pipe Line Co., 204 Roselawn Drive, Lafayette.
JOHN A. ELLIS, E. E., R., Gulf States Utilities Co., 3338 Myrtle Ave., Baton Rouge.
JOHN H. ELLIS, C. E., R., Caddo Parish Highway Dept., 1141 Janther Place, Shreveport 49.
SYDNEY ELLIS, JR., M. E., Ch. E., R., N. O. Public Service Inc., 1600 S. Peters St., New Orleans 13.
WILLIAM C. ELLIS, E. E., R., Walter J. Barnes Elec. Co., 7814 Burthe St., New Orleans 18.
JOHN B. ELLSTROTT, Ch. E., R., Walter Cooke & Associates, 816 Howard Ave., Room 305, New Orleans 13.
O. H. ELVERUM, C. E., Box 23, Morgan City.
WALDO A. ERICKSON, M. E., E. E., Shell Oil Co., Inc., 35 Shell Village, Norco.
T. EDWARD ERNST, C. E., M. E., E. E., R., La., Miss., Consulting Engineer, 822 Perdido St., New Orleans.
J. BRES EUSTIS, C. E., R., La., Miss., Eustis Engineering Co., 3635 Airline Hwy., Metairie.
EDW. E. EVANS, C. E., R., Edw. E. Evans & Associates, 2955 Fritchie Drive, Baton Rouge.
WILLIAM S. EVANS, C. E., M. E., R., Wm. S. Evans, Architect & Engineer, 620 Johnson Bldg., Shreveport.
NOEL J. EVERARD, C. E., R., Louisiana State University, 5785 Glenwood, Baton Rouge.
FORREST W. EWING, M. E., Esso Standard Oil Co., 7954 Prescott Road, Baton Rouge.
JAMES P. EWIN, JR., C. E., R., La., Ala., Miss., Tex., Ewin, Campbell & Gottlieb, 7303 Freret St,. New Orleans 18.
MARSHALL B. EWING, M. E., E. E., R., Air Conditioning Appliance Corp., 2520 Albert St., Alexandria.

F

NORRIS L. FANT, M. E., R., Freeport Sulphur Co., 1818 Octavia St., New Orleans.
ARNOLD L. FARMER, E. E., R., N. O. Public Service Inc., 1418 Frankfort St., New Orleans 22.
BENJAMIN R. FARMER, JR., (J), Pet. E., U. S. A. F., Box 164, West Monroe.
ARTHUR E. FAULK, JR., E. E., R., Marine Electric Co., 114 E. Congress St., Lafayette.
JAMES C. FAULKNER, M. E., R., Texas Eastern Transmission Corp., P. O. Box 1612, Shreveport.
FRANCIS J. FAVALORO, E. E., R., N. O. Public Service Inc., 1600 S. Peters St., New Orleans 13.
H. F. FAVRET, C. E., R., Lionel F. Favret Co., Inc., 937 Gravier St., New Orleans 12.
JAMES E. FAVRET, C. E., Lionel F. Favret Co., Inc., 937 Gravier St., New Orleans 12.
HENRY G. FAVROT, (J), C. E., 1448 Nashville Ave., New Orleans.
ALBERT H. FAY, Architect, National Gypsum Co., 325 Delaware Ave., Buffalo 2, N. Y.
ALBERT FELDMAN, Ch. E., R., La., N. Y., Dow Chemical Co., 1424 S. Alameda Drive, Baton Rouge.
EUGENE R. FELTON, E. E., R., Esso Standard Oil Co., 2230 Ebony Ave., Baton Rouge.

FRED H. FENN, C. E., E. E., R., College of Engineering, Louisiana State University, Baton Rouge.
ROBT. D. FENNER, (J), C. E., R., Walter Kidde Engineers, 10550 Daryl Drive, Baton Rouge.
RICHARD F. FENTON, JR., M. E., Esso Standard Oil Co., 2151 E. Ramsey Drive, Baton Rouge.
ARTHUR J. FERGUSON, M. E., R., Esso Standard Oil Co., 4524 Gilbert St., Shreveport.
BILLY M. FERGUSON, C. E., R., Demopulos & Ferguson, 522 Johnson Bldg., Shreveport.
PETER A. FERINGA, Maj. Gen. (Ret.), C. E., N. O. Public Service Inc., 317 Baronne St., New Orleans.
JOHN P. FERNANDEZ, Sec.-Treas., M. E., E. E., C. E., U. S. Navy Dist. Public Works Office, 8th N/D, 522 Crystal St., New Orleans 24.
CHAS. H. FILGO, (J), C. E., Esso Standard Oil Co., Box 551, Baton Rouge.
JOHN J. FINEGAN, Mtce. E., VA Hospital, 1601 Perdido St., Apt. B., New Orleans.
H. S. FINKE, (A), H. S. Finke Corp., 311 Hillary St., New Orleans 18.
ROSCOE J. FINKE, C. E., R., La., Tex., Farnsworth & Chambers Co., 5110 Pocahontas St., Bell Aire, Texas.
WM. T. FIRESHEETS, E. E., R., La. Dept. of Highways, 762 Aster St., Baton Rouge.
MARVIN L. FIRMIN, (J), E. E., N. O. Public Service Inc., 340 30th St., New Orleans 24.
FRANK P. FISCHER, M. E., R., Frank P. Fischer Engineering Co., 7924 Maple St., New Orleans 18.
FRANK P. FISCHER, JR., (J), M. E., R., Frank P. Fischer Engineering Co., 7924 Maple St., New Orleans 18.
CHAS. H. FISHER, Agri. Scientist, Southern Research Lab., 1100 Robt. E. Lee Blvd., New Orleans 19.
CHAS. L. FISHER, C. E., R., City of N. O., Dept. of Streets, 1014 Aline St., New Orleans 15.
MELVIN S. FISHER, M. E., The Flintkote Co., 2613 Green Acres Road, Metairie.
EUGENE L. FITHIAN, (A), Eugene Dietzgen Co., 318 Camp St., New Orleans 12.
RICHARD F. FITZGERALD, (A), Contractor, Fitzgerald Plumbing & Heating Co., Inc., Box 6092, Shreveport.
WM. E. FITZGERALD, M. E., R., Fitzgerald Plumbing & Heating Co., Inc., Box 6092, Shreveport.
H. A. FLANAKIN, C. E., R., La., Tex., Dist. Col., 1355/1 Paknam Road, Bangkapi, Bangkok, Thailand.
J. D. FLEMING, JR., E. E., Gulf States Utilities Co., 637 Pierce Ave., Baton Rouge.
HAROLD L. FLETTRICH, M. E., R., Self employed, 4301 Bienville St., New Orleans.
LIONEL E. FLOTTE, SR., C. E., R., La., Ala., Tex., Miss., Cooperative Cold Storage Builders, 5707 Pitt St., New Orleans 15.
GEORGE A. FLOURNOY, Structural E., Cities Service Refining Corp., 2122 Ninth St. Lake Charles.
WM. E. FLOWERS, C. E., Pan American Engineers, Box 4171, Alexandria.
DAVID H. FLOYD, C. E., P. E., R., La., Okla., Tex., Southwest Natural Gas Co., Box 1487, Shreveport.
J. THAD FLOYD, JR., C. E., R., Metal Bldg. Products Co., Inc., 1937 Lafayette St., New Orleans 6.
PRESTON M. FLOYD, JR., (A), Floyd Electric Co., Inc., 6600 Florida Blvd., Baton Rouge.
HOMER FLYNN, JR., C. E., R., Southern Builders, Inc., 1947 Bayou Drive, Shreveport.
JOHN T. FOLK, C. E., R., Retired Prof. of C. E., La. Polytechnic Institute, 108 S. Bonner Ave., Ruston.
CHAS. C. FORD, E. E., R., Central La. Elec. Co., Inc., 612 S. Lexington Ave., Bunkie.
HAROLD N. FORD, E. E., R., N. O. Public Service Inc., 4910 Gawain Drive, New Orleans 22.
GEO. P. FORMAN, C. E., R., La. Dept. of Highways, Box 1852, Monroe.
VINCENT A. FORTE, E. E., R., Self employed, Box 385, Plaquemine.
EDWARD J. FOSS, (J), C. E., 2219 N. Broad Ave., New Orleans.
CHAS. B. FOSTER, JR., C. E., R., City of Shreveport, Dept. of Water & Sewerage, 247 Preston, Shreveport.
LOUIS H. FOUGEROUSSE, (J), Ch. E., Esso Standard Oil Co., 1712 W. Catalpa Drive, Baton Rouge 6.
JAMES M. FOURMY, C. E., R., Consulting Engineer, Hammond.
J. BRIANT FOURNET, (J), C. E., Tidewater Oil Co., 116 Woodvale Ave, Lafayette.
FREDERICK H. FOX, (L. M.), C. E., R., College of Engineering, Tulane University, New Orleans 18.
HARDY B. FOWLER, M. E., R., H. B. Fowler & Co., Inc., 1900 Destrehan Ave., P. O. Box 213, Harvey.
LUIGI FRANCILLO, M. E., R., Boland Machine & Mfg. Co., Inc., P. O. Box 1089, New Orleans 4.
ALBERT J. FRANSEN, M. E., E. E., R., Industrial Steel Co., Inc., P. O. Box 12025, New Orleans 24.
L. T. FRANTZ, E. E., R., La., Tex., Consultant, 8735 Apricot St., New Orleans 18.
WALTER K. FRANTZ, JR., C. E., R., W. K. Frantz, Jr. & Associates, P. O. Box 444, New Iberia.
HAROLD M. FRASER, Ch. E., R., International Lubricant Corp., P. O. Box 390, New Orleans.
M. E. FRATER, Architect R., W. Horace Williams Co., 833 Howard Ave., New Orleans 13.
PRESLEY J. FREDERICK, (J), C. E., R., Route 1, Box 562, Abbeville.
E. M. FREEMAN, C. E., R., La., Tex., Okla., Miss., Ark., E. M. Freeman & Associates, Henry C. Beck Bldg., Shreveport.
LOUIS S. FREEMAN, M. E., Esso Standard Oil Co., 5251 Lanier Drive, Box 149, Route 1, Baton Rouge.
E. JOSEPH FRENCH, (J), C. E., R., 639 Rutherford St., Shreveport.
WILLIAM H. FRENCH, C. E., R., Freeport Sulphur Co., Box 728, Port Sulphur.
CLIFTON A. FREY, C. E., M. E., E. E., R., La., Ark., Frey, Huddleston & Associates, 1010 Creswell St., Shreveport.
JOHN M. FRIDGE, M. E., Engineering Dept., Cities Service Ref. Corp., Lake Charles.
DAVID B. FRIED, JR., E. E., R., David Fried, Manufacturers Agent, 6027 Chatham Drive, New Orleans 22.
VICTOR A. FRIESE, JR., (J), C. E., R., 2520 Boyd Ave., Ft. Worth, Texas.
EUGENE A. FRISCH, JR., (J), M. E., R., La. Power & Light Co., 4809 Jefferson Hwy., New Orleans 21.
HARRY W. FRISTOE, JR., E. E., R., Southern Bell Tel. & Tel. Co., 316 Breard St., Monroe.
JACOB C. FRITZ, (J), Ch. E., Shell Chemical Corp., P. O. Box 2633, Houston 1, Texas.

ALVIN M. FROMHERZ, (L. M.), C. E., R., La., Miss., Ala., Fromherz Engineers, 816 Howard Ave., New Orleans 12.
FRANK C. FROMHERZ, C. E., R., La., Mo., Fromherz Engineers, 1327 Pine St., New Orleans 18.
THOS. A. FROMHERZ, C. E., R., Fromherz Engineers, 1524 Leontine St., New Orleans 15.
GERALD R. FUCCICH, (J), M. E., 237 Crystal St., New Orleans.
FORNEY FULLER, M. E., R., La., Ala., Combustion Engineering, Inc., 264 Lee Circle Bldg., New Orleans 13.
M. M. FUNDERBURK, E. E., La. Power & Light Co., Box 304, Sterlington.
ALBERT T. FURR, JR., Ch. E., Esso Standard Oil Co., P. O. Box 45, Baker.
WALTER H. FUSH, E. E., R., Ebasco Services, Inc., 3531 Robert St., New Orleans 25.

G

WM. C. GADDY, JR., (J), C. E., R., Esso Standard Oil Co., 5232 Abelia Drive, Baton Rouge.
GAUDENZ GADMER, Ch. E., R., Brown & Root, Inc., 5040 Verdome Lane, Houston 18, Texas.
NICHOLAS J. GAGLIANO, E. E., R., Rutgers University, School of Law, 53 Washington St., Newark 2, N. J.
EARL B. GAINES, M. E., R., Gulf Engineering Co., 3123 Yupon St., New Orleans 19.
GEO. C. GALLAGHER, JR., (J), C. E., Esso Standard Oil Co., 3552 Government St., Baton Rouge 6.
JOHN D. GALLET, (J), Ch. E., E. I. duPont de Nemours, Inc., 408 W. Pine Ave., Orange, Texas.
BENJAMIN E. GALLOWAY, JR., M. E., R., 46 Ravan St., Harahan, New Orleans 23.
LEONARD T. GALSTER, (J), E. E., R., Kaiser Aluminum & Chem. Corp., 4138 E. Brookstown Drive, Baton Rouge.
CARY B. GAMBLE, M. E., E. E., R., La., Tex., Miss., Ala., Tenn., Ga., Ky., N. C., S. C., Cary B. Gamble & Associates, 635 Commercial Place, New Orleans 12.
WM. T. GAMBLIN III., E. M. Freeman & Associates, 437 Mohawk Trail, Shreveport.
GLENN D. GARBER, M. E., Petroleum Chemicals, Inc., 1516 Alvin St., Lake Charles.
PATRICK E. GARNER, 5831 S. W. 12th St., Miami, Fla.
VERGIL S. GARNETT, C. E., R., Olin Gas Transmission Corp., Box 1482, Monroe.
JOSEPH D'L. GARON, M. E., Comfortair Co., Inc., 2116 Burdette St., New Orleans.
MARION D. GARRISON, M. E., Mo., Olin Mathieson Chem. Corp., 1709 Kirkman St., Lake Charles.
EDW. A. GASTROCK, Ch. E., R., Southern Regional Research Laboratory, 2105 Haring Road, Metairie.
JOHN R. GAUGLER, E. E., R., Central La. Elec. Co., Inc., 102 White Circle, Lafayette.
FRANK C. GAULT, M. E., R., A. M. Lockett & Co., P. O. Box 553, Lake Charles.
CARL M. GAUTHIER, (J), M. E., R., Hessmer.
JOHN S. GENTILICH, C. E., U. S. Engineer Corps, N. O. Dist., 4675 Venus St., New Orleans.
ROY GEOGHEGAN, C. E., R., Ala., Plibrico Sales & Service Co., 21 Colonial Club Lane, New Orleans 23.
F. J. GERMANO, C. E., R., Atkinson Hall, Louisiana State University, Baton Rouge.
EDW. H. GESSNER, C. E., R., La., N. Y., Ala., Ga., Puerto Rico, Frederic R. Harris, Inc., 27 William St., New York 5, N. Y.
ASHBY T. GIBBONS, JR., C. E., R., La., Ala., Ga., Portland Cement Ass'n, 611 Gravier St., New Orleans.
WALTER D. GIBSON, (A), C. E., R., La. Dept. of Highways, P. O. Box 545, Oak Grove.
JOHN B. GIDDENS, JR., C. E., R., Board of Commissioners, Port of New Orleans, 2 Canal St., New Orleans.
R. B. GIEZENTANNER, M. E., R., La., Tex., Okla., c/o Interstate Oil Pipe Line Co., Box 1107, Shreveport.
H. R. GILBERT, (A), John H. Carter Co., 1531 Fern St., New Orlean 18.
JAMES R. GILBERT, C. E., R., Pyburn & Odom, 1447 Ross Ave., Baton Rouge.
RILEY L. GILBERT, M. E., R., La., Tex., Gulf Engineering Co., 28 Chatham Drive, New Orleans 22.
MURRAY M. GILKESON, JR., Ch. E., Met. E., R., Tulane University.
SIDNEY S. GILL, M. E., Thermatomic Carbon Co., 701 K. St., Monroe.
E. M. GILLEN, C. E., R., La. Dept. of Highways, 101 Egan St., Shreveport.
H. C. GILLEN, (A), Texcrete Co., 2110 Highland Ave., Shreveport.
JULIAN S. GILLS, Ind. E., General Electric Co., P. O. Box 1189, Alexandria.
I. HARRY GILLUM, E. E., Esso Standard Oil Co., 1332 Lee Drive, Baton Rouge.
ELVOY L. GISH, (A), Engineering Artist, La. Dept. of Highways, 3388 Delaware St., Baton Rouge.
ALLEN T. GIVENS, M. E., Columbia Carbon Co., 603 Auburn St., Monroe.
WESLEY D. GLASSELL, C. E., R., La., Ark., W. D. Glassell Co., P. O. Box 1622, Shreveport.
HOWARD W. GLEASON, C. E., R., Apartado 10235, Caracas, Venezuela.
JOHN A. GLOVER, C. E., Geo. J. Glover Co., Inc., 206 Vincent Ave., Metairie.
DAVID W. GODAT, (L. M.), C. E., M. E., R., La., Miss., Tex., Ala., David W. Godat & Associates, 816 Howard Ave., New Orleans 12.
MAYER GODCHAUX, (L. M.), M. E., Mayer Godchaux Mechanical Contractors, P. O. Box 1687, New Orleans.
WALTER GODCHAUX, JR., Ch. E., R., National Blow Pipe & Mfg. Co., Inc., 1835 Octavia St., New Orleans 15.
JACOB B. M. GOFF, M. E., The Dow Chemical Co., 9325 Meredith Drive, Baton Rouge.

J. McC. GONDRAN, (L. M.), C. E., 8228 Panola St., New Orleans 18.
LOUIS K. GOOD, C. E., R. P. Farnsworth & Co., Inc., P. O. Box 850, New Orleans 2.
FERD L. GOODMAN, C. E., R. Ind., Barber Bros. Co., Contractors, 2974 Fritchie Drive, Baton Rouge.
LOUIS N. GOODMAN, E. E., R., La., Miss., Pa., Louis N. Goodman & Associates, 405 Audubon Bldg., New Orleans 16.
ALFRED N. GORDON, M. E., R., Esso Standard Oil Co., 2228 Edinburgh Ave., Baton Rouge.
JAMES R. GORE, C. E., R., Eustis Engineering Co., 3635 Airline Hwy., Metairie.
ROBT. E. GOSA, C. E., W. Horace Williams Co., 833 Howard Ave., New Orleans 12.
NEWTON J. GORSHA, (A), Ralph S. Holt Testing Lab., Inc., 109 Parkwood Drive, Alexandria.
GERALD M. GOSSSEN, C. E., R., Gossen Construction Co., P. O. Box 818, Lafayette.
RAYMOND A. GOULAS, (Jr. Member), Graduate of S. L. I., 300 Hanson St., Franklin.
RICHARD N. GRAHAM, C. E., U. S. Corps of Engineers, 2407 Gen. Pershing St., New Orleans 15.
PRENTIS G. GRAMBLING, JR., M. E., E. E., R., City of Ruston, P. O. Box 45, Ruston.
RODNEY J. GRANDY, JR., (J), Esso Standard Oil Co., 1056 Rittinge Drive, Baton Rouge.
ARTHUR A. GRANT, (L. M.,) M. E., R., Private Practice, 1745 National Bank of Commerce Bldg., New Orleans 12.
FRANCIS W. GRANT, C. E., R., Consulting Engineer, 500 Ricou-Brewster Bldg., Shreveport.
BISHOP B. GRAVES, JR., (J), C. E., Esso Standard Oil Co., 941 Woodhaven St., Baton Rouge.
CHAS. L. GRAVES, C. E., R., J. Ray McDermott & Co., Inc., Box 38, Harvey.
CHAS. H. GREEN, C. E., Wm. F. Surgi Equipment Co., P. O. Box 1309, New Orleans 10.
JOHN M. GREEN, (J), M. E., Esso Standard Oil Co., 11135 Black Oak Drive, Baton Rouge.
MERLIN L. GREEN, (Jr. Member), Graduate of S. L. I., 120 E. 7th St., Crowley.
PETER L. GREEN, (J), M. E., R., Lone Star Cement Corp., 812 Gravier St., New Orleans 12.
ISAAC M. GREGORIE, (J), Industrial E., Esso Standard Oil Co., 3175 McConnel Drive, Baton Rouge.
HARBERT S. GREGORY, E. E., R., Gregory-Salisbury & Co., Inc., 820 Julia St., New Orleans 12.
BERNARD A. GREHAN, C. E., R., La., Pa., B. M. Dornblatt & Associates, Inc., 2831 Octavia St., New Orleans 15.
ROBT. H. GREHAN, C. E., R., R. B. Tyler Co., Inc., 1207 Henry Clay Ave., New Orleans 18.
F. B. GREVEMBERG, C. E., R., Private Practice, 217 Norland Ave., New Orleans 14.
GEORGE J. GROH, M. E., R., R. J. Tricon Co., 751 Tchoupitoulas St., New Orleans.
JOHN F. GROSCH, III, (J), C. E., R., Armco Drainage & Metal Products Co., 623 Carondelet Bldg., New Orleans.
HENRY K. GROVES, P. E., Esso Standard Oil Co., 1136 Richland Ave., Baton Rouge.
ROBT. J. GRUSH, M. E., R., Manufacturer's Representative, 214 St. Clair Bldg., 3709 S. Carrollton Ave., New Orleans 18.
WILL S. GUEDRY, C. E., R., A. M. Mutersbaugh, 1105 Reid St., Lake Charles.
MARIO R. GUELL, E. E., R., Gaylord Container Corp., Bogalusa.
MISS M. L. GUERRIERO, (J), C. E., R., City of New Orleans, 7004 St. Charles Ave., New Orleans 18.
CHARLES L. GUIDRY, (Jr. Member), Graduate of S. L. I., 300 Madison St., Lafayette.
EARL GUIDRY, (Jr. Member), Graduate of S. L. I., 409 S. St. Charles, Abbeville.
GARY J. GUIDRY, (A), Air Cond. Engr., United Gas Corp., 120 Iberia St., New Iberia.
JOSEPH T. GUIDRY, (Jr. Member), Graduate of S. L. I., 708 Eighth St., Lafayette.
WALDECK F. GUILBEAU, Ch. E., R., Southern Utilization Research Lab., 6644 Louis XIV St., New Orleans 24.
AUDLEY P. GUILLORY, C. E., R., La. Dept. of Highways, R. F. D. No. 1, Box 331, Ville Platte.
HORACE J. GUILLORY, Central La. Electric Co., St. Landry.
J. MASON GUILLORY, M. E., E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
E. E. GUILLOT, JR., C. E., R., La. Dept. of Highways, 738 Arthur St., Lafayette.
MALCOLM A. GUILLOT, M. E., R., U. S. Army Engineer Dist. N. O., 1221 Behrman Ave., New Orleans 14.
ROGER P. GUISSINGER, C. E., R., La. Dept. of Highways, 2122 Cedardale Ave., Baton Rouge.
D. E. GUIZA, C. E., R., Boh Bros. Construction Co., 207 Sena Drive, Metairie.
WALTER GULICK, M. E., R., Ethyl Corp., 1734 Stuart Ave., Baton Rouge.
SAM P. GULLATT, JR., E. E., R., 1126 Oriole Road, Santa Barbara, Calif.
JAMES O. GUNDLACH, (J), M. E., 5012 Pitt St., New Orleans.
JOS. W. GUNN, Ch. E., Lone Star Cement Corp., 100 Park Ave., New York, N. Y.
WM. B. GURNEY, M. E., Gulf States Utilities Co., 272 E. Circuit Drive, Beaumont, Texas.
M. M. GURTLER II, C. E., R., La., Ala., Gurtler, Hebert & Co., Inc., 1539 Pleasant St., New Orleans 19.
JOHN J. GUTH, E. E., R., Carl M. Hadra Associates, Louisiana Bank Bldg., Shreveport.
JEROME P. GUY, (J), C. E., R., La. Dept. of Highways, 3353 Wyoming St., Baton Rouge.

H

JOHN A. HAASE III, C. E., R., Haase Construction Co., Inc., 5901 Vicksburg St., New Orleans 24.
ROBT. N. HABANS, C. E., R., Orleans Materials & Equip. Co., Inc., 53 Dove St., New Orleans 24.
CARL M. HADRA, M. E., E. E., R., La., Ark., Tex., Carl M. Hadra Associates, Louisiana Bank Bldg., Shreveport.
E. J. HAGSTETTE, JR., Ch. E., R., Calif., P. O. Box 1675, Houston, Texas.
CHAS. W. HAIR, JR., C. E., R., La., Tex., Pyburn & Odom, 4960 Holloway Ave., Baton Rouge.
HARRELL A. HAIR, C. E., R., La. Dept. of Highways, 606 Police St., Minden.
ALTON S. HALL, Valentine Sugars, 7312 Spanish Fort Blvd., New Orleans 24.
CHRIS H. HALL, M. E., R., Esso Standard Oil Co., 1641 Avondale Drive, Baton Rouge 8.
ELMER P. HALL, C. E., R., Caffery & Hall, 422 Adrian St., Lafayette.
HARVEY A. HALL, C. E., R., State Dept. of Public Works, 169 Hearthstone Drive, Baton Rouge.
IRA E. HALL, (A), Flynn Mfg. Corp., 2228 Thornton Court, Alexandria.
ROBERT S. HALL, JR., E. E., R., Miss., Westinghouse Electric Supply Co., 7665 Richards Drive, Baton Rouge.
RUSSELL A. HALL, C. E., R., T. Edward Ernst, 513 Sena Drive, Metairie.

W. HANSEN HALL, E. E., R., La., Miss., Tex., Consulting Engineer, 1822 April St., Baton Rouge 6.
DANIEL HALLARON, JR., M. E., E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
JAMES H. HAMILTON, Ch. E., Barrow-Agee Laboratories, Inc., P. O. Box 858, Shreveport.
JOHN W. HAMILTON, JR., M. E., R., Columbian Carbon Co., 1800 Milton St., Monroe.
GEO. R. HAMMETT, (L. M.), M. E., R., A. M. Lockett & Co., Ltd., 308 Whitney Bldg, New Orleans 12.
ROBT. C. HANKS, (J), E. E., R., Esso Standard Oil Co., 328 N. 26th St., Baton Rouge.
FRED A. HANNAMAN, JR., M. E., R., Esso Standard Oil Co., 1671 Cedardale Ave., Baton Rouge 8.
EDWIN F. HARDY, (J), C. E., R., Esso Standard Oil Co., 718 Carol Marie Drive, Baton Rouge.
JOHN BURTON HARDY, (J), Schlumberger Well Surveying Corp., Route 3, Box 372, Kaplan.
WILLIAM HARDY, Hardy-Stevens Co., 520 Fern St., New Orleans 18.
QUENTIN W. HARGROVE, M. E., E. E., R., La., Tex., Consulting Engineer, 226 Simon Bldg., Shreveport.
M. L. HARGUS, (A), United Electric Service, 2407 N. Seventh St., West Monroe.
WM. I. HARING, M. E., R., The Lummus Co., P. O. Box 2602, Baton Rouge.
EUGENE H. HARLOW, C. E., R., N. J., Pa., Tex., Tenn., Mass., La., Miss., Conn., N. Y., Ind., Ontario, Canada, c/o Frederick R. Harris, Inc., 1915 Tulane Ave., New Orleans 16.
ALLAN J. HARRIS, (L. M.), M. E., R., Allan J. Harris Co., 7615 Jeannette St., New Orleans 18.
ELBERT F. HARRIS, C. E., R., La., Miss., Consulting Engineer, 803 Murray St., Alexandria.
WM. K. HARRIS, M. E., R., United Gas Corp., 1511 Fairview Ave., Monroe.
WILLIE R. HARRIS, E. E., R., Gulf States Utilities Co., 8142 White Road, Beaumont, Texas.
FRED K. HARRISON, E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
ROBERT M. HARRISON, Address Unknown.
ROBT. A. HART III, E. E., R., La., Miss., H. E. Bovay, Jr., Consulting Engineers, 5217 Government St., Baton Rouge.
ROBERT G. HART, JR., E. E., M. E., R., Columbian Carbon Co., 2720 Point Drive, Monroe.
AUDIO G. HARVEY, M. E., E. E., Delta Exploration Co., Box 220, Route 1, Jackson, Miss.
FRANK H. HARVEY, M. E., R., Esso Standard Oil Co., 8935 Gail Drive, Baton Rouge 8.
JOSEPH M. HARVEY, E. E., Esso Standard Oil Co., 11635 Robin Hood Drive, Baton Rouge 6.
JAMES E. HASSINGER, JR., (J), C. E., R., 2021 S. Carrollton Ave., New Orleans 18.
WALTER L. HASTINGS, (A), Layne Louisiana Co., P. O. Box 887, Lake Charles.
LEWIS S. HAVENS, Southern Bell Tel. & Tel. Co., Room 321, 1215 Prytania St., New Orleans 13.
EUGENE C. HAWKINS, M. E., E. E., C. E., R., Celotex Corp., 508 Hector Ave, Metairie.
W. W. HAY, (L. M.), C. E., R., c/o Ohio River Co., Atlas Bank Bldg., Cincinnati 2, Ohio.
HONORE M. HAYNE, C. E., R., Dept. of Public Works, 2106 Stanford Ave., Baton Rouge 15.
ARTHUR C. HAYS, Sales E., Arthur C. Hays & Associates, 1221 Carondelet Bldg., New Orleans 12.
EDWARD T. HEARD, JR., P. E., M. E., R., State of La., Dept. of Revenue, 1701 Auburn St., Monroe.
JNO. E. HEARD, C. E., R., Carter Oil Co., 644 Kingshighway, Shreveport 38.
MARION D. HEATH, C. E., R., La. Dept. of Public Works, 2059 Cloverdale Ave., Baton Rouge 6.
FLOYD C. HEBERT, (J), M. E., R., Leonville.
LT. HAROLD J. HEBERT, A03054330, (J), Box 6096, Student P. O., Harlingen AFB, Texas.
JOHN A. HEBERT, E. E., R., Southern Bell Tel & Tel Co., 1215 Prytania St., New Orleans.
J. I. HEBERT, JR., C. E., R., C. W. Mackie Co., P. O. Box 4024, New Orleans.
MALCOLM HEBERT, M. E., Roland Construction Co., P. O. Box 850, Alexandria.
OMER J. HEBERT, C. E., R., Hebert Bros., Engineers, 1015 Osage Ave., Plaquemine.
R. A. HEBERT, JR., M. E., Kaiser Aluminum & Chem. Corp., 548 Elmeer Place, Metairie 20.
GEO. A. HEFT, C. E., M. E., E. E., R., La., Ala., Tenn., G. A. Heft & Co., 2420 Audubon St., New Orleans 25.
ELBERT S. HEIM, C. E., R., La. Dept. of Highways, 1017 New Benton Road, Bossier City.
SAMUEL J. HELFMAN, E. E., R., Barnard & Burk, 2105 Ferndale Ave., Baton Rouge.
HAROLD W. HELMKE, JR., (J), Ch. E., 4516 Louisa Drive, New Orleans 22.
JOHN E. HELQUIST, (A), M. E., Naugatauck Chem. Div., U. S. Rubber Co., 1044 E. River Oaks, Baton Rouge.
DAVID C. HENDRICK, P. E., E. E., R., Southern Bell Tel. & Tel Co., 7843 Jefferson Hwy., Baton Rouge.
NUMA J. HELWICK, M. E., R., Grimaldi Heating & Plumbing Co., 809 Greenwood Drive, New Orleans 24.
HARRY B. HENDERLITE, C. E., R., Modjeski & Masters, 249 Belleview Drive, Baton Rouge.
JAMES P. HENDERSON, M. E., 1627 S. Carrollton Ave., New Orleans 18.
GEORGE C. HENGY, E. E., R., La., Ark., Okla., Tex., Geo. C. Hengy Co., 228 N. Market St., Shreveport.
WILLIAM H. HENKEL, M. E., E.,E., R., Design Engineers Associated, 617 Carol Drive, New Orleans 21.
H. L. HENRY, M. E., R., Tex., Dept. of General Engineering, La. Polytechnic Institute, Ruston.
THOS. R. HENRY, JR., C. E., M. E., R., Columbian Carbon Co., Box 1562, Monroe.
LEWIS W. HENSLEE, JR., Ch. E., R., Columbia-Southern Chemical Corp., 206 Aqua Drive, Lake Charles.
H. WM. HERBST, C. E., R., B. M. Dornblatt & Associates, Inc., 10 Forest Ave., Metairie.
F. M. HEROY, SR., C. E., Photomaps, Inc., 103 Elvis Court, Metairie.
FRANK M. HEROY, JR, (J), C. E., R., La. Dept. of Highways, 2219 Myrtledale Ave., Baton Rouge.
WALTER T. HERRMANN, (J), E. E., R., 1808 Ohio St., Lawrence, Kans.
RUDOLF HERTZBERG, (J), C. E., U. S. Army Engineer District, 1327 Webster St., New Orleans 18.
JAMES K. HESS, C. E., R., c/o Jones & Laughlin Steel Corp., P. O. Box 66, New Orleans 6.
WILLIAM T. HESS, M. E., E. E., R., La. Power & Light Co., 142 Delaronde St., New Orleans 14.
R. M. HETHERWICK, E. E., R., Southwest La. Elec. Membership Corp., 130 Azalea St., Lafayette.
KEITH A. HETRICK, C. E., City of Shreveport, 3403 Penick St., Shreveport.
ELLIOTT H. HEWES, C. E., R., La. Dept of Public Works, 325 Amelia St., Lafayette.
VICTOR C. HICKS, Aero E., W. Horace Williams Co., 3705 Vincennes Place, New Orleans.

OSCAR HIGGINBOTHAM, M. E., Compania Ingenios Azucareros, Matanzas, S. A., Central Espana, Perica, Cuba.
LESTER G. HIGH, C. E., R., La., Miss., Ky., Private practice, Room 6, Kusin Bldg., Monroe.
ARTHUR M. HILL, M. E., R., N. Mex., Sandia Aircraft Corp., 1835 Sigma Chi Road, N. E., Albuquerque, N. Mex.
GEO. H. HILL, E. E., R., Cities Refining Corp., 1900 Tenth St., Lake Charles.
GEO. WM. HILL, M. E., E. E., White Motor Co., Diesel Eng. Div., 3651 Piedmont Drive, New Orleans 22.
GEO. WM. HILL, M. E., Esso Standard Oil Co., 4533 Essen Lane, Baton Rouge 8.
J. CLIFTON HILL, Ch. E., Esso Standard Oil Co., 2153 Broussard St., Baton Rouge.
LCDR. ROLAND D. HILL, USN., C. E., R., DPWO-8ND, Bldg., 16., U. S. Naval Station, New Orleans 40.
PAUL E. HIME, M. E., R., Dow Chemical Co., 4372 Dickens Drive, Baton Rouge.
NEWTON HIMEL, E. E., R., Central La. Elec. Co., Inc., 420 Charles St., New Iberia.
DAVIDSON D. HINCKLEY, C. E., R., D. W. Godat & Associates, 816 Howard Ave., New Orleans.
ROBT. O. HINCKLEY, M. E., Boeing Airplane Co., 2344 Federal Ave., Seattle 2, Wash.
EDMOND F. HINDS, JR., (J), M. E., R., Esso Standard Oil Co., 10534 Daryl Drive, Baton Rouge.
LOUIS L. HINES, E. E., Esso Standard Oil Co., 2111 Hood Ave., Baton Rouge.
H. JACK HINRICHS, M. E., R., Hinrichs & Associates, 74 Neron Place, New Orleans 18.
MARCUS M. HIRSCH, (J), M. E., Barnard & Burk, 890 W. Garfield, Baton Rouge.
CAMIEL HOCTEL, JR., (A), The Celotex Co., 139 W. Henfer Park, New Orleans 23.
EDWARD A. HODGE, Agri. E., La. Power & Light Co., 506 River Oaks Drive, New Orleans 14.
R. DALE HODGES, C. E., R., Pan-American Engineers, 3415 N. Acadian Thruway, Baton Rouge.
FREDERICK J. HOFFMAN, Ch. E., R., N. O. Public Service Inc., 1600 S. Peters St., New Orleans 13.
GEO. A. HOFFMAN, (A), Sangamo Elec. Co., 5705 Canal Blvd., New Orleans 24.
FRANK E. HOGAN, C. E., R., State of La., Dept. of Public Works, 5825 Chandler Drive, Baton Rouge 2.
M. DAN HOGAN, Shamrock Construction Co., 8 Shadow Lane, Metairie.
W. T. HOGG, C. E., R., La., Miss., Ala., Fla., Bd. of Comm., Port of New Orleans, 2 Canal St., New Orleans.
TRUDEAU J. HOGUE, JR., E. E., R., Southern Bell Tel. & Tel. Co., 710 W. Michigan Ave., Hammond.
JOSEPH A. HOLLAND, C. E., R., City of New Orleans, 5517 Hawthorne Place, New Orleans 24.
RALPH B. HOLLAWAY, E. E., R., Ethyl Corp., 11834 Sherbrook Drive, Baton Rouge.
CLYDE W. HOLLENSHEAD, M. E., R., United Gas Pipe Line Co., Box 1407, Shreveport.
THOS. F. HOLLENSHEAD, C. E., United Gas Pipe Line, Inc., 2633 E. Cavett St., Shreveport.
WARREN R. HOLLIER, M. E., R., Central La. Elec. Co., Inc., Box 1096, Lafayette.
MAJOR WALTER HOLLOWAY, L. M., E. E., R., Ala., Lt. Col. USAF, 34 Washington Ave., Ocean Springs, Miss.
WM. D. HOLLOWAY, Lubrication E., Gulf Oil Corporation, P. O. Box 400, New Orleans 1.
RALPH S. HOLT, Testing E., Ralph S. Holt Testing Laboratory, Inc., 637 Tchoupitoulas St., New Orleans 12.
W. T. HOLT, JR., M. E., R., La., Tex., Dow Chemical Co., 317 Azalea St., Lake Jackson, Texas.
LEO L. HOLZENTHAL, Ch. E., M. E., R., Southern Region Research Laboratory, 6520 Catina St., New Orleans 24.
ROBIN M. HOOD, M. E., R., Shreveport Refrigeration Co., Inc., 633 McCormick St., Shreveport.
PAUL F. HOOTS, (L. M.), N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
DAVID A. HOPKINS, Standard Fruit & SS Co., 944 St. Charles, New Orleans 12.
WM. N. HOPKINS, C. E., R., Gaylord Container Corp., 731 Ontario Ave., Bogalusa.
FRANKLYN G. HORNSBY, E. E., Gulf States Utilities Co., 1145 Bel Air Drive, Baton Rouge.
WM. F. HORRELL, JR., M. E., R., N. O. Public Service Inc., 5718 Louis XIV St., New Orleans 24.
JOHN R. HORTON, M. E., La. Power & Light Co., 142 Delaronde St., New Orleans 14.
ROBT. L. HORTON, C. E., R., City of Shreveport, 213 Preston St., Shreveport.
S. E. HOTTINGER, JR., M. E., E. E., R., La. Rating & Fire Prevention Bureau, 70 Hawk St., New Orleans.
FRANK S. HOUGHTON, M. E., Standard Oil Co. of La., 9456 Meredith Drive, Baton Rouge.
DAVID H. HOVEY, E. E., La., Miss., Hovey-Cole & Associates, 3734 Florida St., Baton Rouge.
HY. G. HOWARD, C. E., R., La., Me., Miss., Ala., Vt., c/o Michael Baker, Jr., Inc., Box 9997, Northside Sta., Jackson, Miss.
LEWIS B. HOWE, C. E., R., La. Dept. of Highways, Box 126, Minden.
WM. M. HOWE, E. E., Civil Aeronautics Adm., 2410 N. W. 25th St., Ft. Worth, 6, Texas.
THOMAS F. HOWIE, E. E., R., Jack Moorman, Electrical Contractor, Inc., 417 Ricou St., Box 1631, Shreveport.
ROBT. E. HOWSON, (J), C. E., R., Avondale Marine Ways, Inc., 218 Fairfax Drive, New Orleans 14.
CHARLES P. HOYT, M. E., R., Esso Standard Oil Co., Box 864, Baton Rouge 1.
RICHARD H. HUDSON, JR., M. E., Esso Standard Oil Co., 1935 Marilyn Drive, Baton Rouge.
ALVIN R. HUDSPETH, (A), M. E., Olin-Mathieson Chem. Corp., 2710 8th St., Lake Charles.
GEO. O. HUET, Marine E., Naval Architect, 5635 Milne St., New Orleans 24.
JAMES T. HUEY, C. E., M. E., R., La. Dept. of Highways, 678 North 5th St., Baton Rouge.
S. E. HUEY, C. E., R., S. E. Huey & Co., Consulting Engineers, Ouachita Bank Bldg, Monroe.
STANTON E. HUEY, JR., C. E., R., S. E. Huey & Co., Engineers, Box 156, Monroe.
JOE D. HUFFMAN, M. E., Continental Oil Co., Ponca City, Okla.
JOHN H. HUFFMAN, (A), Pet. E., R., United Gas Corp., 506 Lakeshore Drive, Monroe.
E. F. HUGHES, C. E., R., Sewerage & Water Board, 4500 S. Miro St., New Orleans 12.
CHAS. H. HUNDEMER, Gaylord Container Corp., 806 North Border Drive, Bogalusa.
LAWRENCE N. HUNSINGER, JR., (J), C. E., La. Dept. of Highways, 1100 W. First St., Kaplan.
DONALD G. HUNTER, E. E., R., City of Alexandria, 3407 Halsey, Alexandria.
MALCOLM L. HURSTELL, (J), E. E., R., N. O. Public Service Inc., 4900 Kendall Drive, New Orleans 19.
MILES B. HUTSON, E. E., R., Bedell & Nelson Engineers, Inc., 321 Hillary St., New Orleans 18.
CARL J. HUVAL, (J), C. E., Address unknown.
NORWOOD F. HYMEL, C. E., R., Fromherz Engineers, 816 Howard Ave., Room 300, New Orleans 12.

I

C. A. IBACH, M. E., Gulf States Utilities, P. O. Box 111, Baton Rouge.
ORVILLE T. ICE, JR., P. E., R., La. Conservation Dept., Minerals Div., 522 Egan St., Shreveport.
JOHN L. ILES, (A), La. Metal Culvert Co., P. O. Box 4281, Centenary Sta., Shreveport.
JAS. F. ILGENFRITZ, M. E., R., Boyce-Harvey Machinery, Inc., 137 Diane Ave., New Orleans 23.
THEO J. INNES, JR., M. E., R., Esso Standard Oil Co., 3160 Svendson Drive, Baton Rouge 8.
FRANK W. IRLAND, M. E., R., Mo., Libbey-Owens-Ford Glass Co., 809 Cardinal St., Shreveport.
IRWIN ISAACSON, JR., M. E., E. E., R., Leo S. Weil & Walter B. Moses, 600 Audubon Bldg., New Orleans 16.
C. A. IVES, JR., (L. M.,) C. E., R., Esso Standard Oil Co., 940 Park Blvd., Baton Rouge.

J

A. D. JACKSON, C. E., R., La. Dept. of Highways, 1749 Parker St., Baton Rouge.
ALLEN S. JACKSON, E. E., R., Crouse-Hinds Co., 205 Guave Drive, Baton Rouge.
CLARENCE A. JACKSON, M. E., Self employed, Box 623, Sulphur.
O. D. JACKSON, M. E., R., United Gas Pipe Line Co., Box 1407, Shreveport.
JOSEPH JACOBS, (A), United Gas Corp., 3604 Breville St., Monroe.
JOS. C. JAGERS, Pet. E., Central La. Elec. Co., Inc., 1111 Cushman St., Alexandria.
COMMODORE ERNEST LEE JAHNCKE, (L. M.), Retired, 726 West Beach, Pass Christian, Miss.
PAUL F. JAHNCKE, (L. M.), C. E., R., Jahncke Service, Inc., 814 Howard Ave., New Orleans 4.
JAY M. JALENAK, M. E., R., Jay M. Jalenak Engr. Co., 1832 Gentilly Blvd., New Orleans 19.
E. JOE JAMES, C. E., R., La. Dept. of Highways, 1133 Glenmore Ave., Baton Rouge.
HARDY M. JAMES, M. E., R., James Machine Works, Box 1296, Monroe.
ROBT. B. JAMES, M. E., E. E., R., N. O. Public Service Inc., 2838 Iberville St., New Orleans.
JAMES S. JANSSEN, C. E., M. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
J. E. JARMAN, C. E., R., La. Dept. of Highways, 134 Memory Lane, Lafayette.
NEILL P. JEFFREY, JR., C. E., R., A. W. Thompson & Associates, 6306 Beauregard Ave., New Orleans 19.
RAYMOND E. JENKINS, E. E., M. E., R., Southwestern La. Institute, P. O. Box 64, Lafayette.
JOHN M. JENNY, JR., M. E., R., Edwards Engineering Corp., 996 Filmore St., New Orleans.
ALLEN H. JENSEN, M. E., R., La., Ill., N. O. Public Service Inc., 1600 S. Peters St., New Orleans 13.
D. W. JESSEN, C. E., R., Private practice, Room 18, Kaufman Bldg., Lake Charles.
GEORGE T. JOHNS, C. E., R., La. Dept. of Public Works, Box 701, Tallulah.
ERNEST D. JOHNSON, (A), Kaiser Aluminum & Chemical Corp., 5249 E. Brookstown Drive, Baton Rouge 5.
EVERETT K. JOHNSON, JR., (J), C. E., Sewerage & Water Board, 3816 Bissonet Plaza, Metairie.
FRANK E. JOHNSON, JR., E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
DR. LEE H. JOHNSON, JR., Dean, C. E., R., College of Engineering, Tulane University, P. O. Station 20, New Orleans 18.
LESLIE M. JOHNSON, M. E., R., Esso Standard Oil Co., 332 Semur Road, Pensacola, Fla.
MILTON R. JOHNSON, JR., E. E., R., La. Polytechnic Institute, 810 Robert St., Ruston.
O. D. JOHNSON, JR., E. E., M. E., R., Esso Standard Oil Co., 4312 Shelley St., Baton Rouge.
RICHARD L. JOHNSON, JR., (J), M. E., Manufacturers Representative, P. O. Box 304, Shreveport.
ROY E. JOHNSON, C. E., R., H. H. Robertson Co., 1020 Maritime Bldg., New Orleans 12.
WM. J. JOHNSON, JR., C. E., U. S. Corps of Engineers, 536 N. Market St., Opelousas.
SAMUEL R. JOHNSTON III, Surveyor, R., Self-employed, 3962 Sumner St., Shreveport.
WM. H. JOHNSTON, M. E., R., F. N. Johnston, Inc., 829 Howard Ave., New Orleans 12.
EDW. M. JOLLY, M. E., R., E. M. Freeman & Associates, 3052 Gorton Road, Shreveport.
C. LEONARD JONES, (L. M.), C. E., R., Board of Commsisioners, Port of New Orleans, 27 Maryland Drive, New Orleans 24.
C. PALMER JONES, M. E., R., McLellan Equipment Co., 2375 Tchoupitoulas St., New Orleans.
E. ROGER JONES, JR., M. E., R., La. State University, 1836 Steele Blvd., Baton Rouge.
FRANK W. JONES, E. E., R., La., Tex., Gulf States Utilities Co., 1665 Euclid St., Beaumont, Texas.
JOHN P. JONES, M. E., R., Ogden, Woodruff & Dyer, 956 Francis Harriet Drive, Baton Rouge.
SARGENT F. JONES, C. E., R., 5422 Prytania St., New Orleans 15.
W. C. JONES, (J), Southern Bell Tel. & Tel. Co., 209 N. Sibley St., Metairie.
AINSWORTH V. JORDY, (A), Price Brothers Co., 100 Friedrichs Ave., Metairie.
EDMOND M. JULIAN, C. E., Standard Dredging Co., 621 Cumberland St., Harriman, Tenn.
RALPH W. JUNIUS, (A), Architect, Boh Bros. Construction Co., 433 Jewel St., New Orleans 24.
JOHN H. JURIK, C. E., R., Walter Kidde Engineers, P. O. Box 1750, Baton Rouge.

K

TED H. KALENCKI, M. E., E. E., R., Kaiser Aluminum & Chem. Co., Inc., Route 2, Jackson.
KARL P. KAMMER, M. E., E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
NOEL P. KAMMER, Architectural E., General Earthwork Service, 3527 Carondelet St., New Orleans 15.
JAMES N. KAYSER, M. E., R., Esso Standard Oil Co., 1655 Goldenrod Ave., Baton Rouge.
W. J. KEATING, (A), E. E., E. Levy & Co., 28 Mary St., Alexandria.
HAROLD L. KEATON, Ch. E., R., Gaylord Container Corp., 906 Florida Ave., Bogalusa.
ARTHUR R. KEILER, Chief Inspector, Hartford Steam Boiler Inspection & Ins. Co., 519 Hibernia Bank Bldg., New Orleans 12.
EDWARD H. KEILER, M. E., R., U. S. Dept. of Navy, 323 Midway Drive, New Orleans 21.
MIKE KELLEHER, M. E., E. E., R., Kelleher Engineering Corp., P. O. Box 7311, New Orleans.
CHAS. KELLER, JR., M. E., R., Keller Construction Corp., P. O. Box 439, New Orleans 1.

GEO. H. KELLERMANN, E. E., General Electric Co., 837 Gravier St., New Orleans.
CLAUDE J. KELLY, C. E., N. O. Cement Products Co., Inc., 4139 Walmsley Ave., New Orleans 25.
CLAUDE J. KELLY, JR., (J), C. E., R., N. O. Cement Products Co., Inc., 4139 Walmsley Ave., New Orleans 25.
JOSEPH E. KELLY, M. E., R., J. B. Beaird Co., Inc., 217 Russell St., Shreveport.
CHAS. M. KERR, (H. M., L. M.), C. E., R., 5821 S. Robertson St., New Orleans 15.
GERALD C. KERR, Acoustical E., Johns-Manville Co., 625 Pine St., Apt. 2, New Orleans 18.
JAMES F. KERR, C. E., R., Tex., Missouri Pacific Lines, 404 West Alabama Ave., Houston 6, Texas.
JAMES E. KESSEL, (J), Southern Bell Tel. & Tel. Co., 409 Louise St., Lafayette.
ROY C. KETCHUM, C. E., Public Works Center, Box 6, U. S. Navy Base, Navy 3002, FPO San Francisco, Calif.
BERNARD L. KIERNAN, SR., M. E., E. E., R., Jackson Brewing Co., 1622 Mirabeau Ave., New Orleans 22.
ELLIS M. KILLGORE, M. E., R., Louisiana Polytechnic Institute, Box 12, Tech Station, Ruston.
MARVIN R. KIMBRELL, JR., E. E., General Electric Co., 1004 Richards Bldg., New Orleans 12.
B. LEON KINCHEN, JR., M. E., R., Esso Standard Oil Co., Route 2, Box 303-A, Denham Springs.
CLIFFORD A. KING, (A), Contractor, 219 Dryades St., New Orleans 12.
H. M. KING, JR., (J), E. E., Brown-Roberts Elec. Co., 307 Carl St., Route 21, Alexandria.
WM. F. KING, (J), M. E., E. E., R., Design Engineers Associated, 311 Board of Trade Annex, New Orleans 12.
O. G. KIRBY, C. E., R., A. P. Johnston Contra., Inc., 4541 Hyacinth Ave., Baton Rouge.
THOS. W. KIRBY, Chemist, Cities Service Refining Corp., 2114 22nd St., Lake Charles.
M. E. KIRKPATRICK, JR., M. E., R., La., Ala., E. I. Dupont deNemours & Co., 406 Sherwood Drive, Aiken, S. C.
LEONARD R. KIRST, C. E., M. E., R., La. State Dept. of Public Works, 317 East Drive, Baton Rouge.
MARK H. KITE, (J), C. E., R., 5429 Wedgemont Circle, Ft. Worth, Texas.
RICHARD P. KLOPP, Ch. E., R., Catalytic Construction Co., 1719 Florida St., Baton Rouge.
JOHN T. KNIGHT, JR., M. E., R., La., Miss., Ala., Equitable Equipment Co., Inc., 410 Camp St., New Orleans.
NAT B. KNIGHT, JR., (A), E. E., 916 Fourth St., Gretna.
CHAS. P. KNOST, E. E., R., Molony Elec. Co., 4018 Thalia St., New Orleans 15.
M. F. KNOST, M. E., Gulf Refining Co., P. O. Box 400, New Orleans.
WALTER C. KOHFELDT, Ch. E., Esso Standard Oil Co., 9435 W. Havana Drive, Baton Rouge.
RICHARD B. KOHNKE, (L. M.), C. E., R., City of New Orleans, 932 Pichcloup Place, New Orleans 19.
STANLEY P. KOLTUN, Ch. E., R., Southern Research Laboratory, 28 Curry Court, Metairie.
PAUL C. KOONS, JR., M. E., R., Delta Tank Mfg. Co., 11132 Black Oak Drive, Baton Rouge.
LOUIS I. KORN, M. E., E. E., R., U. S. Navy, Marine Engineer, 2201 Octavia St., New Orleans 15.
HAROLD F. KRAUS, E. E., R., Avondale Marine Ways, Inc., 544 Carol Drive, New Orleans 21.
S. HENRY KRONTHAL, Architectural E., The Rust Engineering Co., 6007 Beldart St., Houston 21, Texas.
EMILE S. KROUSE, JR., Agri. E., Gulf States Utilities Co., Box 2431, Baton Rouge.
PAUL P. KRUTAK, E. E., R., Westinghouse Electric Corp., 1226 Whitney Bldg., New Orleans 12.
ROBERT J. KUHN, (L. M.), E. E., M. E., R., La., Ky., Tenn., Miss., Ind., Ark., 1643 Octavia St., New Orleans 15.
MARSHALL F. KULL, M. E., R., Fred Kull, Consulting Engineer, 1017 Audubon Ave., West Monroe.
A. R. KUZEL, M. E., R., La. Dept. of Highways, 5836 Fairfield Ave., Baton Rouge.

L

GERALD LABORDE, (Jr. Member), Graduate of S. L. I., Route 1, Box 177, Mansura.
EDWIN A. LAFAYE, M. E., R., Eggelhof Engineers, P. O. Box 13186, New Orleans 25.
PAUL M. LAGARDE, C. E., R., Standard Fruit & S. S. Co., 123 Elvis Court, Metairie.
IRWIN M. LAIS, M. E., R., Military Dept.—State of Louisiana, 823 Jewel St., New Orleans 24.
THEODORE J. LALA, M. E., R., Hepinstall Steel Works, Inc., P. O. Box 1422, New Orleans.
HY. C. LALUMANDIER, M. E., R., Esso Standard Oil Co., 4767 Arrowhead St., Baton Rouge.
GEO. B. LAMBERT, JR., Consulting Engineer, 124 Palmetto Lane, Mississippi City, Miss.
ALBERT F. LANDERS, M. E., E. E., Diesel-Electric Consultant, 1630 Killdeer St., New Orleans 22.
HERBERT M. LANDEY, U. S. Eighth Naval District, 1505 Webster St., New Orleans 18.
HENRY L. LANDRY, E. E., R., Gulf States Utilities Co., 2222 Cedardale Ave., Baton Rouge.
LOUIS C. LANDRY, JR., E. E., M. E., R., United Gas Corp., New Iberia.
SAMUEL P. LANDRY, JR., (J), C. E., R., Bedell & Nelson Engineers, Inc., 501 Pine St., Norco.
WALTER A. LANDRY, JR., M. E., R., National Gypsum Co., 6531 Vicksburg St., New Orleans 24.
HERRICK J. LANE, (L. M.), C. E., Retired, 1465 State St., New Orleans 18.
HERRICK J. LANE, JR., C. E., W. Horace Williams Co., 1206 Nashville Ave., New Orleans.
WM. A. LANE, M. E., Esso Standard Oil Co., R. F. D., Ethel.
E. J. LANGHETEE, JR., (J), P. E., R., La. Land & Exploration Co., 1325 Mendez St., New Orleans 22.
JOHN E. LANGLEY, M. E., R., Esso Standard Oil Co., 1812 Ingleside Drive, Baton Rouge.
CHAS. K. LANGLINAIS, Surveyor, R., Private practice, P. O. Box 184, Broussard.
N. E. LANT, (H. M.), C. E., R., 4780 Newcomb Drive, Baton Rouge.
HILRY J. LANTZ, (J), Ch. E., 3565th Student Sqdn., James Connally A.F.B., Waco, Texas.
FERNAND S. LAPEYRE, M. E., E. E., R., The Peelers Co., P. O. Box 1102, New Orleans 4.
WM. H. LARKIN, E. E., Gulf States Utilities, Lake Charles.
FERDINAND L. LARUE, JR., Ch. E., Southwestern Louisiana Institute, P. O. Box 8382, University Station, Baton Rouge.
DR. LEO J. LASSALLE, (H. M.), C. E., M. E., R., Louisiana State University and A. & M. College, 1160 Stanford Ave., Baton Rouge 6.
DOUGLAS F. LATIMER, M. E., C. E., Gulf States Utilities Co., Box 2431, Baton Rouge.
ROLAND W. LAURENT, (J), C. E., R., U. S. Army, 1002 Myrtle Blvd., Lafayette.
ROBT. D. LAW, JR., (A), C. E., R., La. Dept. of Highways, 980 Carrollton Ave., Baton Rouge.
DAVID B. LAWRENCE, (A), E. E., N. O. Public Service Inc., 1235 Henry Clay Ave., New Orleans.
RICHARD H. LAWTON, SR., Gulf States Utilities Co., 369 E. River Oaks Drive, Baton Rouge 6.
WHITNEL E. LAZARUS, JR., E. E., Address unknown.
MAXWELL A. LEA, M. E., R., Ethyl Corp., 3970 Hundred Oaks Ave., Baton Rouge.
HARRISON C. LEAK, JR., C. E., R., Esso Standard Oil Co., 9566 Donna Drive, Baton Rouge.
W. STONE LEAKE, E. E., R., General Electric Co., 303 Betz Place, Metairie.
JOE E. LEAVINES, E. E., R., Kaiser Aluminum & Chemical Corp., 2920 Main St., Baton Rouge 2.
H. A. LeBLANC, JR., Ch. E., Shell Oil Co., Inc., Norco.
JOHN A. LeBLANC, C. E., R., U. S. Army, Route 1, Box 350, Maurice.
OWEN V. LeBLANC, C. E., R., W. Horace Williams Co., 6480 Argonne St., New Orleans.
RANDOLPH A. LeBLANC, (Junior Member), Graduate of S. L. I., 801 Anderson St., Franklin.
RUSSELL T. LeBLANC, M. E., R., Louisiana Industries, Inc., 9213 7th St., Harahan Br., New Orleans 23.
WHARTON A. LeBLANC, Agri. E., M. E., R., General Gas Corp., 2226 Pickett Ave., Baton Rouge.
WENDEL J. LECHTENBERG, E. E., Olin Mathieson Chemical Gas Corp., 3721 Vanderbilt St., Lake Charles.
STANLEY M. LECOURT, C. E., M. E., R., Self employed, 302 Dauphine St., New Orleans 16.
CHAS. J. LEDOUX, M. E., R., La., Tenn., Gulf Refining Corp., P. O. Box 400, New Orleans 1.
J. M. LeDOUX, E. E., R., National Electric Products Corp., 650 S. Galvez St., New Orleans 19.
CLARENCE O. LEE, Mining E., R., Freeport Suphur Co., P. O. Box 1520, New Orleans 5.
ROBERT E. LEE, JR., M. E., Esso Standard Oil Co., 3124 Tyrone Drive, Baton Rouge.
BENJAMIN F. LEEPER, M. E., E. E., R., Sperry-Rand Corp., 1457 Country Club Drive, Baton Rouge.
PERSHING J. LEFORT, (J), M. E., The Texas Co., P. O. Box 66, Galliano.
ALBERT C. LEGE, (J), E. E., R., Box 71, Gueydan.
RANDALL F. LEGEAI, (L. M.), M. E., E. E., R., N. O. Public Service Inc., 3824 Nashville Ave., New Orleans 15.
WALTER C. LEHIGH, (A), Shell Oil Co., 160 Hollywood Drive, Metairie.
AUGUST J. LEHMAN, M. E., E. E., R., La., Tex., Freeport Sulphur Co., Box 187, Port Sulphur.
H. L. LEHMANN, (H. M.), C. E., R., La. Dept. of Highways, Baton Rouge.
WENDEL G. LEIBE, M. E., R., City of N. O., Dept. of Mech. Inspection, 426 S. Jefferson Davis Pkwy., New Orleans 19.
HAROLD F. LEIENDECKER, (J), C. E., Esso Standard Oil Co., 657 Carol Marie Drive, Baton Rouge.
ELMER R. LELEUX, (Jr. Member), Graduate of S. L. I., Delcambre.
WALTER LEMANN, JR., Ch. E., R., Associated Engineers of Baton Rouge, P. O. Box 151, Baton Rouge.
GUY F. LeMIEUX, (J), C. E., R., J. J. Krebs & Sons, P. O. Box 7131, Mid City Station, New Orleans.
HY. F. LeMIEUX, C. E., R., Raymond Concrete Pile Co., 140 Cedar St., New York, N. Y.
DANIEL B. LEMOINE, (A), Southern Bell Tel. & Tel. Co., 8809 27th St., Metairie.
GEO. P. LEMOINE, Ch. E., Lemoine Bros., Box 298, Bunkie.
JAMES A. LEMOINE, M. E., Lemoine Bros., P. O. Box 298, Bunkie.
LEON C. LEONARD, (J), M. E., R., Betz Engr. Sales So., 2613 Palmer Ave., New Orleans 18.
FRED E. LESHE, C. E., Cities Service Refining Corp., 214 Rio Hondo, Maplewood.
HAROLD A. LEVEY, SR., Ch. E., M. E., E. E., R., La., Tex., American Products Mfg. Co., 311 Audubon Blvd., New Orleans 25.
DAVID J. LEVINE, (J), M. E., R., Equitable Equipment Co., Inc., 410 Camp St., New Orleans 12.
ERNEST LEVINGSTON, C. E., Cities Service Refining Corp., 1051 McClung St., Baton Rouge.

ALLISON M. LEVY, M. E., R., La., Miss., International Engineers, 16 W. Liberty St., Pensacola, Fla.
DAVID P. LEVY, M. E., E. E., R., Equitable Equipment Co., Inc., 410 Camp St., New Orleans.
EUGENE LEVY, (A), E. Levy & Co., Box 1845, Alexandria.
CAPTAIN NEVILLE LEVY, M. E., E. E., R., Equitable Equipment Co., Inc., 410 Camp St., New Orleans 12.
SIDNEY F. LEWIS IV, (J), C. E., 436 Hillary St., New Orleans.
WM. LEE LEWIS, (J), M. E., R., Esso Standard Oil Co., 1016 Broadmoor Court, Baton Rouge.
HOWARD B. L'HEUREUX, C. E., R., La., S. Car., Howard L'Heureux & Associates, 720 Murray St., Alexandria.
GEORGE F. LIEBKEMANN III, (J), M. E., 1230 State St., New Orleans.
HUGH A. LILES, M. E., R., Allied Sales & Service Co., 4376 State St. Drive, New Orleans.
DONALD D. LINCOLN, (A), Southern Bell Tel. & Tel. Co., 2111 Paris St., Alexandria.
RALPH E. LIND, C. E., R., 6624 Louis XIV St., New Orleans 24.
ROBT. P. LINFIELD, C. E., R., 7715 Burthe St., New Orleans 18.
GEO. M. LIPSCOMB, E. E., R., Tex., Kaiser Aluminum & Chem. Corp., Box 253-B., Zachary.
WM. A. LOCHTE, M. E., American-South African Steamship Co., 7935 S. Claiborne Ave., New Orleans 18.
ROBT. P. LOCKETT, (A), M. E., A. M. Lockett & Co., 2130 Palmer Ave., New Orleans 18.
ROBT. P. LOCKETT, JR., M. E., R., A. M. Lockett & Co., 308 Whitney Bldg., New Orleans 12.
T. BENBURY LOCKETT, M. E., R., Service Supply & Eng. Co., 2130 Palmer Ave., New Orleans.
JOSEPH S. LODATO, E. E., R., U. S. Government, 1211 Gov. Nicholls St., New Orleans 16.
CHARLES E. LOEB, JR., (J), C. E., 401 Walnut St., New Orleans.
DR. Z. L. LOFLIN, M. E., Ch. E., R., Southwestern Louisiana Institute, Box 353, S. L. I., Lafayette.
GEO. L. LOGAN, P. E., R., Lyons & Logan, 1500 Beck Bldg., Shreveport.
JOHN S. LOGAN, Highway E., U. S. Bureau of Public Roads, 416 East Drive, Baton Rouge 6.
GEO. F. LOMAX, JR., M. E., R., 2129 Armour Drive, Wilmington 8, Del.
ROBT. A. LONGMIRE, Ch. E., Esso Standard Oil Co., 748 N. Parkview Place, Baton Rouge.
DANIEL J. LORIO, JR., P. E., U. S. Rubber Co., 2981 Eaton St., Baton Rouge.
JAMES C. LORIO, (J), E. E., R., La. Dept. of Highways, 2540 Calumet St., Baton Rouge.
JULES A. LORIO, (L. M.), M. E., Dibert, Bancroft & Ross Co., Ltd., 7420 Benjamin St., New Orleans 18.
STAVROS D. LOUCHIS, M. E., R., Kaiser Aluminum & Chem. Corp., 105 Fiesta Circle, Orinda, Calif.
ALFRED J. LOUP, JR., C. E., R., Wilson Steel Co., 2349 Edgewood Drive, Baton Rouge.
L. A. LOUSTALOT, (L. M.), C. E., Guaranty Bank & Trust Co., Hammond.
BERNARD LOUVIERE, M. E., R., Creole Eng. Co., P. O. Box 12115, New Orleans 24.
WILLIAM T. LOWREY, (Jr. Member), Graduate of S. L. I., Gen. Del., S. L. I., Lafayette.
ODIE E. LOYD, E. M. Freeman & Associates, 2046 Murray St., Shreveport.
ELIHU R. LUCAS, JR., C. E., R., Upham Engineers, 4644 Kendall Drive, New Orleans.
LARRY R. LUCAS, (J), C. E., R., La. Dept. of Highways, Box 454, Franklin.
M. CONWAY LUSK, C. E., R., La. Dept. of Highways, 8065 Owen St., Baton Rouge.
EMILE W. LUSTED, M. E., R., Delta Tank Mfg. Co., Inc., 9365 Southmoor Drive, Baton Rouge.
KENNETH E. LUTZ, M. E., R., Esso Standard Oil Co., 2320 Nicholson Drive, Baton Rouge.
CHAS. W. LYMAN, JR., M. E., R., Self employed, P. O. Box 724, Opelousas.
FRANK R. LYMAN, C. E., R., Private Consultant, 116 W. Pine St., Crowley.
JAMES W. LYON, JR., (J), C. E., R., La. Dept. of Highways, 2071 Cloverdale Ave., Baton Rouge.
A. A. LYONS, C. E., R., City of Shreveport, 659 Rutherford St., Shreveport.
BYRON P. LYONS, C. E., R., La. Dept. of Public Works, 614 Drehr Ave., Baton Rouge.
VAL A. LYONS, C. E., R., La., Tex., Ark., Consulting Engineer, 612 Sklar Bldg., Shreveport.
WM. F. LYTLE, Agri. E., C. E., Agri. Eng. Dept., L. S. U., Baton Rouge.

Mc

SAMUEL H. McAFEE, M. E., N. O. Public Service Inc., 2838 Iberville St., New Orleans.
JOHN E. McADAM, E. E., R., Dixie Electric Membership Corp., 381 Finchley Drive, Baton Rouge.
C. R. McBRIDE, JR., M. E., E. E., R., Firestone Tire & Rubber Co., 207 Jeannine St., Lake Charles.
ROBERT R. McBRIDE, JR., (J), C. E., Palmer & Baker Engineers, Inc., 608 Airline Park Blvd., Metairie.
JOHN I. McCAIN, C. E., R., McCain & Associates, 8200 Florida St., Baton Rouge.
JOHN C. McCAMPBELL, Geologist, Southwestern Louisiana Institute, Box 326, S. L. I., Lafayette.
A. H. McCANN, JR., Architect, C. E., R., La., A. H. McCann & Associates, 410 Howes Bldg., Clinton, Iowa.
CHAS. B. McCARTHY, (J), C. E., R., Bedell & Nelson, 537 Beverly Drive, Metairie.
DANIEL B. McCARTY, C. E., Surveyor, R., La. Dept. of Highways, 432 S. New Hampshire St., Covington.
MARVIN R. McCARTY, M. E., McCarty-Branton, Inc., Box 3277, Istrouma Station, Baton Rouge.
JAMES M. McCLANAHAN, (J), E. E., R., Convair Aircraft, 4920 Gilbert Drive, Ft. Worth 16, Texas.
LLOYD D. McCLATCHEY, JR., E., Esso Standard Oil Co., 366 S. Waverly Drive, Baton Rouge.
HAROLD H. McCLELLAND, C. E., R., La., Tex., E. M. Freeman & Associates, 229 Justin St., Shreveport.
RALPH McCOLLISTER, C. E., R., Esso Standard Oil Co., 3175 Conley St., Baton Rouge.
STRUBBE McCONNELL, JR., E. E., Esso Standard Oil Co., 2284 Hillsdale Drive, Baton Rouge 8.
S. LOGAN McCONNELL, C. E., M. E., E. E., R., City of New Orleans, 1219 First St., New Orleans 13.
DANA D. McCORMICK, (A), McLemore & Atchley, 3506 Palm Road, Shreveport.
JAMES P. McCULLOUGH, Ch. E., United Gas Pipe Co., P. O. Box 1407, Shreveport.
THOMAS J. McDANIEL, JR., E. E., Gaylord Container Corp., Route 3, Box 67, Bogalusa.
HENRY E. McDOWELL, C. E., U. S. Army Corps of Engineers, P. O. Box 1551, Shreveport.
DAN D. McDUFF, C. E., R., La. Dept. of Highways, 602 Balboa St., Monroe.
JOHN A. McEACHERN, C. E., R., Zonolite Co., 7642 Bermuda Court, Normandy, Mo.

SAM S. McENNIS, (A), c/o Mr. W. J. Wilkie, Ebasco Services, Inc., P. O. Box S608, Dallas, Texas.
REGINALD A. McFARLAND, C.,E., R., La. Polytechnic Institute, P. O. Box 446, Ruston.
WM. E. McFARLAND, Ch. E., M. E., R., Henderson Sugar Refining, Inc., 8002 Plum St., New Orleans 13.
RAYMOND L. McGEE, (A), 230 Louie St., Lake Charles.
I. LUCIUS McGEHEE, M. E., E. E., R., Delta Bag Co., Inc., 201 Pine St., New Orleans.
WILLIE E. McGOUGH, M. E., R., Olin Matheison Chem. Corp., 1712 Emerson St., Monroe.
GEO. B. McGUIRE, C. E., Esso Research & Engineering Co., 867 Bradford Ave., Westfield, N. J.
KENNETH N. McINTOSH, E. E., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
CHAS. M. McKAY, Ch. E., Copolymer Corp., 2503 Spain St., Baton Rouge 6.
ALBERT G. McKEE, Ch. E., R., Box 553, Tech Station, Ruston.
DEAN C. McKEE, (J), C. E., R., Bodman, Murrell & Smith, 1837 Pickett St., Baton Rouge.
PAUL A. McKIM, Ch. E., Ethyl Corp., 630 Delgado Drive, Baton Rouge.
JAMES R. McKINLEY, E. E., R., Southern Bell Tel. & Tel. Co., 100 Hudson Lane, Monroe.
MARC McKINLEY, (A), E. E., 1316 Ford St., Lake Charles.
GEO. E. McLEAN, Aero. E., Gulf Engineering Co., Inc., 3712 Green Acres Road, Metairie.
JAMES R. McLEAN, M. E., Copolymer Rubber & Chem. Co., 3570 Lorraine St., Baton Rouge.
LEAL C. H. McLEAN, M. E., E. E., Jones & Laughlin Steel Corp., P. O. Box 66, New Orleans 6.
EDW. A. McLELLAN, M. E., R., McLellan Equipment Co., P. O. Box 238, New Orleans 3.
JESSIE C. McLEMORE, Surveyor, R., McLemore & Atchley, 506 First National Bank Bldg., Shreveport.
GEO. C. McMILLEN, Mining E., R., La., Tex., Freeport Sulphur Co., P. O. Box 1520, New Orleans 5.
EDW. J. McNAMARA, C. E., R., Freeport Sulphur Co., P. O. Box 1520, New Orleans 5.
FRANK P. McNAMARA, C. E., R., Lone Star Cement Corp., 425 Philips St., Sulphur.
JOHN E. McNAMARA, Radio E., General Electronic & Engineering Service Corp., Field Engineer, Bldg. 15-MS 324, Hughes Aircraft Co., Culver City, Calif.
ERNEST W. McNEIL, JR., E. E., Esso Standard Oil Co., 1449 Rosemont Drive, Baton Rouge.
EDWARD S. McROBERTS, M. E., R., The J. B. Beaird Co., Inc., 6114 Henderson St., Shreveport.
WM. E. McWHIRTER, JR., (J), Ch. E., R., American Oil Co., 23 Santa Ana Ave., New Orleans 21.

M

DANIEL P. MABEL, E. E., Anaconda Wire & Cable Co., 601 Hibernia Bldg., New Orleans 12.
AUBON L. MABRY, C. E., U. S. Navy Dist. Public Works Office, 101 Larchmont Place, New Orleans 14.
NORMAN L. MABRY, (J), Demopulos & Ferguson, 2754 Parkridge St., Shreveport.
F. W. MACDONALD, C. E., R., Tulane University, P. O. Station 20, New Orleans 18.
ROBT. W. MacDONALD, Ch. E., Esso Standard Oil Co., 1836 Avondale Drive, Baton Rouge.
KENNETH W. MACKENZIE, Testing E., Construction Materials Laboratory, 624 Atchley St., Knoxville, Tenn.
RAYMOND P. MADDUX, M. E., R., N. O. Public Service Inc., 3617 Bissonette Drive, Metairie.
LEONARD F. MAGEE, E. E., R., City of Alexandria, 2425 Elliot St., Alexandria.
CLAYTON R. MAHAFFEY, SR., M. E., R., U. S. Rubber Co., Route 2, Box 47, Port Allen.
LELAND S. MAJOR, M. E., Esso Standard Oil Co., 4511 Highland Road, Baton Rouge.
JOHN S. MALAHY, JR., M. E., E. E., R., La., Tex., Miss., Private practice, 330 E. Kingshighway, Shreveport.
JOHN J. MALARKEY, (A), Olin Matheison Chem. Corp., 1606 Sixth St., Lake Charles.
JOHN F. MALLETTE, C. E., R., La. Dept. of Highways, Box 657, Monroe.
JOHN D. MALONE, JR., E. E., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
LAWRENCE MANN, JR., M. E., R., The Lummus Co., 4051 Churchill Ave., Baton Rouge.
LOUIS B. MANN, (J), M. E., Louisiana Motors, Box 354, Lafayette.
H. H. MANNER, JR., Architectural E., La. Metal Culvert Co., Box 2427, Baton Rouge 2.
GERALD R. MANNING, C. E., Raymond Concrete Pile Co., 407 Pere Marquette Bldg., New Orleans.
JOHN F. MANSON, C. E., R. P. Farnsworth & Co., Inc., P. O. Box 850, New Orleans.
S. K. MANSON, JR., C. E., R., King & Co., Inc., 401 Park Road, Metairie.
CHARLES I. MANSUR, C. E., Independent Wellpoint Corp., 3816 Convention St., Baton Rouge.
ROBT. G. MARBUT, (J), I. E., Esso Standard Oil Co., 1150 Boyd Ave., Apt. 8-D, Baton Rouge.
M. J. MARCHESE, E. E., R., U. S. Navy, 1716 St. Roch Ave., New Orleans 17.
WARREN E. MARCUM, (A), C. E., R., La. Dept. of Highways, 2045 North 17th St., Baton Rouge 2.

LEO MARIENFELDT, E. E., P. O. Box 5713, Crosstown Station, Memphis 4, Tenn.
GODFREY L. MARINE, E. E., R., Marine Elec. Co., 114 E. Congress St., Lafayette.
HAROLD O. MARQUART, C. E., Gaylord Container Corp., 330 N. Border Drive, Bogalusa.
GORDON A. MARSALIS, C. E., R., Industrial Steel Products Co., Inc., Box 1814, Shreveport.
EARL J. MARTEL, (A), 2014 Avondale Drive, Baton Rouge.
HARRY C. MARTIN, Ch. E., R., Olin Mathieson Chem. Corp., Box 488, West Monroe.
HARVEY J. MARTIN, (J), E. E., R., N. O. Public Service Inc., 2915 Tournefort St., Chalmette.
PAUL G. MARTIN, C. E., R., La., Kan., Burgwin & Martin, 406 West 7th St., Topeka, Kan.
JOHN L. MARTINEZ, M. E., R., Tulane University, 2420 Pine St., New Orleans 18.
WILLIAM A. MASSIMINI, (A), M. E., R., Gulf Engineering Co., 1000 S. Peters St., New Orleans.
ALLEN J. MATHERNE, E. E., Gulf States Utilities Co., 7166 LaSalle Ave., Baton Rouge.
EMMETT L. MATHEWS, JR., C. E., R., City of Alexandria, 24 Carlton St., Alexandria.
GEORGE F. MATTHES, M. E., E. E., R., Louisiana State University, Baton Rouge 3.
E. D. MATTIX, Ch. E., Cities Service Ref. Corp., 1616 Seventh St., Lake Charles.
ROGER L. MAURICE, Ch. E., U. S. Rubber Co., Scenic Hwy., Baton Rouge.
G. ELMER MAY, M. E., E. E., R., N. O. Public Service Inc., 2031 Short St., New Orleans 18.
HENRY E. MAY, Southern Bell Tel. & Tel Co., 211 Fourth St., DeRidder.
DAN L. MAYER, (A), Southern States Equipment Co., Inc., 3358 Roger Williams St., New Orleans 19.
JOHN K. MAYER, M. E., C. E., E. E., R., Tulane University, 2419 Audubon St., New Orleans 25.
WM. G. MAYER, C. E., R., La. Dept. of Highways, 301 Westerfield, Bossier City.
ALBERT J. MAYERS, JR., M. E., R., Whipple & Mayers, Consulting Engineers, 7732 Goodwood Ave., Baton Rouge.
CHARLES J. MAYEUX, JR., C. E., R., Gaylord Container Corp., 906 N. Border Drive, Bogalusa.
MANSEL M. MAYEUX, Agri. E., Agri. Eng. Bldg., L. S. U., Baton Rouge.
PAUL J. MAYNE, C. E., R., La., Fla., Private practice, P. O. Box 293, Opelousas.
DR. GEORGE P. MEADE, Ch. E., Colonial Sugars Co., Pontchartrain Hotel, New Orleans 12.
DANIEL J. MEHN, (J), C. E., 8425 Oak St., New Orleans 18.
CHAS. L. MELANCON, JR., M. E., The Dow Chemical Co., Route 1, Box 3-B, Port Allen.
LOLAN J. MELANCON, E. E., R., Southern Bell Tel. & Tel. Co., 132 Tudor St., Pineville.
C. GLENNON MELVILLE, C. E., R., Melville Equipment, Inc., 6026 Memphis St., New Orleans 19.
HAROLD MELVILLE, JR., Pet. E., Address unknown.
F. ROBT. MENDOW, M. E., E. E., R., La., Tex., A. M. Lockett & Co., 308 Whitney Bldg., New Orleans 12.
OSKAR R. MENTON, E. E., Esso Standard Oil Co., 2855 Morning Glory Ave., Baton Rouge.
PHILIP S. MENTZ, Ind. E., Ethyl Corp., 10544 Cletus Drive, Baton Rouge.
CHAS. A. MENVILLE, M. E., Esso Standard Oil Co., 1251 Longwood Drive, Baton Rouge 6.
WALTER H. MERCIER, M. E., R., Esso Standard Oil Co., 2220 Terrace Ave., Baton Rouge.
RICHMOND S. MERRILL, (A), E. M. Freeman & Associates, Box 904, Shreveport.
RICHARD F. MESSINA, C. E., R. F. Messina Co., Inc., Box 13005, New Orleans.
HENRY M. MESSINGER, Surveyor, R., Private practice, 401 Jackson St., Bastrop.
CHAS. E. METRAILER, E. E., R., Metrailer-Ingram Consulting Engineers, 3185 Government St., Baton Rouge.
WM. J. METRAILER, Ch. E., Esso Standard Oil Co., 8580 Old Hammond Hwy., Baton Rouge 8.
EDMUND F. METZ, Ch. E., Copolymer Rubber & Chem. Corp., 835 Iris St., Baton Rouge 2.
EDW. R. METZ, JR., M. E., R., Walter Kidde Engrs., S. W., 6648 Sheffield Ave., Baton Rouge 6.
RANDALL MEYER, M. E., Esso Standard Oil Co., 240 L. S. U. Ave., Baton Rouge.
ALBERT J. MEYERS, C. E., M. E., R., Shell Oil Co., Shell Village No. 60, Norco.
GEORGE F. MEYN, C. E., R., U. S. Corps of Engineers, 4737 Venus St., New Orleans 22.
HAYWOOD B. MILES, JR., C. E., Olin Matheison Chem. Corp., 409 Georgia St., Monroe.
GEORGE E. MILLARD, M. E., R., Fairbanks Morse & Co., 5528 Pitt St., New Orleans 15.
GUY W. MILLER, E. E., R., Gulf States Utilities Co., 4655 Dellwood Lane, Beaumont, Texas.
HAROLD A. MILLER, E. E., R., Consultant Electrical Engineer, 419 Jewel St., New Orleans 24.
OTIS O. MILLER, (A), M. E., R., H. E. Bouaq, Jr., Consulting Engrs., 1465 Duchess Drive, Baton Rouge.
ERNEST L. MIRE, C. E., R., N. O. Public Belt R. R., P. O. Box 1240, New Orleans 10.
EDWARD C. MISHOU, M. E., Pet. E., R., La., Minn., Minnesota Pipe Line Co., 1848 Pinehurst Ave., St. Paul 16, Minn.
DENNIS E. MITCHEL, JR., (J), C. E., R., La. Dept. of Highways, P. O. Box 452, Natchitoches.
H. LANE MITCHELL, C. E., R., City of Shreveport, City Hall, Shreveport.
VIRGIL O. MITCHELL, E. E., Ethyl Corp., 4020 Churchill St., Baton Rouge.
DAVID L. MIZELL, (J), M. E., R., Gaylord Container Corp., 318-B Lexington St., Bogalusa.
HENRY C. MOFFITT, JR., C. E., R., U. S. Army Engineer Dist., N. O., 6055 Patton St., New Orleans 18.
JAMES D. MOHR, (J), C. E., R., E. M. Freeman & Associates, 1103 Henry C. Beck Bldg., Shreveport.
HENRI J. MOLAISON, Ch. E., R., La., Tex., Jos. E. Leininger & Associates, 5531 Marshall Foch St., New Orleans 24.
ARTURO MIGUEL MOLINARI, (J), E. E., M. E., Zabala 2231, Buenos Aires, Argentina.
RALPH R. MONGEAU, (J), E. E., R., Owen & White, 4744 Floynell Drive, Baton Rouge.
J. E. MONROE, JR., Ch. E., R., Freeport Sulphur Co., P. O. Box 657, Port Sulphur.
CAPT. CHAS. R. MONTEIRO, USCG., C. E., R., U. S. Coast Guard, 1927 Milan St., New Orleans.
JOS. T. MONTGOMERY III, C. E., R., La., Ala., Miss., Bedell & Nelson Engineers, Inc., 1200 St. Charles Ave., New Orleans 13.
DAVID MOODIE, M. E., R., N. O. Public Service Inc., 1600 S. Peters St., New Orleans 13.
JAS. E. MOODY, E. E., R., Southwestern Gas & Electric Co., 1922 Bermuda St., Shreveport.
LAMON L. MOODY, JR., C. E., R., Kaiser Aluminum & Chem. Corp., Box 804-A, Route 1, Baker.
JOSEPH R. MOONEY, M. E., C. E., R., The Mooney Equipment Co., 5117 Louisa Drive, New Orleans 22.
ANDREW M. MOORE, E. E., R., Central La. Elec. Co., Inc., P. O. Box 111, Alexandria.
CHARLES B. MOORE, Ch. E., Esso Standard Oil Co., 2657 E. Lakeshore, Baton Rouge.
EDWARD C. MOORE, M. E., R., Bedell & Nelson Engineers, 608 Codifer Blvd., Metairie.

JAMES H. MOORE, JR., Esso Standard Oil Co., 2530 Amarillo St., Baton Rouge 3.
MARION MOORE, Ch. E., R., Dept. of Rev., Severance Tax, State of La., 1302 Peniston St., New Orleans 15.
LARRY L. MOREAUX, (Jr. Member), Graduate of S. L. I., Cecelia.
JOHN E. MOREHISER, JR., M. E., R., Orleans Parish School Board, 148 Moss Lane, Harahan Branch, New Orleans 23.
JAMES S. MORGAN, Ch. E., Barrow-Agee Laboratories, Inc., 4355 Bayliss Ave., Memphis, Tenn.
KEITH H. MORGAN, E. E., R., Southern Bell Tel. & Tel. Co., 7204 Willow St., New Orleans 18.
LELAND E. MORGAN, Agri. E., R., Product Planning Office, Ford Motor Co., Tractor Div., 2500 E. Maple St., Birmingham, Mich.
MELVIN MORGAN, (Jr. Member), Graduate of S. L. I., Pecan Island.
R. DOUGLAS MORGAN, C. E., R., La., Tex., T. L. James & Co., Inc., 1000 Green Acres Road, Metairie.
THURMAN C. MORGAN, C. E., R., Dept. of Public Works, 336 Elizabeth Ave., Lafayette.
WALLIS J. MORGAN, C. E., R., The Texas Co., 2300 Somerset Drive, New Orleans 14.
RICHARD A. MORNHINVEG, M. E., R., Louisiana State University, 1042 Ingleside Drive, Baton Rouge.
ANTHONY P. MOROVICH, (J), C. E., R., Tulane University Graduate School, 7001 Vicksburg St., New Orleans 24.
CARL T. MORRIS, Licensed Surveyor, Gulf Oil Corp., P. O. Box 1731, Shreveport.
DEWITT L. MORRIS, M. E., E. E., R., Freeport Sulphur Co., 6647 Louisville St., New Orleans 24.
HAROLD I. MORRIS, (A), Freeport Sulphur Co., Box 697, Port Sulphur.
WALTER B. MOSES, (L. M.), M. E., E. E., R., La., Miss., Ala., Tenn., Mo., Tex., Ohio, Ind., Leo S. Weil & Walter B. Moses, 600 Audubon Bldg. New Orleans 16.
MAGEE J. MOSS, C. E., R., La. Dept. of Highways, Route 2, Box 270-A, Abbeville.
F. PRESTON MOTTRAM, M. E., R., Red Star Yeast & Products Co., 221 E. Buffalo St., Milwaukee 2, Wisc.
CURTIS J. MOUTON, (J), M. E., Petroleum Chemicals Inc., P. O. Box 1522, Lake Charles.
DAVID A. MOYNAN, JR., (J), C. E., R., Fromherz Engineers, 4200 Purdue Drive, Metairie.
SAM J. MUERY, JR., Ch. E., R., Freeport Sulphur Co., P. O. Box 1520, New Orleans 5.
J. F. MULLER, JR., M. E., Muller Furniture Mfg. Co., 3 Fairview Court, Metairie.
RICHARD F. MULLER, M. E., E. E., Allis Chalmers Mfg. Co., 2319 Lowerline St., New Orleans 18.
WM. M. MULLINNIX, C. E., Eustis Engineering Co., 3635 Airline Hwy., Metairie.
HOMER H. MULLINS, C. E., R., Olin Mathieson Chem. Corp., 1401 Trenton St., West Monroe.
PETER L. MULLINS, (J), M. E., Armed Services, 13-B Travis, Holloman Air Force Base, New Mexico.
ROBT. S. MUNSELL, Mining E., Bechtel Corp., 6267 California Ave., Long Beach 5, Calif.
GEO. K. MUNSON, C. E., R., Self employed, 6 Bridge St., New Iberia.
GORDON J. MUNZEY, (J), E. E., R., Olin-Revere, 1606 North 18th St., Baton Rouge.
E. LANDRY MURPHY, M. E., R., Allan J. Harris Co., 148 Elaine Ave., Harahan.
STENNING C. MURPHY, Ch. E., R., Blue Plate Foods, Inc., 15 Rosa Park, New Orleans 15.
JOHN D. MURRY, JR., C. E., R., 151 Kayla St., Shreveport.
HOWARD D. MUSE, C. E., R., Kaiser Aluminum & Chem. Corp., 6223 Goodwood Ave., Baton Rouge 6.
W. W. MUSE, JR., C. E., R., Dept. of Highways, 2617 Madison Ave., Baton Rouge.
HU B. MYERS, C. E., R., La. Dept. of Highways, 2539 Olive St., Baton Rouge.
LARUE D. MYERS, C. E., R., Tex., Miss., La., United Gas Pipe Line, P. O. Box 1407, Shreveport.

N

E. M. NABERSCHNIG, (L. M.), Ch. E., R., Southern Cotton Oil Co., 365 River Road, Westwego.
ERNEST V. NAHR, E. E., R., La., Tex., Ethyl Corp., 2123 Cedardale Ave., Baton Rouge.
PATRICK J. NAIN, C. E., R., C. W. Vollmer & Co., Inc., Ore City, Texas.
CLAYTON L. NAIRNE, M. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
ROBT. L. NALL, M. E., R., John H. Carter Co., 318 Citrus Road, New Orleans 23.
JOSEPH L. NANNEY, C. E., R., La., Va., Esso Standard Oil Co., 375 Riverlon Ave., Baton Rouge.
ARTHUR J. NAQUIN, M. E., E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
STEVE A. NASCA, C. E., E. E., R., La. Dept. of Highways, 3945 Hundred Oaks Ave., Baton Rouge.
JAMES R. NEEF, (J), C. E., R., La. Dept. of Highways, Box 595, Lafayette.
WALTER I. NEEL, C. E., R., Private practice, 1006½ N. Second St., Monroe.
CONRAD R. NEFF, JR., M. E., R., Esso Standard Oil Co., 1648 Kenmore Ave., Baton Rouge.
ALLEN J. NEGROTTO, (L. M.), C. E., R., U. S. Navy—DPWO 8ND, 129 Beverly Drive, Metairie.
RAYMOND C. NEIGEL, SR., (A), 48 Creagan Ave., Gretna.
EDWARD A. A. NELSON, JR., E. E., R., La., Tex., Interstate Pipe Co., 711 Camilla Drive, Shreveport.
WALDEMAR S. NELSON, M. E., E. E., La., Tex., Miss., Ark., Ala., Bedell & Nelson Engineers, Inc., 1200 St. Charles Ave., New Orleans 13.
WYLY D. NELSON, Ch. E., Supt. Sugar Factory, La. State Penitentiary, General Delivery, Angola.
EUGENE H. NETTLES, (J), C. E., Eustis Engineering Co., 3635 Airline Hwy., New Orleans 20.
ROBT. E. NEUMANN, E. E., R., Self employed, 75 Thrasher St., New Orleans 24.
CLIFTON R. NEWLIN, M. E., E. E., N. O. Public Service Inc., 2216 Octavia St., New Orleans 15.
CARL E. NEWMAN, Southern Bell Tel. & Tel. Co., 312 S. Acadian Thruway, Baton Rouge.
GEN. HARRY P. NEWTON, Ch. E., Retired, P. O. Box 526, DeBarry, Fla.
JAMES H. NICKELSON, Highways E., R., La. Dept. of Highways, Box 1106, Houma.
JOHN L. NIKLAUS, (J), C. E., R., U. S. Navy, 4665 Venus St., New Orleans 22.
TED J. NISSING, (J), Agri. E., Louisiana State University, Box 6392, L. S. U., Baton Rouge.
LEO A. NIXON, C. E., The Texas & Pacific Railway Co., 132 Russel Courts, Alexandria.
PAUL S. NOBLE, M. E., R., Freeport Sulphur Co., 227 Walter Road, New Orleans 23.
BERNARD H. NOLAN, E. E., R., Southern Bell Tel. & Tel. Co., 187 Atlantic Ave., Shreveport.
SIDNEY D. NOLAN, M. E., R., Cities Service Refining Co., 215 Vine St., Maplewood.
H. R. NORCKAUER, C. E., R., La. Dept. of Highways, 445 N. Parkview Place, Baton Rouge.
BENJAMIN F. NORMAN, JR., M. E., R., La., Tex., Freeport Sulphur Co., P. O. Box 1520, New Orleans 5.
JAMES B. NORMAN, C. E., R., La., Ark., Tex., Ark.-Louisiana Gas Corp., 3809 Eddy Place, Shreveport.
JAMES M. NORRIS, Land Surveyor, R., United Gas Pipe Line Co., P. O. Box 1422, Monroe.

O

CECIL K. OAKES, C. E., R., La. Dept. of Public Works, 4035 S. Barrow Drive, Baton Rouge.
WILLIAM F. OAKES, (L. M.), O'Connor-Oakes Co., 344 Camp St., New Orleans.
DONALD P. O'BRIEN, C. E., R., Atlantic Refining Co., 207 Marie Antoinette St., Lafayette.
JOSEPH T. O'BRIEN, E. E., Esso Standard Oil Co., 1557 Ingleside Drive, Baton Rouge.
P. S. O'BRIEN, Metallurgical E., Socony Paint Products Co., 2140 Terrace Ave., Baton Rouge 6.
JESSE C. ODOM, (Jr. Member), Graduate of S. L. I., Box 112, Eunice.
LEO M. ODOM, C. E., R., La., Miss., Tex., Ryburn & Odom, P. O. Box 267, Baton Rouge.
JOHN M. OERTLING, (J), M. E., Esso Standard Oil Co., 4368 Tupello St., Baton Rouge.
SEWALL J. OERTLING, Ch. E., Shell Oil Co., Inc., Norco.
CARL A. OESER, C. E., R., La. State Dept. of Public Works, P. O. Box 723, Lafayette.
HORATIO N. OGDEN, C. E., M. E., E. E., R., Ogden, Woodruff & Dyer, Inc., 1645 Nicholson Drive, Baton Rouge.
JAMES P. OHLSEN, JR., E. E., R., L. N. Goodman & Associates, 1836 Oleander St., Metairie.
CHAS. W. OKEY, (L. M.), C. E., Tennessee Valley Authority, Crestwood Drive, R. F. D. No. 6, Knoxville, Tenn.
JAMES M. OLIVER, (J), Agri. E., Address unknown.
ROBBIE C. OLIVER, Surveyor, R., Caddo Parish Highway Dept., 4018 Thompson St., Shreveport.
HARRY W. OLLINGER, (J), C. E., 18 S. Pine St., Mobile, Ala.
OLE K. OLSEN, (H. M.), C. E., R., Ole K. Olsen Co., 823 Perdido St., New Orleans 12.
RICHARD R. O'NEALL, C. E., R., Ark., Tex., La., Box 1087, Shreveport.
JAMES A. O'NEILL, JR., Ch. E., Ingram Oil & Refining Co., P. O. Box R. R., Chalmette.
JOHN O'NEILL, (H. M.), (L. M.), C. E., R., Consulting Engineer, 637 Lowerline St., New Orleans 18.
DON J. O'ROURKE, Land Surveyor, C. E., Southwestern Louisiana Institute, 314 S. Buchanan St., Lafayette.
ADLOE ORR, JR., C. E., R., Adloe Orr, Jr. & Associates, 539 Topaz St., Lakeshore, New Orleans.
THOS. P. ORR, JR., (A), Draftsman, Avondale Marine Ways, Inc., 222 Sauve Road, New Orleans 23.
VIRGIL ORR, Ch. E., R., La. Polytechnic Institute, 501 Glendale St., Ruston.
GLENN H. ORTEGO, (Jr. Member), Graduate of S. L. I., 119 W. Cotton, Ville Platte.
ANTOINE J. ORY, JR., (J), M. E., N. O. Public Service Inc., 1600 S. Peters St., New Orleans 13.
FRANCIS J. ORY, C. E., R., Gervais Favrot Contractors, 312 Millaudon St., New Orleans 18.
NEVILLE J. ORY, (J), C. E., R., The Texas Co., 905 Parkview Ave., New Iberia.
RAYMOND A. OSBORN, C. E., R., La. Dept. of Highways, Box 232, Hammond.
W. P. OSTER, M. E., E. E., R., Equitable Equipment Co., Inc., 410 Camp St., New Orleans 12.
PAUL F. OSWALD, M. E., R., Thomson Machinery Co., 3031 Coliseum St., New Orleans 15.
GEO. L. OTIS, JR., C. E., Esso Standard Oil Co., 3225 Gilbert St., Baton Rouge.
LOUIS R. OTTO, JR., AF0278650, E. E., R., Daniel, Mann Johnson & Mendenhall, APO 125, New York, N. Y.

ROBERT C. OVERALL, C. E., R., Coastal Contractors, Inc., Box 911, Baton Rouge.
WALTER R. OVERTON, C. E., R., La. Dept. of Highways, 115 Mallard St., W. Monroe.
EUGENE H. OWEN, (J), M. E., R., La., Miss., Tenn., Owen & White, 6453 Choctaw Drive, Baton Rouge.
WM. E. OWEN, E. E., R., College of Engineering, L. S. U., Baton Rouge 3.
HENRY F. OWSLEY, JR., M. E., Owsley Insurance Agency, 311 California Co. Bldg., New Orleans 12.

P

GEO. CECIL PALMER, Pet. E., R., Southwest Natural Production Co., P. O. Box 1487, Shreveport.
EDW. S. PARRISH, C. E., R., La. Dept. of Public Works, 602 Cole Ave., Monroe.
JOSEPH M. PARISH, M. E., R., La., Tex., The Dow Chemical Co., 1668 Ormandy Drive, Baton Rouge.
RHETT S. PARKER, C. E., E. M. Freeman & Associates, 4437 Clingman Drive, Shreveport.
JULES G. PATOUT, M. E., R., Red Fox Machine & Supply Co., Hotel Frederic, New Iberia.
HAROLD J. PATTERSON, C. E., R., 1637 Robert St., New Orleans 15.
EDGAR H. PAVIA, M. E., R., La., Miss., G. A. Heft & Co., 820 Union St., New Orleans 12.
CHAS. L. PAYNE, M. E., R., Columbia-Southern Chem. Corp., 929 N. Division St., Lake Charles.
GEO. P. PEAGLER, C. E., R., Ebasco Services, Inc., Ft. Myers, Fla.
T. ELLIS PEAK, M. E., R., Esso Standard Oil Co., 2028 Lake Shore Drive, Baton Rouge 6.
BRANDT PEDERSEN, M. E., Ch. E., R., Self-employed, 651 Quilty St., Lake Charles.
J. HOWELL PEEBLES, JR., M. E., R., School of Engineering, Tulane University, New Orleans 18.
B. W. PEGUES, (H. M.), (L. M.), C. E., Prof. Emeritus Civ. Eng., L. S. U., 4604 Perkins Road, Baton Rouge.
JAMES L. PELTIER, (J), M. E., General Electric Co., 1018 Regent St., Schenectady 9, N. Y.
RHEA D. PERCY, C. E., R., R. D. Percy, Consulting Engineer, 202 St. James St., Baton Rouge 1.
ROBT. R. PERCY, C. E., R., Ethyl Corp., 1934 Longwood Drive, Baton Rouge.
JOHN H. PERE, E. E., General Electric Co., 2585 Lally St., Beaumont, Texas.
H. A. PERKINS, Ch. E., Magnolia Petroleum Co., 2950 16th St., Beaumont, Texas.
NORMAN D. PERKINS, C. E., R., Modjeski & Masters, 6853 Wuerple St., New Orleans 24.
CLAIBORNE PERRILLIAT, C. E., R., Perrilliat-Rickey Const. Co., Inc., Box 13128, New Orleans 25.
HOWARD PERRILLIAT, Perrilliat-Rickey Const. Co., Inc., P. O. Drawer 13128, New Orleans 25.
FELICIAN PERRIN, M. E., R., American Oil Co., 2210 Jefferson Ave., New Orleans 15.
QUENTIN F. PERRITT, C. E., R., Nebo Oil Co., Inc., Box 964, Jena.
S. L. PERRY, M. E., R., City of Alexandria, 2231 Olive St., Alexandria.
RALPH M. PERSELL, Ch. E., R., La., Miss., La. Southern Regional Research Laboratory, 7216 Zimple St., New Orleans 18.

JAMES B. PETTEY, C. E., R., La. Dept. of Highways, 915 Louisiana St., Tallulah.
CHESTER A. PEYRONNIN, JR., M. E., R., College of Engineering, Tulane University, P. O. Sta. 20, New Orleans 18.
JOS. R. PEZOLD, C. E., R., Fromherz Engineers, 1900 Green Acres Road, Metairie.
JOHN L. PFEFFER, (J), C. E., R., N. O. Port of Embarkation, 1816 S. Lopez St., New Orleans.
ROBERT A. PHILIBERT, M. E., Jones, Philibert & Co., 358 Sauve Road, New Orleans 23.
CHAS. J. PHILLIPS, JR., M. E., E. E., R., Percy & Phillips Co., Inc., 855 Audubon Ave., Baton Rouge.
R. E. PHILLIPS, M. E., R., La., Ohio, Ethyl Corp., 10445 S. River Oaks Drive, Baton Rouge 6.
R. L. PHILLIPS, SR., M. E., R., La. Power & Light Co., Sterlington.
CLAUDE E. PICOU, C. E., The Flintkote Co., 8327 Palm St., New Orleans 18.
B. B. PIERCE, E. E., M. E., R., Gaylord Container Co., Bogalusa.
FREDERICK F. PILLET, (L. M.), C. E., R., Retired, 730 North 10th St., Baton Rouge 8.
JACK L. PILLOW, M. E., Esso Standard Oil Co., Field Coordination Office, Baton Rouge.
LUKE J. PIRANTO, (Jr. Member), Graduate of S. L. I., 323 Willow St., Franklin.
U. L. PITRE, JR., (J), C. E., R., Modjeski & Masters, 217 Jade Ave., Metairie.
HOMER E. PITTMAN, JR., (J), E. E., Esso Standard Oil Co., P. O. Box 2095, Baton Rouge.
NATHAN W. PITTMAN, JR., E. E., R., Gaylord Container Corp., Route 1, Box 260-A, Bogalusa.
WALTER F. PLAUCHE, M. E., R., deLaureal & Moses, 5929 General Diaz St., New Orleans 24.
ALVIN J. POKORNY, M. E., R., Foster Grant Co., 9921 Van Drive, Baton Rouge.
SIDNEY L. POLEYNARD, C. E., R., La. Dept. of Highways, 2412 July St., Baton Rouge.
DR. E. F. POLLARD, Ch. E., R., La., Miss., Southern Regional Research Laboratory, 314 W. Wm. David Pkwy., Metairie.
JOS. POMINSKI, Ch. E., R., Southern Regional Research Laboratory, 930 Helois Ave., Metairie.
ROBERT L. PONS, M. E., Convair Div. of General Dynamics Corp., 5705 Walla Ave., Ft. Worth 15, Texas.
WILEY D. POOLE, Agri. E., M. E., R., La. State University, 4468 Cypress St., Baton Rouge.
GEO. H. POPE, M. E., Creole Petroleum Corp., Las Piedras, Falcon, Venezuela.
GERALD E. PORCHE, (J), C. E., R., 231 Wright Ave., Houma.
ARTHUR C. PORTER, M. E., Convair Div. of General Dynamics Corp., 4620 Rutland Ave., Fort Worth 15, Texas.
A. EARL PORTER, JR., C. E., R., Porter, Barry & Associates, Box 1708, Baton Rouge 1.
WANNER L. POTIN, E. E., R., Reliance Electric & Engineering Co., 4724 Ashbury Drive, New Orleans 21.
JAMES R. POTTER, C. E., R., Gulf Refining Corp., 8323 Sycamore St., New Orleans 18.
JOHN E. POTTHARST, M. E., Mechanical Equipment Co., Inc., 861 Carondelet St., New Orleans 12.
JOHN E. POTTHARST, JR., M. E., E. E., R., Mechanical Equipment Co., Inc., 861 Carondelet St., New Orleans 12.
HENRY T. POULAN, M. E., E. E., R., Poulan's Electrical Co., 501 Morris Ave., Monroe.
GORMAN S. POUNDERS, (J), C. E., R., La. Dept. of Highways, 7 Kent Ave., Alexandria.
TRUMAN E. POUNDS, M. E., R., La., Tex., Dow Chemical Co., 11155 Robin Hood Drive, Route 1, Baton Rouge.
E. REID POWELL, M. E., R., York Corp., 6434 Louisville St., New Orleans 24.
FRANK J. PREHODA, (J), M. E., Esso Standard Oil Co., 5665 Capitol Heights Ave., Baton Rouge.
E. E. PRESCOTT, M. E., Copolymer Rubber & Chemical Co., 2035 North 16th St., Baton Rouge.
KENNETH A. PRESTON, C. E., R., Trunkline Gas Co., 1815 Gibbons St., Pineville.
JERE K. PRICE, M. E., R., Moody-Price, Inc., 1866 Ormandy Drive, Baton Rouge.
JEROME L. PRICE, M. E., Esso Standard Oil Co., 9555 E. Danmuth Place, Baton Rouge.
HAMPTON PRIMEAUX, C. E., R., La. Dept. of Highways, P. O. Box 454, Franklin.
LOUIS F. PRIMOS, C. E., City of Shreveport, Dept. of Water & Sewerage, 3542 Hardy St., Shreveport.
OTTO PROCHASKA, (J), M. E., Esso Standard Oil Co., 4725 Orchid St., Baton Rouge.
CHARLES S. PUGSLEY, JR., M. E., Esso Standard Oil Co., 4473 Whitehaven St., Baton Rouge 15.
WARD C. PURDUM, M. E., R., Ingersoll-Rand Co., P. O. Box 13134, New Orleans 25.
IVAN H. PURINTON, M. E., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
DeWITT L. PYBURN, C. E., R., La., Miss., Ark., Pyburn & Odom, P. O. Box 267, Baton Rouge.

Q

JOS. J. QUARTANA, M. E., R., Buse, Quartana & Associates, 4424 Earhart Blvd., New Orleans 25.
FRANK W. QUIN, JR., M. E., R., Texas Eastern Transmission Corp., 3875 Greenway Place, Shreveport.
JAMES H. QUINETTE, (A), Orleans Parish School Board, 2116 Dante St., New Orleans 18.
P. H. QUINLAN, (L. M.), C. E., R., Sewerage & Water Board, 1807 Pine St., New Orleans 18.

R

ROBT. L. RABORN, (J), E. E., R., Esso Standard Oil Co., 5374 Breckenridge Ave., Baton Rouge 5.
WALTER S. RAINVILLE, JR., Transportation E., American Transit Assn., 98-10 70th Ave., Forest Hills, N. Y.
EMETERIO I. RAMIREZ, (J), E. E., R., Commonwealth Electrical Const., Inc., Box 44, Rio Piedras, Puerto Rico.
LEONARD C. RAMON, JR., E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 18.
AMBROSE K. RAMSEY, JR., E. E., R., College of Engineering, L. S. U., Baton Rouge 3.
WAYNE C. RANDALL, E. E., deLaureal & Moses, 332 Bedford Drive, Baton Rouge.
PAUL E. RANDOL, E. E., R., Central Louisiana Electric Co., 2427 Jackson St., Alexandria.
EDW. S. RANDOLPH, C. E., R., City & Industrial Planners, 301 Stanford Ave., Baton Rouge 8.
THOMAS M. RANDOLPH, (J), M. E., 6322 Hurst St., New Orleans.
JAMES T. RANGELEY, Constr. E., Ebasco Services Inc., 2 Rector St., New York 6, N. Y.
JOSEPH J. RANNA, M. E., R., A. M. Lockett & Co., Ltd., 308 Whitney Bldg., New Orleans 12.

HERBERT RASBERRY, E. M. Freeman & Associates, 4549 Old Mooringsport Road, Shreveport.
F. COOPER RATLIFF, Ch. E., R., Gaylord Container Corp., 409 Georgia Ave., Bogalusa.
IRVING B. RAU, C. E., R., La., Miss., Consulting Engineer, 730 Gravier St., New Orleans.
ASA M. RAY, C. E., R., La. Dept. of Highways, Route 4, Box 368, Edgewater Gardens, Monroe.
ALFRED G. RAYNER, C. E., R., Consulting Engineer, 3170 Florida Ave., Baton Rouge.
JOHNNIE E. REBOLD, M. E., R., Welding & Mfg. Co., 116 Coolidge St., New Orleans 21.
ARTHUR E. REED, Ch. E., R., Gaylord Container Corp., Box 129, Bogalusa.
C. ESPY REED, E. E., R., Reed Unit Fans, Inc., 1001 St. Charles Ave., New Orleans 8.
JAMES E. REED, JR., E. E., R., Central La. Elec. Co., Inc., 416 West St. Joseph St., Lafayette.
MARION B. REED, E. E., R., College of Engineering, L. S. U., Baton Rouge 1.
ROBT. N. REED, E. E., R., Esso Standard Oil Co., 3684 Winnebago St., Baton Rouge.
KENNETH A. REES, Ch. E., Esso Standard Oil Co., 332 Beverly Drive, Baton Rouge.
MICHAEL H. REILLY, General Contractor, 123 So. Patrick St., New Orleans.
HERBERT P. REINSCH, M. E., Lago Oil & Transport Co., Ltd., Box 632, Lago Colony, Aruba, Netherlands Antilles.
THOS. J. RENNIE, C. E., R., City of New Orleans, Dept. of Streets, No. 2 Charlotte Drive, New Orleans 22.
BILLY R. RENTROP, (J), M. E., 515 East Lake Road, Lake Charles.
RODNEY J. RENTROP, M. E., Cities Service Refining Co., 1020 Sampson St., Lake Charles.
ALBERT H. REPSCHA, M. E., R., Southwestern Louisiana Institute, 307 Marguerite Blvd., Lafayette.
JAMES V. REUTER, JR., (J), M. E., R., La., Miss., Self employed, 5534 Canal Blvd., New Orleans 24.
LARRY F. REYNAUD, M. E., Westinghouse Elec. Corp., 930 Smith Ave., Sharon, Penn.
FRANK L. REYNOLDS, (L. M.), Constr. E., R., Retired, 5515 8th Ave., North, St. Petersburg, Fla.
STANLEY B. REYNOLDS, JR., (J), M. E., Esso Standard Oil Co., 355 Summit Ridge Drive, Baton Rouge.
WM. C. REYNOLDS, (J), C. E., Esso Standard Oil Co., 4412 Plank Road, Baton Rouge.
HERBERT M. RHODES, E. E., R., Truman B. Wayne & Associates, 6838 Louisville St., New Orleans 24.
WM. H. RHODES, (L.M.), C. E., R., Retired, 1531 Henry Clay Ave., New Orleans.
ANTOINE D. RICHARD, E. E., R., Southern Bell Tel. & Tel. Co., 1723 Goldenrod Ave., Baton Rouge 6.
ARTHUR M. RICHARD, (Jr. Member), Graduate of S. L. I., 528 N. Walnut, Opelousas.
JOSEPH G. RICHARD, JR., (J), C. E., R., La. Dept. of Highways, 220 Sunset Blvd., Baton Rouge.
WALTER E. RICHARD, Olin-Mathieson Chem. Corp., 2025 Twenty-Second St., Lake Charles.
FLOYD D. RICHARDS, Ch. E., Esso Standard Oil Co., 9165 Woodbine St., Baton Rouge 6.
EDW. K. RICHARDSON, E. E., Industrial Elec. Inc., 6507 Camphor St., Metairie.
ROBT. B. RICHARDSON, C. E., R., Roberts & Eastland, 1019 Ingleside Drive, Baton Rouge.
W. PAT RICHARDSON, M. E., E. E., Johns-Manville Sales Corp., Box 7397, Mid City Station, New Orleans 19.
C. W. RICKER, E. E., R., Consulting Engineer, 119 S. Claiborne, Apt. 606, New Orleans 12.
G. B. S. RICKETTS, M. E., E. E., R., La., Miss., Kaiser Aluminum & Chem. Corp., 1924 Broadway, Oakland, Calif.
RICHARD W. RIEDEL, C. E., R., La., Tex., Dow Chemical Co., 1719 Silliman Drive, Baton Rouge.
FRANK RIESS, C. E., M. E., E. E., R., Reagan Tool Co., Inc., 1322 State St., New Orleans 18.
JOHN RIESS, (L. M.), C. E., Carondelet Bldg., New Orleans 12.
JOSEPH S. RIORDA, E. E., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
MARTIN J. RIPP, (A), N. O. Public Service Inc., 319 Baronne St., New Orleans.
BEN E. RITCHEY, (J), Ch. E., R., P. O. Box 402, Lafayette.
FRANK M. RITCHIE, Surveyor, R., The La. Land & Exploration Co., 225 Bayou Black Drive, Houma.
CHAS. L. RITTENBERG, C. E., R., Meyers, Whitty & Hodge, 429 Lowerline St., New Orleans 18.
ANDERSON B. RITTER, C. E., R., La. State Health Dept., 936 Broadway, New Orleans 18.
JOHN E. RITTER, E. E., Esso Standard Oil Co., 9555 Greenbrier Drive, Baton Rouge.
ALFRED F. ROACH, Esso Standard Oil Co., 7524 Richards Drive, Baton Rouge 6.
CALVIN J. ROACH, M. E., General Electric Co., 2 Damson Lane, Bayberry, Liverpool, N. Y.
JOHN W. ROACH, JR., C. E., R., La., Miss., Eustis Engineering Co., 3635 Airline Hwy., Metairie.
SPENCER B. ROANE, Ch. E., R., Dow Chemical Co., P. O. Box 587, Donaldsonville.
W. S. ROATEN, M. E., Worthington Pump & Machinery Corp., 3812 Parkway, Shreveport.

GEO. P. ROBBINS, JR., M. E., E. E., R., Robbins & Robbins, 1037 Magazine St., New Orleans 13.
WARREN M. ROBBINS, C. E., R., Kaiser Aluminum & Chem. Corp., 1430 Country Club Drive, Baton Rouge.
JAMES M. ROBERT, (H. M.), (L. M.), M. E., Dean Emeritus, Col. of Eng., Tulane University, Waveland, Miss.
KEARNY ROBERT, M. E., E. E., Pet. E., R., Robert Oil Co., 829 Hibernia Bank Bldg., New Orleans 12.
RICHARD C. ROBERT, C. E., R., East Baton Rouge City-Parish Dept. of Public Works, 3257 Myrtle Ave., Baton Rouge.
THOMAS C. ROBERT, E. E., R., The Solvay Process Div., 2855 Elgin St., Baton Rouge.
WM. E. ROBERT, C. E., R., La. Dept. of Highways, P. O. Box 595, Lafayette.
DALLAS C. ROBERTS, (A), Communications E., Southern Bell Tel. & Tel. Co., 825 Murray St., Alexandria.
FRANCIS M. ROBERTS, (J), C. E., R., La. Dept. of Highways, 352 E. Madison St., Opelousas.
JESSE D. ROBERTS, C. E., R., Barnard & Burk, Construction Engineers, 2855 Madison Ave., Baton Rouge.
FRANCIS J. ROBERTSON, (Jr. Member), Graduate of S. L. I., 428 E. Vermillion, Lafayette.
ROBERT J. ROBERTSON, M. E., E. E., R., Gulf States Utilities Co., 6919 Goodwood Ave., Baton Rouge.
ERNEST T. ROBINSON, JR., C. E., R., Texas Eastern Transmission Corp., 1902 Audubon St., Shreveport.
ROBT. E. ROBINSON, Pet. E., R., La., Ark., Miss., N. Dak., Kansas, Private practice, 1839 Line Ave., Shreveport.
A. RODI RODRIGUEZ, C. E., M. E., R., Private practice, 1628 N. Dupre St., New Orleans 19.
OSCAR G. RODRIGUEZ, M. E., Esso Standard Oil Co., 10545 Cletus Drive, Baton Rouge.
LOUIS H. ROEGER, C. E., R., E. M. Freeman & Associates, 3444 Beverly Place, Shreveport.
EVERETT G. ROESSLE, (L. M.), C. E., R., Roessle & Galloway, Consulting Engineers, 1019 Leontine St., New Orleans 15.
ALLEN J. ROGERS, (Jr. Member), Graduate of S. L. I., 607 Greenwood St., Morgan City.
CHAS. M. ROGERS, M. E., N. O. Public Service Inc., 6042 Prytania St., New Orleans 18.
WM. D. ROLAND, Contractor, R., Roland Construction Co., P. O. Box 850, Alexandria.
J. R. ROMBACH, E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
WESLEY B. ROOT, JR., M. E., R., Esso Standard Oil Co., 6857 Annabelle Ave., Baton Rouge.
ALBERT H. RORDAM, (A), Fairbanks, Morse & Co., 302 Cedar Drive, Metairie.
LOUIS J. ROSENBOHM, JR., C. E., R., Ricciuti & Associates, 521 Royal St., New Orleans 16.
AARON M. ROSENTHAL, JR., C. E., E. E., R., La. Dept. of Highways, 286 Kenwood Ave., Baton Rouge 12.
J. ELLIS ROSS, C. E., R., La. Dept. of Highways, 303 Browning St., West Monroe.
N. H. ROSS, (A), Ole K. Olsen, Inc., 823 Perdido St., New Orleans 12.
CMDR. ALFRED J. ROTH, JR., C. E., R., c/o CINEASTLANT, Box 71, Navy No. 100, FPO New York, N. Y.

RALPH K. ROTHROCK, M. E., Private practice, 5316 Dryades St., New Orleans 15.
WM. J. ROUNTREE, C. E., R., La. Dept. of Highways, P. O. Box 1321, Alexandria.
CHAS. R. ROSTRON, C. E., R., La., Tex., School of Engineering, L.P.I., Ruston.
LARRY J. ROUSSEAU, (J), C. E., R., U. S. Navy, 4417 Eastern St., New Orleans.
ALBERT T. ROWAN, M. E., R., National Gypsum Co., P. O. Box 5257-B, New Orleans 15.
OTIS B. ROWLAND, JR., Ch. E., R., Commercial Solvents Corp., P. O. Box 205, Bastrop.
FRANCIS C. ROY, (J), E. E., R., La. Polytechnic Institute, 209 Bernard St., Ruston.
JOSEPH V. ROY, E. E., Copolymer Rubber & Chem. Corp., 3126 Anita Ave., Baton Rouge.
MICHAEL J. RUCK, (J), C. E., R., Fromherz Engineers, 705 River Oaks Drive, New Orleans 14.
RICHARD E. RUCKSTUHL, (J), C. E., R., Esso Standard Oil Co., 11870 Sherbrook Drive, Baton Rouge.
THOMAS F. RUFFIN, M. E., R., La., Miss., Tex., Ark., Ruffin Transport, Inc., P. O. Box 571, Shreveport.
RALPH A. RUSCA, Physicist, Southern Regional Research Lab., 6530 General Haig St., New Orleans.
JOHN H. RUSCH, JR., Ch. E., R., N. Y., W. Va., Chemical Cleaning, Inc., 505 Colony Road, Metairie.
CHAS. J. RUSSELL, C. E., R., La. Dept. of Highways, P. O. Box 595, Lafayette.
ELMORE G. RUSSELL, E. E., Sperry Gyroscope Co., Inc., 300 South Galvez St., New Orleans.
HERBERT E. RUSSELL, (A), C. E., R., La. Dept. of Highways, Box 572, Winnsboro.
J. D. RUSSELL, (J), M. E., R., Ethyl Corp., 5826 Saurage Drive, Baton Rouge.
AUGUST J. RYBERG, Surveyor, R., Private practice, Lock Drawer 392, Mansfield.

S

HENRY DAY SALASSI, C. E., R., La. Dept. of Highways, 1146 Glenmore Ave., Baton Rouge.
CARLETON C. SALLEY, C. E., R., E. M. Freeman & Associates, 3321 Surrey Road, Shreveport.
CMDR. H. S. SALZER, (L. M.), C. E., Cmdr., U. S. Coast Guard, Retired, 6028 Catina St., New Orleans 24.
DANIEL D. SANDEFUR, C. E., R., Lafargue & Sandefur, 1809 Bush Ave., Alexandria.
DAVID E. B. SANDERS, JR., (J), C. E., Esso Standard Oil Co., 5366 Bea Drive, Baton Rouge.
HILLARY C. SANDERS, JR., (J), M. E., R., Columbian Carbon Co., 407 Eason Place, Monroe.
WADE M. SANDERS, C. E., R., La., Tenn., City of Monroe, 2549 N. 12th St., Monroe.
ELBERT H. SANGWINE, Ch. E., Kaiser Aluminum & Chem. Corp., 209 Jewel St., New Orleans 24.
HORACE A. SAWYER, C. E., Lone Star Cement Corp., 100 Park Ave., New York, N. Y.
WALTER H. SCALES, C. E., R., La., Ill., Ind., National Lumber Manufacturers Assn., 550 National Bank of Commerce Bldg., New Orleans 12.
SAMUEL Z. SCANDALIATO, (J), C. E., 1419 Alvar St., New Orleans.
HERBERT A. SCHAEFFER, JR., E. E., M. E., R., The Flintkote Co., 2518 Pressburg St., New Orleans 22.
VERNON L. SCHARFE, M. E., United Gas Pipe Line Co., P. O. Box 1628, New Orleans 11.
J. GILBERT SCHEIB, Constr. E., Housing Authority of New Orleans, 2412 Gen. Pershing St., New Orleans 15.
DONALD B. SCHELL, M. E., Robbins & Robbins, 1037 Magazine St., New Orleans.
HAROLD SCHILL, (A), H. & W. Construction Co., Inc., 650 S. Galvez St., New Orleans.
LOUIS C. SCHILLING, M. E., Copolymer Corp., 4225 Monroe St., Baton Rouge.
HERMAN SCHULTER, JR., E. E., Esso Standard Oil Co., 11454 Molly Lea Drive, Baton Rouge 5.
JOHN H. SCHULTER, M. E., R., Board of Commissioners, Port of New Orleans, 5 Melodia Court, New Orleans 25.
GEO. H. SCHMITT, JR., E. E., N. O. Public Service Inc., 101 Celeste Ave., New Orleans 23.
EDWIN O. SCHNEE, U. S. Air Force, 602 Jefferson Drive, Lake Charles.
CARL SCHNEIDER, (L. M.), C. E., M. E., E. E., R., Consulting Engineer, 7711 Plum St., New Orleans 18.
EDWARD L. SCHNEIDER, Ch. E., R., Southern Surgical Supply Co., Inc., 225 Chappelle St., New Orleans.
ALFRED W. SCHOEFFLER, (J), C. E., R., Southwestern Louisiana Institute, Box 63, S. L. I. Station, Lafayette.
GEO. S. SCHRENK, C. E., M. E., R., La., Miss., Tex., Consulting Engineer, 138 N. Jefferson Davis Pkwy., New Orleans 19.
ROBERT H. SCHROEDER, JR., (J), C. E., 4125½ Eden St., New Orleans.
EUGENE M. SCHWARTZ, M. E., R., Columbia Southern Chemical Corp., 37 Center Avenue, Maplewood.
WALTER J. SCHWARZ, Ch. E., R., C/O The Flintkote Co., 4500 N. Galvez St., New Orleans.
ROY F. SCRIBER, Continental Constrs., Inc., 8220 Thurman Dr., Baton Rouge.
R. MALLARD SEAGO, M. E., E. E., R., N. O. Public Service Inc., 1600 South Peters St., New Orleans 13.
JOS. W. SEARS, M. E., R., R. J. Tricon Co., 7321 Onyx St., New Orleans 24.
GEO. A. SEAVER, JR., C. E., R., Boh Bros. Construction Co., 2400 Cypress St., New Orleans 19.
RICHARD M. SEE, M. E., R., Cities Service Refining Corp., 3215 Landfair, Lake Charles.
RALPH S. SEGALL, M. E., R., B. Segall Co., 848 River Road, Shreveport.
GUY J. SEGHERS, JR., (J), C. E., R., Unistrut Southern Co., P. O. Box 1231, New Orleans.
SOLIS SEIFERTH (L. M.), Architect R., La., Miss., Tex., Ga., Dreyfous & Seiferth, 328 Audubon Bldg., New Orleans.
JAMES L. SELF, (A), M. E., R., Cities Service Refining Corp., 213 Fraser Street, Lake Charles.
CHAS. SELLERS, (J), M. E., R., United Gas Corp., 517 Iberia St., New Iberia.
EUGENE M. SELLERS, (Jr. Member), Graduate of S. L. I., 106 S. Bailey Ave., Abbeville.
JOHNNY B. SELLERS, C. E., R., La., Tex., Trunkline Gas Co., 6214 Flamingo St., Houston 17, Texas.
J. M. SEMMES, C. E., R., La. Dept. of Highways, 759 Concordia, Baton Rouge.
CORLEY P. SENYARD, (J), M. E., R., Esso Standard Oil Co., 5273 Abelia Dr., Baton Rouge.
J. P. SESSIONS, C. E., R., La., Miss., Jordan, Kaiser & Sessions, P. O. Box 66, Natchez, Miss.

FRANCIS B. SESSUMS, C. E., R., La., Tex., The Dow Chemical Co., 2219 Myrtledale Ave., Baton Rouge.
ROY T. SESSUMS, C. E., R., Freeport Sulphur Co., P. O. Box 1520, New Orleans 5.
HARVEY D. SHAFFER, (J), C. E., R., La. Dept. of Highways, 824 N. 8th St., Baton Rouge.
WARREN C. SHANKLE, The Dow Chemical Co., 4635 Orchid St., Baton Rouge 8.
GEO. E. SHAW, M. E., Shaw Engineering Inc., P. O. Box 20073, Houston 25, Texas.
RICHARD M. SHAW, C. E., U. S. Army Engineer Dist., 7438 Dominican St., New Orleans 18.
GEO. F. SHELLEY, M. E., R., Shelley Filter Co., Box 178, Rt. 2, Bayou Liberty Road, Slidell.
EMILE S. SHERRARD, E. E., Div. 12.4, National Bureau Standards, Washington 25, D. C.
CECIL M. SHILSTONE, Ch. E., R., La., Tex., Shilstone Testing Laboratory, 814 Conti St., New Orleans.
CHAS. H. SHIPMAN, U. S. Government Civil, Architectural and Structural Engineer, Rt. 4, Box 286, Lake Charles.
JAMES B. SHIPP, E. E., R., James H. Howard & Associates, 27 Horseshoe Lane, Maplewood.
JERRY T. SHOEMAKER, (A), La. Power & Light Co., Rt. 4, Box 186, Ray Drive, Monroe.
DALTON B. SHOURDS, C. E., R., La., Miss., Ind., Consulting Engineer, 137 Markham Dr., Mississippi City, Miss.
RONALD E. SHRADER, M. E., Copolymer Rubber & Chemical Corp., Star Rt. 29, Box 240, Greenwell Springs.
ELMER SHUTTS, C. E., R., F. Shutts' Sons Consulting Engineers, Box 732, Lake Charles.
FRED N. SHUTTS, C. E., R., F. Shutts' Sons Consulting Engineers, Box 732, Lake Charles.
HARRY H. SHUTTS, C. E., R., F. Shutts' Sons Consulting Engineers, Rte. 3, Box 204-D, Lake Charles.
L. ROYDON SIBILLE, (J), E. E., La. Power & Light Co., 2414 Roosevelt Blvd., Kenner.
EUGENE E. SIKES, JR., (J), M. E., United Gas Corp., Box 435, New Iberia.
ELVIN M. SIMMONS, Cities Service Refining Corp., 316 Rio Hondo St., Maplewood.
RAYMOND J SIMMONS, JR., C. E., R., La., Tex., United Gas Pipe Line Co., Box 1407, Shreveport.
JOS. T. SIMMS, JR., E. E., M. E., R., Central La. Elec. Co., Coughlin Station, Unit 5, St. Landry.
JULES E. SIMONEAUX, JR., (A), C. E., R., Henry A. Steckler Co., P. O. Box 130, New Orleans 3.
JAMES H. SIMPSON, JR., M. E., R., La., Tex., Rawson & Co., 661 Carol Marie Drive, Baton Rouge.
HARVEY J. SIMS, JR., (J), M. E., R., Petroleum Chemicals, Inc., 319 W. Claude St., Lake Charles.
RODRIC M. SINGLETON, JR., M. E., R., United Gas Corp., 3005 S. Gen. Wainwright Drive, Lake Charles.
JOSEPH C. SKINNER, JR., (J), C. E., R., W. Horace Williams Co., 3125 N. Villere St., New Orleans 17.
JAMES R. SLEDGE, (J), E. E., Tenn. Valley Authority, 4438 Estonia Road, Knoxville, Tenn.
RAYMOND SLOSS, C. E., R., U. S. Dept. of Interior, 424 Highland Park Drive, Baton Rouge 8.
THOMAS B. SMART, C. E., R., State Dept. of Public Works, 2020 Hiawatha St., Baton Rouge 2.
JOSEPH L. SMILIE, (J), Agri. E., R., La. State University, 2344 W. Contour Drive, Baton Rouge.
BARNEY R. SMITH, C. E., R., Gaylord Container Corp., 708 St. Augustine St., Bogalusa.

CHAS. F. SMITH, JR., (J), C. E., R., La., Va., Esso Standard Oil Co., 9523 Meredith Drive, Baton Rouge.
FREDERICK E. SMITH, C. E., R., Carnegie & Smith, 3000-A Dalrymple Drive, Baton Rouge.
GLENDON L. SMITH, M. E., Pet. E., R., Cities Service Refining Corp., 39 Horseshoe Lane, Maplewood.
HARRELL R. SMITH, M. E., Pet. E., R., Cities Service Refining Corp., 816 Sixth St., Lake Charles.
JAMES B. SMITH, C. E., R., Howard L'Heureux & E. F. Harris, 803 Murray St., Alexandria.
JEAN F. SMITH, (A), M. E., R., Gulf States Utilities Co., 4343 St. Katherine St., Baton Rouge 5.
JOE REGAN SMITH, C. E., R., La. Dept. of Highways, 250 Westerfield, Bossier City.
RICHARD A. SMITH, C. E., R., La., Va., La. Polytechnic Institute, 126 Pinecrest Drive, Ruston.
SAMPSON C. SMITH, C. E., R., La. Dept. of Public Works, P. O. Box 950, Tallulah.
SIDNEY S. SMITH, (Jr. Member), Graduate of S. L. I., St. Francisville.
SPENCER G. SMITH, M. E., R., Bedell & Nelson Engineers, Inc., 1200 St. Charles Ave., New Orleans 13.
T. BAKER SMITH, (L. M.), C. E., R., Consulting Engineer, Box 266, Houma.
ARNOLD R. SMYTHE, JR., (J), C. E., 107 Court St., Batesville, Miss.
OLIVER I. SNAPP, JR., (J), C. E., R., La., S. C., Esso Standard Oil Co., 4222 Orchid St., Baton Rouge.
DONALD G. SNOW, (A), Const. E., Farnsworth & Chambers Co., Post Office, Ocean Springs, Miss.
RICHARD K. SNOW, (J), Raymond Concrete Pile Co., 407 Pere Marquette Bldg., New Orleans.
WM. E. SNOW, JR., M. E., Ingersoll-Rand Co., 4918 Convention St., Baton Rouge.
MILLARD P. SNYDER, C. E., Pet. E., R., Self Employed, 1109 Sklar Bldg., Shreveport.
C. M. SOLBERG, Mining E., Self Employed, Kentwood.
BENJAMIN C. SONES, C. E., 304 Sabine St., Bogalusa.
FRANK B. SONNIER, E. E., R., Gulf States Utilities Co., 709 Wilson St., Lafayette.
W. C. SORENSEN, C. E., R., La., Tex., Ark., Miss., Neild-Somdal Associates, 960 Jordan St., Shreveport.
ALBERT L. SOULE III, E. E., R., Phelps Dodge Copper Products Corp., 2120 Blue Ridge Blvd., Birmingham 9, Ala.
W. HOBSON SPAAR, C. E., Hq. Technical Training Air Force, 19 Poplar Circle, Gulfport, Miss.
DELROY O. SPANN, Ch. E., R., Delta Tank Mfg. Co., 8008 LaSalle Ave., Baton Rouge.
LOUIS G. SPANN, (J), M. E., R., W. R. Grace Co.-Polymer Chem. Div., 9336 S. River Oaks Drive, Baton Rouge.
WM. S. SPANN, M. E., Esso Standard Oil Co., 5175 Bluebell Drive, Baton Rouge.
WINFRED J. SPANO, C. E., R., Buquet & LeBlanc, Inc., 5716 College Dr., Baton Rouge.
DOUGLAS W. SPEED, (J), M. E., Esso Standard Oil Co., 545 Highland Park Drive, Baton Rouge.
DAVIS E. SPEEG, Ch. E., R., La., Tex., Coastal Engineering Corp., 509 Melanie Ave., Metairie.
ASHLEY C. SPEIR, JR., (J), Esso Standard Oil Co., 2021 Terrace Ave., Baton Rouge.
JAMES W. SPENCE, Donnelly Constr. Co., 8 Carroll Dr. Chalmette.
CHAS. B. SPENCER, C. E., C. B. Spencer Co., Inc., P. O. Box 1338, New Orleans 10.
J. COOPER SPENGLER, Chemist, Gulf States Utilities Co., 1230 Stanford Ave., Baton Rouge.
WESLEY J. SPERIER, M. E., R., U. S. Navy, 8th Naval Dist., 131 Lavergne St., New Orleans 14.
RAMON D. SPILMAN, (L. M.), Inspection E., Cities Service Refining Corp., 123 Liberator, Sulphur.
LEE N. SPINKS, E. E., R., Cathodic Protection Service, 1462 Joseph St., New Orleans 15.
DUDLEY A. STADLER, JR., (J), M. E., R., Kaiser Aluminum & Chem. Corp., 3123 Pimpernel Ave., Baton Rouge.
TRUMAN C. STAGG, Cities Service Refining Corp., 709 S. Ryan St., Lake Charles.
ARTHUR D. STANCLIFF, M. E., E. E., R., 4735 Carondelet St., New Orleans 15.
WM. F. STANDKE, JR., C. E., R., 4718 Fairfield Ave., Shreveport.
DAVID STAYER, (L. M.), E. E., R., Ky., U. S. Army Engr. Corps., 2364 Hawthorne Ave., Louisville 5, Ky.
MAITLAND A. STEELE, C. E., R., Freeport Sulphur Co., 359 Fremaux, Slidell.
RICHARD M. STEERE, E. E., R., La. Polytechnic Institute, 406 W. Florida Ave., Ruston.
R. A. STEINMAYER, (L. M.), Retired, 123 Nicholas Ave., Waveland, Miss.
JAMES A. STELLY, E. E., R., Gulf States Utilities Co., 3175 Fritchie St., Baton Rouge.
JOHN C. STEPHENSON, (A), C. E., R., La. Dept. of Highways, Box 1106, Houma.
ASHBY B. STEVENS, E. E., R., Central La. Elec. Co., P. O. Box 111, Alexandria.
FRED W. STEVENS, (L. M.), Retired, 3380 State St. Drive., New Orleans 25.
ROGER G. STEVENS, Ch. E., R., Southwestern Louisiana Institute, 306 Monroe St., Lafayette.
GEO. F. STEVENSON, C. E., R., La. Dept. of Highways, 1727 Valence St., New Orleans 15.
BINGHAM C. STEWART, C. E., Boh Bros. Construction Co., 2400 Cypress St., New Orleans.
CHESTER A. STEWART, M. E., United Gas Pipe Line Co., 2420 Metairie Road, Metairie.
EUGENE Y. STEWART, M. E., Cities Service Refining Corp., 2312 Aster St., Lake Charles.
FRANK STEWART, C. E., R., La., Tex., Farnsworth & Chambers Co., 3710 Alberta St., Houston 21, Texas.
JAMES M. STEWART, JR., M. E., R., Petroleum Chemicals, Inc., 1917 Sixth St., Lake Charles.
JEFF M. STEWART, C. E., R., Tex., Industrial Steel Products Co., Inc., P. O. Box 1814, Shreveport.
LOMIS E. STEWART, M. E., J. Ray McDermott & Co., Inc., Country Club Estates, Star Route, Covington.
WM. G. STEWART, JR., M. E., Copolymer Rubber & Chem. Corp., 653 Finchley Ave., Baton Rouge.
JAMES E. ST. GERMAIN, M. E., R., American Oil Co., 1621 Agriculture St., New Orleans 19.
LOUIS A. ST. GERMAIN, C. E., R., Barnard & Burk, Inc., P. O. Box 1470, Baton Rouge.
HARRY W. STINCHCOMB, (J), C. E., R., Fromherz Engineers, 1710 S. Carrollton, Apt. G, New Orleans.
JOHN H. STINSON, JR., C. E., R., La. Dept. of Highways, 3817 Eddy Place, Shreveport.
FELTUS B. STIRLING, E. E., R., Gulf States Utilities Co., 2005 Ferndale Ave., Baton Rouge 15.
CHARLES W. STOKES, M. E., R., Cities Service Refining Corp., 1311 Eleventh St., Lake Charles.
SAMUEL J. STOKES, C. E., R., Shell Oil Co., 4960 Desire Drive, New Orleans.
WM. J. STORM, M. E., R., Campbell, Goldstein & Glade, 810 Richards Bldg., New Orleans 12.
PIERRE J. STOUSE, JR., (J), E. E., R., Walter J. Barnes Elec. Co., 5537 Hurst St., New Orleans 15.
JACK E. STOVER, (J), M. E., Gaylord Container Corp., 623 Carolina Ave., Bogalusa.
HENRY H. ST. PAUL, JR., M. E., R., Service Supply & Engr. Co., 1048 Constance St., New Orleans 13.

RONALD J. ST. PIERRE, (J), Agri. E., R., Shell Oil Co., 444 Pine St., Norco.
EMANUEL STRAVOLEMOS, M. E., R., J. B. Beaird Co., Inc., 867 Audubon Place, Shreveport.
JOHN P. ST. RAYMOND, M. E., R., Monsanto Chem. Co., 3539 Napoleon Ave., New Orleans.
HAROLD H. STREAM, JR., Ch. E., R., Union Oil Co. of Calif., 1460 Lombardy Rd., Pasadena 5, Calif.
LEO J. STROLE, M. E., United Gas Corp., Monroe.
HERMAN W. STUMBORG, (A), N. O. Public Service Inc., 936 Arabella St., New Orleans 15.
MALCOLM W. STUMPF, E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
RICHARD J. SULLIVAN, Pet. E., R., Consultant, 1328 Meadow Drive, Lake Charles.
JAMES M. SUMMERLIN, Constr. E., Fish Service Corp., 441 S. Syndicote Ave., Ft. William, Ontario, Canada.
THEODORE A. SUNDIN, (J), M. E., R., U. S. Air Force, Box 720, Rt. 8, Ft. Worth, Texas.
WALTER L. SUTTON, E. E., General Elec. Co., 9653 Molly Lea Drive, Baton Rouge 6.
HERBERT C. SWAN, E. E., R., N. O. Sewerage & Water Board, 366 Pine St., New Orleans 18.
JACOB B. SWANSON, JR., M. E., R., Esso Standard Oil Co., 7444 Boyce Dr., Baton Rouge.
ROBT. J. SWAYNE, JR., M. E., R., Stevens Band, Inc., 4447 Ware Ave., Orleans Parkway, New Orleans 21.
BENNY J. SWINDLER, M. E., Copolymer Rubber & Chem. Corp., 2960 McGrath St., Baton Rouge.
H. M. SYLVESTER, C. E., R., La., N. Y., N. J., Calif., S. C., Intercontinental Hotels Corp., Avon House, Apt. 9-C, 340 E. 74th St., New York 21, N. Y.
ROBT. B. SYMON, (J), Shell Oil Co., 3408 Page Drive, Metairie.
AUGUST J. SZABO, C. E., R., Southwestern La. Institute, Box 523, S. L. I., Lafayette.

T

HARRY L. TABONY, (J), E. E., R., Harry L. Tabony & Associates, 301 Civic Center Bldg., New Orleans 12.
WM. D. TABOR, (A), C. E., R., La. Dept. of Highways, 616 St. Philip St., Thibodaux.
DOUGLAS S. TALBOT, (J), C. E., R., 620 Grinage St., Houma.
ENOCH TALLEY, E. E., R., Esso Standard Oil Co., 1575 Audubon Ave., Baton Rouge.
SIDNEY N. TANNER, E. E., Seismograph Service Corp., 10634 E. 11th St., Tulsa, Okla.
JAMES S. TARBUTTON, E. E., R., La. Polytechnic Institute, Rt. 1, Ruston.
CLAUDE L. TAYLOR, (J), E. E., Copolymer Rubber & Chem. Corp., 4549 Monroe Ave., Baton Rouge.
DAYTON R. TAYLOR, M. E., R., La., Va., Baton Rouge Water Works Co., P. O. Drawer 2391, Baton Rouge.
ERNEST J. TAYLOR, C. E., R., La., Miss., La. Dept. of Public Works, 1124 Highland Park Dr., Baton Rouge.
E. E. TAYLOR, E. E., R., Concordia Elec. Coop., Inc., 1002 North 4th St., Ferriday.
FRANCIS M. TAYLOR, Ch. E., R., College of Engineering, Tulane University, New Orleans 18.
FULTON G. TAYLOR, E. E., Address Unknown.
W. H. TAYLOR, JR., C. E., R., La. Dept. of Highways, 11024 Tama Dr., Baton Rouge.
GUY E. TEMPLET, (A), M. E., R., Ogden, Woodruff & Dyer, 1473 St. Rose St., Baton Rouge.
WILLIAM W. TENNANT, C. E., Retired, 520 Convention St., Baton Rouge.
JACK A. TERRILL, C. E., R., Southern Builders, Inc., 372 Atlantic, Shreveport.
L. W. TERRY, C. E., Self Employed, P. O. Box 349, DeRidder.
S. A. THEARD, (L. M.), C. E., R., Stevens Shell Co., Inc., 417 Audubon Blvd., New Orleans 18.
ARTHUR R. THEIS, (J), C. E., R., La. Dept. of Public Works, 216 Ricou-Brewster Bldg., Shreveport.
GASTON J. THERIOT, E. E., U. S. Maritime Administration, 137 Atherton Dr., Metairie.
HUBERT J. THIBODEAUX, (J), M. E., 1510 Louisiana St., Baytown, Texas.
OCTA J. THIBODEAUX, M. E., R., Petroleum Chemicals, Inc., 58 Beauregard Rd., Maplewood.
ARTHUR C. THIGPEN, E. E., R., La. Polytechnic Institute, Box 255, Tech Station, Ruston.
J. J. THIGPEN, M. E., R., La. Polytechnic Institute, Box 255, Tech Station, Ruston.
BURTON L. THOMAS, Ch. E., R., Bedell & Nelson Engineers, Inc., 4921 Camp St., New Orleans 15.
CARL H. THOMAS, Agri. E., R., La. State University, 4538 Arrowhead St., Baton Rouge 6.
A. W. THOMPSON, C. E., R., A. W. Thompson & Associates, 635 Commercial Place, New Orleans 12.
CHESTER W. THOMPSON, Agri. E., R., Dow Chem. Co., 5876 Glenwood Drive, Baton Rouge.
EDWIN B. THOMPSON, Aero Eng., Cities Service Refining Corp., Box 336, Lake Arthur.
HORACE A. THOMPSON, JR., Ch. E., R., Thompson Equipment Co., 4020 Thalia St., New Orleans 25.
W. L. THOMPSON, C. E., R., La. Dept. of Highways, P. O. Box 572, Hammond.
MOHNS M. THORNTON, Ch. E., R., Lake Charles Air Force Base, 719 Cleveland St., Lake Charles.
WM. C. THURMON, C. E., R., Mosher Steel Co. of La., Inc., 366 Arthur St., Shreveport.
STEWART TICKNOR, (L. M.), C. E., R., 345 S. Magnolia St., Pascagoula, Miss.
FREDERICK L. TILLEY, (J), C. E., 7420-A Burthe St., New Orleans.
EUGENE F. TIMS, E. E., R., Applied Physics Laboratory, Johns-Hopkins University, Silver Springs, Md.
VAINO A. TIRRI, C. E., Gaylord Container Corp., 318B Lexington St., Bogalusa.
JOHN R. TOCHO, JR., M. E., E. L. Dennis Engineering Co., 6722 Gen'l Diaz St., New Orleans 24.
JAMES M. TODD, (L. M.), (H. M.), M. E., E. E., Mining E., R., La., Ala., Miss., Tex., Design Engineers Associated, 311 Board of Trade Annex, New Orleans 12.
EVERETTE E. TONEY, M. E., E. E., R., Cities Service Refining Corp., 3904 Joseph St., Lake Charles.
HARRY H. TORMEY, C. E., Jahncke Service, Inc., 400 Jefferson Ave., Metairie.
ROBT. E. TORREGROSSA, (A), M. E., R., 710 Tampa St., Bogalusa.
ROLAND L. TOUPS, M. E., R., The South Coast Corp., P. O. Box 230 Houma.
JAMES E. TRACY, (A), Carruth-Dishman Constr. Co., 612 Fay Ave., Beaumont, Texas.
GROVER J. TRAMMEL, M. E., R., La. Polytechnic Institute, Box 255, Tech Station, Ruston.

WALLACE J. TRAMMEL, (A), Hoag & Trammell, 3855 Airline Highway, Metairie.
ELMER V. TRICHE, (J), E. E., R., 4022 S. Derbigny St., New Orleans 25.
SIDNEY E. TROUARD, JR., E. E., R., N. O. Public Service Inc., 317 Baronne St., New Orleans 9.
JOSEPH R. TROXLER, M. E., R., Southwestern La. Institute, Box 64, S. L. I., Lafayette.
REGIS G. TRUMPS, (J), E. E., N. O. Public Service Inc., 3609 Eagle St., Apt. 3, New Orleans 18.
JOHN P. TUCKER, M. E., C. E., R., Mathieson Chem. Corp., 709 W. LaGrange St., Lake Charles.
JAMES D. TUFTS, M. E., Pan-American Southern Corp., Box 97, Destrehan.
HOWARD M. TULL, Sou. Bell Tel. & Tel. Co., 6559 Argonne St., New Orleans 24.
CHAS. G. TULLIS, (J), M. E., R., Tex., Southwest Industries, Inc., 1741 Ronson Drive, Houston 7, Texas.
ALCEE N. TURCAN, JR., Pet. E., R., U. S. Geological Survey, 556 Kimbro Drive, Baton Rouge.
HUMPHREYS T. TURNER, C. E., R., 369 Westgate West, Cambridge 39, Mass.
WM. H. TURNER, (A), La. Power & Light Co., P. O. Box 262, Sterlington.
W. O. TURNER, La. Power & Light Co., 142 Delaronde St., New Orleans 14.
W. T. TURNER, JR., Ch. E., Texas Gas Transmission Corp., Box 577, Owensboro, Ky.
CHAS. E. TURRENTINE, M. E., R., Turrentine Co., North Drive, Alexandria.

U

JOHN C. UPTON, E. E., Perforating Guns Atlas Corp., 401 Mudd Ave., Lafayette.

V

L. F. VALENTINE, C. E., Howard, Needles, Tammen & Bergendoff, 1185 Dudley Drive, Shreveport.
ROBT. H. VAUGHAN, C. E., R., La. Dept. of Highways, 9312 Meredith Drive, Baton Rouge.
WM. G. VELTROP, (J), C. E., Esso Standard Oil Co., 513 E. Boyd Dr., Baton Rouge.
WALTER J. VERLANDER, M. E., R., Power Specialty Co., 1140 Louisiana Ave., New Orleans 15.
HERMAN R. VICK, M. E., R., Tidewater Dredging Co., P. O. Box 545, Metairie.
JOHN E. VIDRINE, (J), Sou. Bell Tel. & Tel. Co., 228 Gabriel St., Lafayette.
WALTER P. VILLERE, C. E., R., Walter P. Villere Co., 4405 River Road, New Orleans 21.
BAILEY C. VINCENT, C. E., R., La. Dept. of Highways, 1114 Bank St., Lake Charles.
CLAUDE A. VINCENT, JR., M. E., R., Cities Service Refining Corp., 533 W. Lincoln St., Sulphur.
RODNEY M. VINCENT, C. E., R., Calcasieu Parish Hwy. Dept., 700 Ninth St., Lake Charles.
WALTER C. VINCENT, C. E., La. Dept. of Highways, P. O. Box 595, Lafayette.
PERCY B. VINET, JR., (J), E. E., R., Copolymer Rubber & Chem. Corp., 6324 Celia Ave., Route 5, Baton Rouge.
LUCIEN J. VIRGILLO, JR., (J), E. E., R., Esso Standard Oil Co., 709 Aster St., Baton Rouge 2.
L. T. VIVIEN, JR., M. E., E. E., R., Bryant, Leaumont Co., 1568 Pleasure St., New Orleans 22.
DANIEL H. VLIET, E. E., R., Tulane University, 2924 Harvey St., Apt. 2F, Madison, Wis.
CHRISTIAN M. VOELKEL, JR., (J), M. E., R., Dixie Machine Welding & Metal Works, Inc., 1255 Mirabeau Ave., New Orleans 22.
JOHN F. VOGT, JR., E. E., N. O. Public Service Inc., 3816 Jena St., New Orleans 15.

ALVIN C. VOLK, C. E., R., Consulting Civil Engineer, 109 W. Jefferson Ave., Bastrop.
HUBERT A. VONDERSTEIN, (Jr. Member), Graduate of S. L. I., Rt. 1, Box 22, Gueydan.
DAVID R. VONDY, M. E., R., La., Okla., Continental Oil Co., 120 Oliver St., New Orleans 14.
LOUIS J. VOORHIES, JR., Address Unknown.
ALVIN A. VOSS, (L. M.), C. E., R., U. S. Naval Air Station, 3825 North 10th Ave., Pensacola, Fla.

W

GEO. D. WADDILL, (L. M.), C. E., R., Retired, 7433 Maple St., New Orleans 18.
B. H. WADE, C. E., R., La., Miss., La. Dept. of Highways, Box 307, Jennings.
RICHARD E. WAGNER, C. E., R., Steward & Skinner, 7165 S. W. 66th St., Miami 43, Fla.
FRANK H. WALK, M. E., C. E., R., Truman B. Wayne & Associates, 1543 Henry Clay Ave., New Orleans 15.
ARTHUR L. WALKER, C. E., R., Tidewater Dredging Corp., 1400 Colapissa St., Metairie.
I. D. WALKER, (L. M.), C. E., R., Lang Co., 549 East Beach, Pass Christian, Miss.
CHAS. W. WALL, SR., M. E., Esso Standard Oil Co., 1609 Moreland Ave., Baton Rouge.
ARCH L. WALLACE, E. E., N. O. Public Service Inc., 527 Magnolia St., New Orleans 12.
JOHN E. WALLACE, Field E., Gaylord Container Corp., 742 Tampa St., Bogalusa.
DR. WAYNE P. WALLACE, C. E., R., Southwestern La. Institute, Box 803, S. L. I., Lafayette.
THEODORE F. WALLANDER, C. E., Bedell & Nelson Engineers, Inc., 103 Narcissus St., Metairie.
STEPHEN J. WALLBILLICH, (L. M.), C. E., R., U. S. Army Engineer Dist. N. O., 4014 Vincennes Place, New Orleans 25.
J. GORDON WALLIS, (A), Sou. Coating & Chem. Co., 936 Jefferson Ave., New Orleans 15.
STANLEY A. WALSH, Cuban American Nickel Co., 68 Thornton Dr., Chalmette.
C. PERCY WALTERS, Operating E., Gulf States Utilities Co., 4333 Broussard St., Baton Rouge 12.
F. C. WALTERS, (A), Marine E., Esso Standard Oil Co., 1047 Westmoreland Drive, Baton Rouge.
GEO. B. WALTHER, JR., M. E., E. E., Agri. E., Cities Service Refining Corp., 636 W. Prien Lake Road, Lake Charles.
JACK B. WALTRIP, (J), Ind. E., Gulf States Utilities Co., Box 2431, Baton Rouge.
PAUL WAMSLEY, Met. E., Esso Standard Oil Co., 1266 Stephens Ave., Baton Rouge.
PHILIP W. WANG, C. E., Bernard & Burke, Bueche.
DARRELL E. WARD, M. E., R., Esso Standard Oil Co., 5238 Woodside Dr., Baton Rouge.
FRED E. WATKINS, (Jr. Member), Graduate of S. L. I., 1403 Ave H., Bogalusa.
RICHARD R. L. WARD, M. E., R., Cit-Con Oil Corp., P. O. Box 1578, Lake Charles.
WALTER S. WARE, (A), M. E., Negley Bag & Paper Co., 206 Lincoln St., West Monroe.
F. J. WARREN, JR., E. E., R., Line Material Industries, 1216 Mudd Ave., Lafayette.
JAMES S. WARREN, E. E., R., Southern Bell Tel. & Tel. Co., 711 Second St., Gretna.
DAVID A. WARRINER, M. E., E. E., R., D. A. Warriner Instrument Sales & Service, 7920 Zimple St., New Orleans 18.
ROBT. A. WARRINER II, (J), M. E., R., D. A. Warriner Instrument Sales & Service, 232 Sena Drive, Metairie.
SAMUEL R. WARRINER, JR., M. E., R., Walter Cooke, 2757 Pinedale St., Jackson, Miss.
JOS. H. WATERFIELD, Corrosion E., United Gas Corp., Lake Charles.
ALEX F. WATKINS, C. E., R., La. Dept. of Highways, 445 Court St., Opelousas.
L. T. WATKINS, C. E., R., Tex., Texas Highway Dept., P. O. Box 836, Conroe, Texas.
JESSE C. WATSON, C. E., R., La. Dept. of Highways, P. O. Box 1482, Lake Charles.
MAX P. WATSON, M. E., E. E., P. E., R., United Gas Pipe Line Co., Box 1407, Shreveport.
CALVIN T. WATTS, C. E., R., La. State Dept. of Public Works, 506 Centenary Drive, Baton Rouge.
CHAS. H. WEATHERLY, M. E., R., Bedell & Nelson Engineers, Inc., 1635 Sixth St., Apt. 1, New Orleans 15.
PAUL E. WEAVER, M. E., R., Dow Chemical Co., 4025 Brady St., Baton Rouge.
GEO. W. WEBB, E. E., R., 342 Celeste Ave., New Orleans 23.
JOHN H. F. WEBERT, Draftsman, Jones & Laughlin Steel Corp., 4115 Clermont Drive, New Orleans 22.
JOS. G. WEDDINGTON, E. E., Sou. Bell Tel. & Tel. Co., 804 Wilson Dr., New Orleans.
GORDON L. WEDEMEYER, U. S. Air Force, 1614 Kayouche, Lake Charles.
IRWIN C. WEIDIG, E. E., R., La. Power & Light Co., 4317 Orleans Ave., New Orleans.
WM. D. WEIDNER, C. E., R., La., Miss., Ark., Tenn., The Texas Co., P. O. Box 89, New Orleans.
LEO S. WEIL, (L. M.), M. E., R., Leo S. Weil & Walter B. Moses, 801 Audubon Bldg., New Orleans 16.
BILLY A. WEISFELD, E. E., R., U. S. Navy, Dist. Public Works Office, 102 Livingston Place, Metairie.
W. B. WELBORN, JR., C. E., R., La. Dept of Highways, 139 South St. Louis St., Lafayette.
FRED E. WELCH, Maintenance E., La. Dept. of Highways, Mill St., Rt. 1, Box 182, Natchitoches.
JOSEPH D. WELDON, M. E., R., The Dow Chemical Co., Route 2, Port Allen.
EDWARD J. WELSCH, C. E., R., E. J. Welsch & Co., Inc., 1036 Nat'l Bank of Commerce Bldg., New Orleans 12.
LESTER E. WENK, E. E., R., Wenk Elec. Service, 737 Neal Drive, Shreveport.
NORMAN D. WESLEY, (J), E. E., R., McCaa Electric, Inc., 1925 North 17th St., Baton Rouge.
CHARLES R. WESTERCHIL, C. E., R., Gravier & Harper Contractors, 3505 Prescott Rd., Alexandria.
W. VALDEMAR WESTH, M. E., Gulf States Utilities, 5965 Government St., Baton Rouge.

CLARENCE A. WETHERN, JR., (J), C. E., R., David W. Godat & Associates, 2621 Ursuline Ave., New Orleans 19.
JOHN R. WHIPPLE, E. E., R., La., Ohio., Miss., Whipple & Mayers, 1370 Stephens Ave., Baton Rouge.
WM. WHIPPLE, M. E., L. S. U., Box 8524, University Station, Baton Rouge.
WILL A. WHITAKER, M. E., E. E., R., Esso Standard Oil Co., 1167 Main St., Baton Rouge 2.
BILLY J. WHITE, C. E., R., Dow Chemical Co., 3467 Eleanor Dr., Baton Rouge.
JACK W. WHITE, JR., (J), Industrial E., Esso Standard Oil Co., 9525 Southmoor Dr., Baton Rouge.
COL. J. LESTER WHITE, C. E., R., City of Baton Rouge, Parish of E, 101 St. Ferdinand St., Box 246, Baton Rouge.
JOHN S. WHITE, JR., (J), E. E., R., Esso Standard Oil Co., 372 Summit Ridge Drive, Baton Rouge.
CO. D. WHITE, C. E., R., La. Dept. of Highways, Box 37, Marrero.
WM. H. WHITE, C. E., R., Ole K. Olsen Co., 202 Brunswick Court, New Orleans 14.
CARL B. WHYTE, E. E., R., Procon Incorporated, 1111 Mt. Prospect Rd., Des Plaines, Ill.
CARL B. WHYTE, JR., (J), M. E., Ingram Oil & Refining Co., 2101 Timoleon St., New Orleans 22.
CHAS. Q. WIGGINS, JR., E. E., R., Tex., Cutler-Hammer, 178 Windover Cove, Memphis, Tenn.
MAJOR RUSSELL A. WILDEY, (A), U. S. Army, P. O. Box 1352, Alexandria.
CLAUDE D. WILKERSON, M. E., Address Unknown.
RICHARD K. WILKERSON, Gulf States Utilities Co., 285 E. Circuit Drive, Beaumont, Texas.
JOHN D. WILKINSON, (A), P. O. Box 920, Shreveport.
ROGER C. WILKINSON, (A), McLemore & Atchley, 506 First Nat'l Bank Bldg., Shreveport.
L. V. WILLEY, C. E.,R., La. Dept. of Highways, 430 Centenary Drive, Baton Rouge 2.
AARON D. WILLIAMS, C. E., R., Columbian Carbon Co., Box 1562, Monroe.
GERALD C. WILLIAMS, M. E., R., La., Tex., Esso Standard Oil Co., 1882 Cedardale Ave., Baton Rouge.
1st LT. MADISON J. WILLIAMS, JR., (J), C. E., U. S. Air Force, A03054056 – 51st Bomb Sqd. AFB, Lake Charles.
R. L. WILLIAMS, M. E., R., Freeport Sulphur, Box 126, Port Sulphur.
ROBERT M. WILLIAMS, C. E., R., W. Horace Williams Co., 833 Howard Avenue, New Orleans.
ROBERT O. WILLIAMS, E. E., R., Southern Bell Tel. & Tel. Co., 3121 Nashville Ave., New Orleans.
ROBT. W. WILLIAMS, Ch. E., Esso Standard Oil Co., Route 3, Box 658, Perkins Road, Baton Rouge.
W. HORACE WILLIAMS, JR., C. E., W. Horace Williams Co., 833 Howard Ave., New Orleans 12.
WALTER L. WILLIAMS, Industrial E., Olin Mathieson Chem. Corp., 1005 Roselawn St., Monroe.
WAYNE E. WILLIAMS, M. E., R., Betz Engineering Sales Co., 1213 Haring Road, Metairie.
C. S. WILLIAMSON, JR., (L. M.), Ch. E., R., Consulting Engineer, 1739 Marengo St., New Orleans 15.
GEO. F. WILLIAMSON, C. E., R., Palmer & Baker Engineers, Inc., P. O. Box 10096, New Orleans 21.
R. B. WILLIAMSON, E. E., R., Williamson Sales Co., P. O. Box 1223, Shreveport.
JAMES H. WILSON, Ingersoll-Rand Co., Box 13134, New Orleans 25.
J. NORMAN WILSON, (L. M.), M. E., Sewerage & Water Board of New Orleans, 2425 Audubon St., New Orleans 18.
TROY L. WILSON, JR., C. E., R., Esso Standard Oil Co., 9163 S. River Oaks Drive, Baton Rouge 6.
W. W. WILSON, C. E., United Gas Pipe Line Co., Box 1407, Shreveport.
A. R. WINGATE, JR., (L. M.), C. E., Jones & Laughlin Steel Corp., P. O. Box 66, New Orleans 6.
JOHN D. WINK, JR., (J), M. E., R., Columbian Carbon Co., 1712 Spencer St., Monroe.
DANIEL L. WINTERS, (A), Ch. E., Central La. Electrical Co., Inc., 155 Duperier Ave., New Iberia.
WILLIAM A. WINTZ, JR., C. E., R., College of Engineering, L. S. U., Baton Rouge 3.
BERNARD P. WOLFE, (A), Frank P. Fischer Engineering Co., 2607 Williams Blvd., Kenner.
BURRIS D. WOOD, C. E., R., La. Dept. of Public Works, 2435 Cottonwood Ave., Baton Rouge.
CARROLL L. WOOD, JR., C. E., R., Perrilliat-Rickey Const. Co., Inc., 552 Walnut St., New Orleans.
JOHN W. WOOD, M. E., Cities Service Refining Corp., 102 Madison St., Maplewood.
CHAS. S. WOODRUFF, M. E., E. E., R., Ogden & Woodruff, Consulting Engineers, 1645 Nicholson Drive, Baton Rouge.
D. F. WOODS, (L. M.), C. E., R., Lutcher.
THOS. A. WOODWARD, E. E., R., Central La. Elec. Co., Inc., 114 Gibbs St., Mansfield.
JOHN K. WOOLF, C. E., R., Ala., Tex., Retired, Magnolia Springs, Ala.
GORDON B. WOOSTER, C. E., M. E., R., Cities Service Ref. Co., Lake Charles.
CARROLL J. WYBLE, (Jr. Member), Graduate of S. L. I., Route 3, Box 536, Opelousas.
FRANCIS H. WYBLE, (J), C. E., R., La. Dept. of Highways, Route 1, Box 4, Arnaudville.
CHAS. J. WYLER, (L. M.), M. E., R., Retired, 2235 Magazine St., New Orleans 13.

Y

ALBERTA M. YOUNG, Pet. E., R., Private practice, 904 National Bank of Commerce Bldg., New Orleans 12.
GRAYSON S. YOUNG, Ch. E., Esso Standard Oil Co., 725 Parlange Drive, Baton Rouge.
LOVETT YOUNG, Chemist, Gulf States Utilities Co., 9192 Wynnewood St., Baton Rouge.
MARION E. YOUNGS, M. E., Byron Jackson Div. Borg, Warner Corp., Suite 315, 2025 Canal St., New Orleans 16.

Z

MARIO G. ZERVIGON, E. E., R., Mario Zervigon & Associates, 236 Burgundy St., New Orleans 16.

JOHN R. ZIERCHER, (J), C. E., R., Esso Standard Oil Co., 2961 Greenwood Drive, Baton Rouge.
ROBT. W. ZIIFLE, N. O. Public Service Inc., 715 Pelican Ave., New Orleans 14.
THOS. H. ZUMWALT, C. E., R., La. Tex., Freeport Sulphur Co., 161 Beverly Drive, Metairie.
FREDERICK W. ZUR BURG, Ch. E., R., Southwestern Louisiana Institute, Box 124, S. L. I., Lafayette.

Past Presidents

°Sidney F. Lewis	1898	°John L. Porter	1928
°Thos. L. Raymond	1899	Frederick H. Fox	1929
°Henry J. Malochee	1900	James M. Todd	1930
°Frank M. Kerr	1901	°Frank G. Frost	1931
°Alf. F. Theard	1902	Frederick N. Billingsley	1932
°Alf. Raymond	1903	John H. O'Neill	1933
°J. F. Coleman	1904	A. L. Dunlap	1934
°W. B. Wright	1905	Edward S. Bres	1935
°W. H. Hoffman	1906	°Allen S. Hacket	1936
°G. W. Lawes	1907	C. S. Williamson	1937
°C. W. Wood	1908	°Bernard H. Grehan	1938
°J. T. Eastwood	1909	David W. Godat	1939
°W. B. Gregory	1910	William H. Rhodes	1940
°J. C. Haugh	1911	°David W. Stewart	1941
°D. S. Anderson	1912	C. Glenn Cappel	1942
°A. M. Shaw	1913	Karl P. Kammer	1943
°W. H. Williams	1914	Charles M. Kerr	1944
°L. C. Datz	1915	Reinhard A. Steinmayer	1945
°Samuel M. Young	1916	Leo Jos. Lassalle	1946
A. T. Dusenbury	1917	Clayton L. Nairne	1947
°John Klorer	1918	W. Stone Leake	1948
Ole K. Olsen	1919	Herman L. Lehmann	1949
John Riess	1920	Lionel J. Cucullu	1950
R. S. Manley	1921	Harry P. Newton	1951
Donald Derickson	1922	°John A. McNiven	1952
°J. S. Bareli	1923	Michael C. Abrahm	1953
James M. Robert	1924	Frank W. Macdonald	1954
Marcel Garsaud	1925	R. Mallard Seago	1955
°Farrar P. Hamilton	1926	Wayne P. Wallace	1956
°Edward S. Lanphier	1927	Waldemar S. Nelson	1957

° Deceased

Student Members

DOUGLAS A. BERNARD, 121 Washington St., St. Martinville.
LOUTO BRAQUET, JR., Route 1. Box 152-L, New Iberia.
ELTON BULLOCK, JR., 221 Pollard Ave., New Iberia.
GUY C. CAMBRE, JR., Laplace.
JOSEPH R. DEMARCO, P. O. Box 126, Reserve.
WILSON R. DIETZ, Box 59, Evangeline.
FRANK DIMMICK. Route 1, Opelousas.
GERALD A. DUBROU, 327½ Elizabeth, Lafayette.
JAMES FAULK, Box 401-D., Abbeville.
MERRICK FONTENOT, 357 W. Bertheaud, Opelousas.
S. L. GELPI, 5765 Wildair Drive, New Orleans.
CARL GRANT, General Delivery, S. L. I., Lafayette.
KIRBY GUIDRY, 108 Columbus St., St. Martinville.
DOLE GUILBEAUX, General Delivery, S. L. I., Lafayette.
JOHN J. HAYDEL, 125 W. Fosh, Lafayette.
ROLAND R. HAYDEL, Main St., Jeanerette.
WARREN HEBERT, 400 S. Guegnon, Abbeville.
JAY HONEYCUTT, 117 Reagan St., Pineville.
THOMAS JOHNSON, 420 St. Joseph St., Lafayette.
RAMIE J. KIELBERT, Welcome.
MURPHY LANDRY, 102 S. College Road, Lafayette.
BERNARD MARCANTEL, Route 1, Box 179, Oakdale.
EDWIN A. McCLANAHAN, Box 339, S. L. I., Lafayette.
CALVIN PERRY, Route 2, Pollock.
WAYNE J. PLAISANCE, 500 Harding St., Lafayette.
JAMES POUSSAN, Box J, Egan.
JAMES ROBERTS, S. Henry, Box 343. Abbeville.
EARL ROMERO. Box 186, St. Bernard P. O.
WILLIAM E. WATKINS, 1403 Ave H., Bogalusa.

THE LOUISIANA ENGINEER

AUGUST 1958

"Patronize Our Advertisers"

INDEX TO ADVERTISERS

This Journal reaches the officials with whom rests the responsibility for the bulk of the municipal, state and industrial works in Louisiana and the surrounding territory. Its advertising pages afford you an effective and dignified means of cultivating a wider acquaintance among prospective buyers.

THE LOUISIANA ENGINEER

Vol. 44 OCTOBER, 1958 No. 5

CONTENTS

EDITOR: Chester A. Peyronnin, Jr.

Tulane University Station, New Orleans, La.

PUBLISHER: Cypress Publishing Company

724 Girod Street, New Orleans, La.

THE LOUISIANA ENGINEER is the official publication of the Louisiana Engineering Society and is published in February, April, June, August, October, and December. Subscription, $3.00 per annum; single copy, 50 cents.

Second Class mail privileges authorized at New Orleans, Louisiana. Acceptance for mailing at special rate of postage provided for in Section 1105, Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

404 Baronne St.

OFFICERS OF THE SOCIETY

ERNEST M. FREEMAN, *President*, 1103 Henry C. Beck Building, Shreveport

ROY T. SESSUMS, *First Vice-President*, P. O. Box 1520, New Orleans 5

EDWARD A. McLELLAN, *Second Vice-President*, P. O. Box 238, New Orleans 3

JOHN P. FERNANDEZ, *Secretary-Treasurer*, 522 Crystal Street, New Orleans 24

BOARD OF DIRECTION OF THE SOCIETY

BEN T. BOGARD, 36 University Drive, Ruston

JAMES S. JANSSEN, 317 Baronne Street, New Orleans 9

WALDEMAR S. NELSON, 1200 St. Charles Avenue, New Orleans 13

WALTER H. SCALES, 1822 Valence Street, New Orleans 15

FRANCIS M. TAYLOR, Tulane University, P. O. Station 20, New Orleans

OFFICERS OF STATE SECTIONS

Alexandria Section:

ANDREW M. MOORE, *President*, 1423 Donahue Ferry Road, Pineville

DALLAS C. ROBERTS, *Secretary-Treasurer*, 825 Murray Street, Alexandria

Baton Rouge Section:

WALTER L. SUTTON, *President*, 9653 Molly Lea Drive, Baton Rouge

HAROLD F. LEIENDECKER, *Secretary-Treasurer*, 657 Carol Marie Drive, Baton Rouge

Lafayette Section:

EMERY DOMINGUE, *President*, P. O. Box 485, S.L.I., Lafayette

WALTER C. VINCENT, *Secretary-Treasurer*, P. O. Box 595, Lafayette

Lake Charles Section:

GLENDON L. SMITH, *President*, 39 Horseshoe Lane, Maplewood

MARION D. GARRISON, *Secretary-Treasurer*, 1709 Kirkman Street, Lake Charles

Monroe Section:

FARRELL W. ADAMS, *President*, Box 2867, Monroe

DAN D. McDUFF, *Secretary-Treasurer*, 602 Balboa Sereet, Monroe

Shreveport Section:

JOHN S. MALAHY, JR., *President*, 330 E. Kings Highway, Shreveport

ORVILLE T. ICE, JR., *Secretary-Treasurer*, 522 Egan Street, Shreveport

STUDENT CHAPTER NO. 1 SOUTHWESTERN LOUISIANA INSTITUTE

CHARLES R. BAKER, *President*, Box 119, S.L.I., Lafayette

JAMES M. McCLANAHAN, *Secretary*, Gen. Delivery, S.L.I., Lafayette

The Relative Economics of Coal and Natural Gas in the Baton Rouge Area

Jack S. Burk, President
and
Henry C. Owen, Jr., Public Utilities Engineer

BARNARD AND BURK, INC.
CONSULTING ENGINEERS

I - Introduction

At the present time, natural gas is the predominant fuel used by industrial plants in Louisiana. The use of coal is negligible, because the price of natural gas has been for many years much cheaper than the total cost of coal "at the burner," including the costs of coal unloading, storage, conveying, pulverizing (where required), ash-removal, etc. However, in the last few years, the price of natural gas has increased rapidly, and this trend is expected to continue in the future. Because of this factor, the relative economics of coal and natural gas as fuel for future industrial plants in Louisiana is being given special study, especially in relation to plants to be located on navigable water.

Various Louisiana electric utility companies are investigating the use of coal at large power plants planned to be built in the near future; and some have already installed boilers which may be converted from natural gas to coal with a minimum of additional investment and a minimum of "down-time." Some chemical plants in the Baton Rouge area have also installed boilers of this type. Provision has been made in these cases for the larger plant area required for coal storage.

This paper will present an analysis of the more important economic factors pertaining to the possible future use of coal by industrial plants in Louisiana, particularly in the Baton Rouge area. This study includes an estimate of the trend of natural gas and coal prices for the next 10 years and also a comparsion of the investment and operating costs applying to natural gas and coal as boiler fuels.

II - Estimated Future Cost of Natural Gas for Industrial Consumption in the Baton Rouge Area

An industrial plant locating in Louisiana must usually purchase its natural gas requirements from a natural gas transmission company. One significant exception was the recent purchase of large natural gas reserves by a subsidiary of The Dow Chemical Company to provide future supplies for the new chemical plant at Plaquemine, La. However, the large investment required usually prevents an industrial plant from providing its own gas reserves and transmission facilities.

Contracts under which a natural gas transmission company sells natural gas to an industrial plant in Louisiana generally provide for long-term sales for a term of 15 to 20 years. Most of these contracts include a charge for the average cost of gas at the wellhead, plus a transportation charge; and usually both of these charges are subject to escalation. In practically every case, any change in the average cost of gas at the wellhead is immediately passed on to the consumer. The transportation charge, in many cases, is fixed for a number of years and then is subject to renegotiation.

(This paper was delivered before the local ASME section in May 1958)

It should be particularly pointed out that these contracts usually provide that all increases in taxes which are applicable to the operation of the transmission company will be passed on to the consumer. At the present time, the State of Louisiana levies a Gas Gathering Tax of one cent per thousand cubic feet (MCF) and a Severance Tax of 0.8 cents per MCF. If these taxes are increased in the future, industrial plants in Louisiana will be required to pay the increase. The estimates of future prices of natural gas in this paper assume taxes remaining constant at present levels.

Contracts for direct industrial sales by a natural gas transmission company are generally not subject to the jurisdiction of any state or federal agency. The rates, terms, and conditions of these contracts are determined solely by negotiation between the two parties involved.

Some of the principal factors influencing the cost of transportation to an industrial plant are as follows:

1. Location and accessibility of adequate reserves.
2. Adequacy of present pipeline capacity to provide for the proposed sales.
3. The cost of any new additional transmission and gathering facilities required.
4. Compression, purification and other operating and maintenance costs chargeable to the proposed sales.

It may be necessary for the transmission company to purchase additional gas reserves for the proposed sales. It is in the purchasing of these reserves that the law of supply and demand enters the picture very strongly.

Chart 1 sets forth the recoverable natural gas reserves, the estimated number of years of natural gas production, and net interstate deliveries of natural gas for Louisiana; and also the recoverable reserves and number of years production for the United States. The figures for Louisiana are also set forth in Chart No. 2. The recoverable reserves in Louisiana increased steadily from 1945 to 1957. In 1957 these reserves were 51,436 billion cubic feet, and represented 23.3 years of natural gas supply at the current production rate. The reserves in 1957 were 2.2 times as great as in 1947.

CHART NO. 1

ESTIMATED RECOVERABLE RESERVES OF NATURAL GAS AND NATURAL GAS PRODUCTION AND CONSUMPTION IN THE UNITED STATES

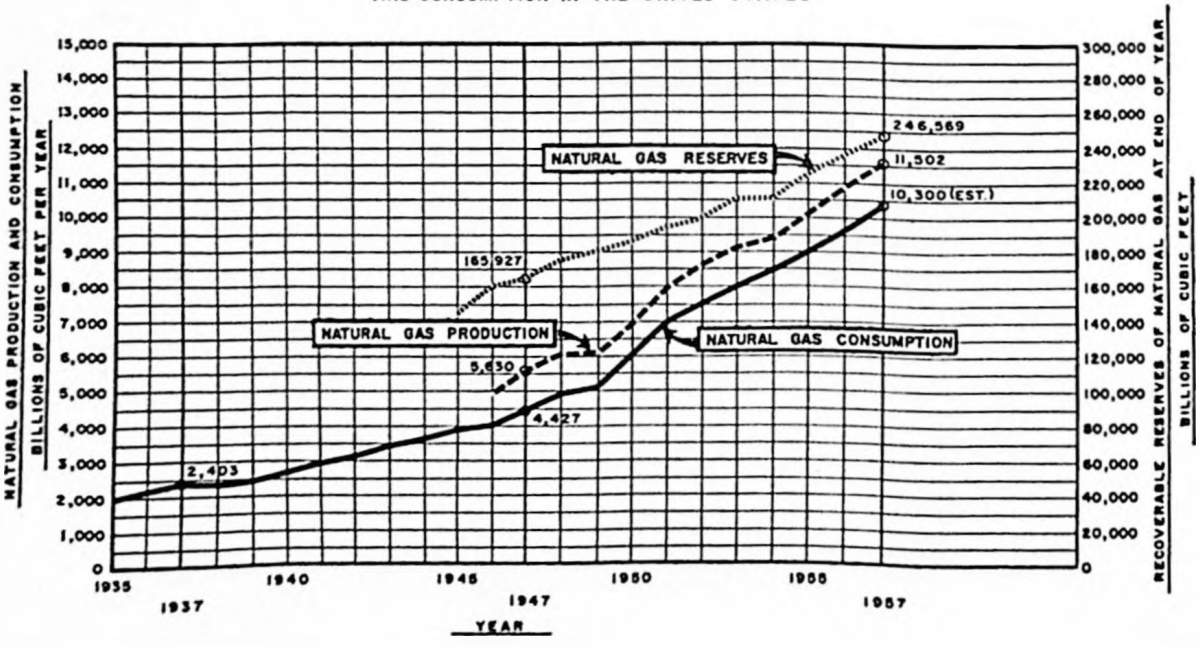
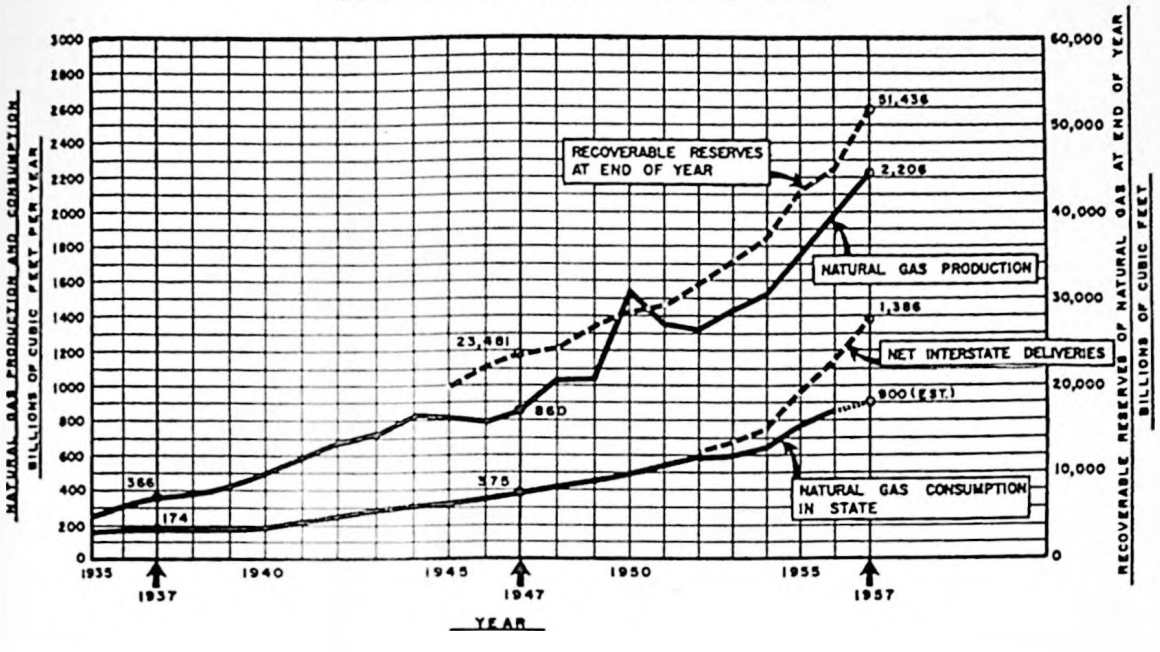


CHART NO. 2

ESTIMATED RECOVERABLE RESERVES OF NATURAL GAS AND NATURAL GAS PRODUCTION AND CONSUMPTION IN THE STATE OF LOUISIANA



Natural gas consumption in the State of Louisiana rose from 375 billion cubic feet in 1947 to 839 billion cubic feet in 1956. It is estimated that the 1957 consumption was approximately 900 billion cubic feet, which is 2.4 times the 1947 consumption.

The available figures on net interstate deliveries, which represent the excess of gas exported from Louisiana over gas imported into Louisiana by interstate pipeline companies, show a sharp increase from 1954 to 1957. In 1957 the net interstate deliveries were approximately 62.8% of the total natural gas production in Louisiana. Thus, it can be seen that the demand for gas for interstate sales is a major factor affecting the price of gas at the wellhead.

New interstate pipeline companies going into operation during the past five years have greatly affected the cost of gas at the wellhead because it was necessary for them to purchase large gas reserves, amounting to approximately 20 years supply, in order to satisfy Federal Power Commission requirements for certification. Also, all interstate natural gas transmission companies have been experiencing large increases in their natural gas sales. The resulting increases in net interstate deliveries (from 622 billion in 1952 to 1,386 billion in 1957) helped supply the expanding requirements of Northern, Eastern and Southeastern states.

Natural gas consumption in the United States has more than doubled in the last 10 years. The total natural gas production in the United States has also doubled in that period. Louisiana produced 19.2% of the total United States production in 1957. The total recoverable natural gas reserves in the United States at the end of 1957 represented 21.4 years of natural gas supply at the 1957 production rate. These figures may also be seen in Chart No. 2.

Natural gas reserves in Canada and Mexico may be considered as supplementing the natural gas requirements of the United States, since gas is now being imported from both of these countries. At the end of 1957, Canada had approximately 20,742 billion cubic feet of natural gas reserves and annual production was only 277 billion cubic feet.

CHART NO. 3

ESTIMATED AVERAGE PRICE OF NATURAL GAS AT THE WELLHEAD AND FOR INDUSTRIAL PLANTS IN THE STATE OF LOUISIANA

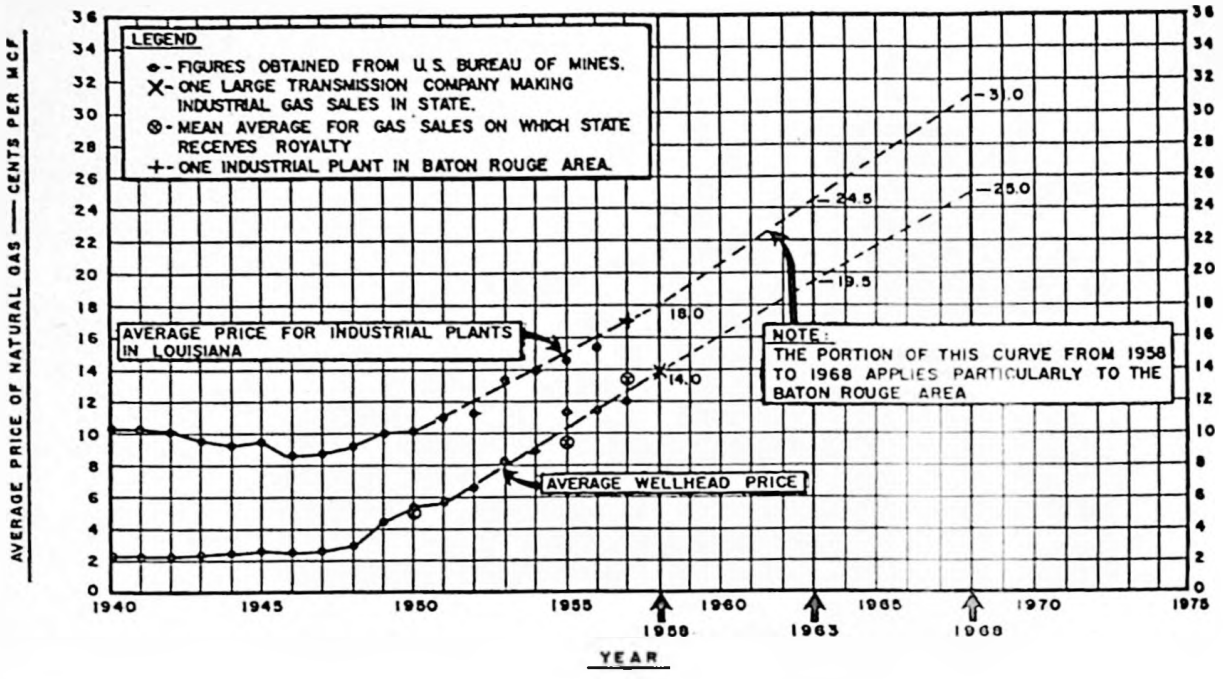


Chart No. 3 shows figures obtained from the U. S. Bureau of Mines for the average price of natural gas at the wellhead in Louisiana, from 1940 through 1957. These show that the price of gas at the wellhead remained almost constant until about 1949. Since then, the average price has increased rather sharply. The average price of natural gas at the wellhead in Louisiana was 3.6¢ per MCF in 1947 and 12.0¢ per MCF in 1957, as estimated by the U. S. Bureau of Mines.

In an effort to check these figures, we have examined the reports submitted to the Louisiana Department of Conservation by all producers of natural gas who paid a royalty to the State for the following four years: 1940, 1950, 1955 and 1957. (These years were selected only as "check" years.) The four annual average prices obtained from this study are shown on Chart No. 3. It can be seen that these four points correspond reasonably well with the curve of the points obtained from the U. S. Bureau of Mines.

We also learned that one large transmission company, which serves many industrial plants in the State, had an average price of natural gas at the wellhead, in the early part of 1958, of approximately 14 cents per MCF. This point agrees very well with the points obtained from the U. S. Bureau of Mines and the figures obtained from the Department of Conservation.

A straight line, drawn between the points for 1951 and 1958, fits the various points reasonably well, and has an average increase of 1.17¢ per MCF per year. In projecting the trend from 1958 to 1968, a straight line is drawn having an average increase of 1.1¢ per MCF per year, so that the average price at the wellhead in 1963 is estimated to be 19.5¢ per MCF and in 1968, 25.0¢ per MCF.

It should be pointed out that many factors will affect the actual price at the wellhead in the future, including the extent to which producers of natural gas will withhold their reserves from interstate markets in order to avoid control over wellhead prices by the Federal Power Commission.

At this point attention is called to Table No. 1 which sets forth the initial price of proposed natural gas sales to interstate gas pipeline companies, as filed by independent producers with the Federal Power Commission from September 30, 1957,

Recent Initial Rate Filings With the Federal Power Commission
Made by Independent Producers

Seller	Buyer	Filing Date	Production Area	Initial Price— Cents Per MCF
Pan American Petroleum	Texas Eastern Transmission Corp.	9/30/57	Bethany-Longstreet	13.8456
Phillips Petroleum	Southern Natural Gas Company	10/ 8/57	Bastian Bay	20.25
Shell Oil Company	United Gas Pipe Line Company	10/25/57	Jennings	6.0
Midstates Oil	Texas Gas Gath.	11/ 6/57	Lake St. John	12.0
Humble Oil & Refinery Co.	Texas Gas Transmission Corp.	12/30/57	East Lake Palourde	20.0
Pioneer Oil & Gas Company	United Gas Pipe Line Company	1/30/58	Napoleonville	18.5
Union Producing Company	United Gas Pipe Line Company	3/ 3/58	Deer Island	20.0
Sohio Petroleum Company	United Gas Pipe Line Company	3/ 5/58	South Lewisburg	19.5
Humble Oil & Refinery Co.	Transcontinental Gas Pipe Line Corp.	3/ 6/58	Lake des Allemands	22.8
Rimrock Tidelands, Inc.	United Gas Pipe Line Company	3/24/58	Gibson	18.5
AVERAGE PRICE				17.98

(Editor's Note — Original paper had 46 Sellers listed. For publication we have reduced this to 10 as examples, therefore the average price will not check out from the above figures.)

TABLE NO. 2

Recent Rate Increase Filings with the Federal Power Commission Made by Independent Producers

Seller	Buyer	Filing Date	Production Area	Current Price c Per MCF	Proposed Price c Per MCF
Humble Oil & Refinery Co.	United Gas Pipe Line Company	10/ 3/57	Duck Lake	21.4	21.6
R. H. Goodrich	United Gas Pipe Line Company	10/ 7/57	Duck Lake	20.4	20.6
Ohio Oil Company	Arkansas-Louisiana Gas Company	10/28/57	Jefferson Rodessa	6.579	7.456
Midstates Oil Company	Louisiana Nevada Transit Co.	10/30/57	Cotton Valley	8.62067	11.29484
Union Producing Company	United Gas Pipe Line Company	12/ 2/57	Bourg	9.0	18.5
R. Lacy, Incorporated	Mississippi River Fuel	12/30/57	Woodlawn	13.0	14.1344
N. L. Adams, Sr., & Jr.	Arkansas-Louisiana Gas Company	1/10/58	Rodessa-Louisiana	6.25	10.0
Crescent Producing Co., Inc.	Arkansas-Louisiana Gas Company	3/21/58	North Ruston	13.75	14.25
Harway Producers	Arkansas-Louisiana Gas Company	3/21/58	North Ruston	13.75	14.25
Atlantic Refining	Arkansas-Louisiana Gas Company	3/21/58	North Ruston	12.370	12.820
AVERAGE PRICE				12.77	14.32
AVERAGE INCREASE					1.55

(Editor's Note — Original paper had 42 Sellers listed. For publication we have reduced this to 10 as examples, therefore the average will not check out from the above figures.)

through March 24, 1958. The prices in this Table vary from 6.0¢ to 22.8¢ per MCF and average 17.98¢ per MCF. The reason for the difference in these prices is the size of the reserve committed to the pipeline company: the larger the gas reserves, the higher the price in general. It will be noticed in Chart No. 3 that this average price of 17.98¢ is about 4¢ per MCF higher than the present estimated average wellhead price of 14¢ and that the highest price of 22.8¢ is about 9¢ per MCF higher than the present estimated wellhead price.

Table No. 2 sets forth information on recent rate-increase filings with the Federal Power Commission as made by independent natural gas producers in Louisiana from September 30, 1957 to March 24, 1958. In this table, information on the current price and the proposed price is given for each contract. The average current price was 12.77¢ per MCF, and the average proposed price was 14.32¢ per MCF, which amounts to an average increase of 1.55¢ per MCF. Most of these increases result from the fact that contracts for sale of natural gas by independent producers to natural gas transmission companies usually contain provisions for periodic price increases in future years. The Federal Power Commission has recently been granted jurisdiction over these prices; and it has, in practically every case, allowed such price increases to take effect. In the past, there was another type of price escalation resulting from the so-called "favored-nations" clause, under which a Purchaser would be required to pay the highest price established in the field from which it was purchasing gas. However, this type of price escalation is rapidly disappearing as contracts are being renegotiated and this type of clause eliminated. At the present time, one large transmission company in Louisiana reports that none of its contracts for purchase of gas at the wellhead contains such a clause.

These two factors, (1) the increase in the cost of new gas reserves over the present average wellhead price, and (2) the increase in the cost of gas under contract due to price escalation clauses (or due to renegotiation at the expiration of contracts) are expected to continue to increase the average wellhead price over the next 10 years, especially since much of the gas being sold in Louisiana is underpriced in relation to most of the prices of new gas sales contracted-for. However, a new factor will begin to be felt in future years, namely, competition from coal, especially for industrial usage. This new factor may very well act to level off the price of gas at the wellhead to around 25¢ to 30¢ per MCF.

We come now to the price of the gas sold to industries in Louisiana. Chart No. 3 sets forth the average prices for industrial gas sales in Louisiana as determined by the U. S. Bureau of Mines; these prices include gas sold to petroleum refineries, natural gas pipelines and other industrial plants, but exclude sales for field operations and sales for carbon black manufacture. It will be noticed that these average prices decreased slightly from 1940 to 1947, primarily because of the increase in the average consumption per consumer. One point is shown which was obtained for 1957, of 17¢

per MCF for sales to one industry in the Baton Rouge area. (It was not possible to obtain other information on the price for industrial gas consumption in the Baton Rouge area.) A straight line is drawn in this Figure from 1951 through 1957 and 1958, having an average increase of 1¢ per MCF per year. This line corresponds well with the various points established in this area of the graph. From the graph, it can be seen that the average transportation charge in the Baton Rouge area in 1958 is approximately 4¢ per MCF, this being the difference between the upper and lower lines. The transportation charge may vary from industry to industry, depending upon various factors, principally the distance from the wellhead and the volume of the gas consumption.

The trend of average price of industrial gas has been projected from 1958 to 1968 at an average increase of 1.3¢ per MCF per year, so that the average price for industrial sales in Baton Rouge area in 1963 is estimated to be 24.5¢ per MCF and the average price in 1968 is estimated to be 31.0¢ per MCF. The average increase per year is determined as the sum of: (a) 1.1¢ per MCF (which is the estimated annual increase in the average cost of gas at the wellhead) and (b) a 5% increase in the estimated 1958 average transportation charge of 4¢ per MCF. Again the effect of competition of coal could cause this projection to flatten in the near future.

III - Estimated Future Cost of Coal for Industrial Consumption in the Baton Rouge Area

In the last few years, many studies of the future energy needs of the United States have been published. A characteristic common to each of these forecasts is the agreement that consumption of coal in the United States will increase rapidly in the next 20 years. For example, the President's Materials Policy Commission in 1952 predicted that in 1975, the production of coal in the United States would be in excess of 800 million net tons.

The annual production of coal, the value of production, the number of mines in operation, and the production capacity of the bituminous-coal and lignite mining industry from 1935 to 1956, are set forth in Table No. 3. The production of coal in 1956 was approximately 500 million tons, so that there must be a large increase in production capacity in the next 20 years in order to meet expected requirements in 1975. This table also sets forth the average value of production in dollars per ton and in cents per million BTU.

Table No. 4 sets forth the consumption of coal by consumer classes in the United States from 1935 to 1957. It will be noticed that the consumption of coal by electric utilities increased from approximately 31 million tons in 1935 to 157 million tons in 1957. During this time the consumption by the railroads decreased until now it is an insignificant portion of the total consumption. The consumption of coal by coke and steel plants varies, in general, with the industrial level, one ton of coal representing approximately one ton of steel. This table also reflects the effect of natural gas competition after 1947, not only in the total consumption but especially in the category of Retail Dealer Deliveries and Other Industrials.

Table No. 5 sets forth the recoverable reserves of coal as of January 1, 1953 (latest figures available), and the number of years of coal supply at the 1956 production rate for the United States and for Illinois, Indiana and Kentucky. For the United States, it is estimated that the coal supply will last over 1800 years at the 1956 production rate. Similar reserves, based on the 1956 production, are available in the three states mentioned.

Coal is produced and is available from many areas of the United States; but as a practical matter, deliverable coal to Baton Rouge and other industrial centers of Louisiana is confined to about three production areas at the present time: Western Kentucky, the Belleville, Illinois district (which is across the river from St. Louis), and Southern Illinois — and perhaps Indiana, in the neighborhood of Tell City or Yankeetown. The reason for this is that coal can be shipped by water from these

TABLE NO. 3

Growth of Bituminous-Coal and Lignite-Mining Industry in the United States (A)

Year	Production-Net Tons (B)	VALUE OF PRODUCTION			Number of Mines	Production Capacity At 200 Days Operation-Million Tons
		Total	Average Per Ton	Avge. Per Million BTU-Cents (C)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1935	372,373,122	$ 658,063,000	$ 1.77	6.76	6,315	582
1936	439,087,903	770,955,030	1.76	6.72	6,875	018
1937	445,531,449	864,042,000	1.94	7.40	6,548	646
1938	348,544,764	678,653,000	1.95	7.44	5,777	602
1939	394,855,325	728,348,366	1.84	7.02	5,820	621
1940	460,771,500	879,327,227	1.91	7.29	6,324	639
1941	514,149,245	1,125,362,836	2.19	8.36	6,822	666
1942	582,692,937	1,373,990,608	2.36	9.01	6,972	653
1943	590,177,069	1,584,644,477	2.69	10.3	6,620	626
1944	619,576,240	1,810,900,542	2.92	11.1	6,928	624
1945	577,617,327	1,768,204,320	3.06	11.7	7,033	620
1946	533,922,068	1,835,539,476	3.44	13.1	7,333	699
1947	630,623,722	2,622,634,946	4.16	15.9	8,700	755
1948	599,518,229	2,993,267,021	4.99	19.0	9,079	774
1949	437,868,036	2,136,870,571	4.88	18.6	8,559	781
1950	516,311,053	2,500,373,779	4.84	18.5	9,429	790
1951	533,664,732	2,626,030,137	4.92	18.8	8,009	736
1952	466,840,782	2,289,180,401	4.90	18.7	7,275	723
1953	457,290,499	2,247,828,694	4.92	18.8	6,671	670
1954	391,706,300	1,769,619,723	4.52	17.3	6,130	603
1955	462,633,408	2,092,382,737	4.50	17.2	7,856	620
1956	500,874,077	2,412,004,151	4.82	18.4	8,520	655

Note: (A) All figures except those in Column 3 are from U. S. Bureau of Mines.
(B) In 1954, the total lignite production, exclusive of Texas, was 2,877,562 tons (0.57% of total bituminous and lignite production) and had an average value of $2.39 per ton. The average value of bituminous coal is computed using these figures as $4.83 per ton ($2,405,134,778 ÷ 497,998,813 Tons).
(C) Figures in Column 5 are based on an average heating value of 26.2 million BTU per ton used by U. S. Bureau of Mines.

regions much cheaper than by rail (or water) from any other source of supply. For this reason, in Table No. 5 and in some of the subsequent tables, information on the States of Kentucky, Illinois and Indiana is emphasized.

TABLE NO. 4

Consumption of Bituminous Coal and Lignite by Consumer Classes in the United States in Thousand Net Tons (A)

Year	Electric Power Utilities (B)	Bunker Foreign Trade (E)	Railroads (Class I) (D)	Coke Plants		Steel and Rolling Mills	Cement Mills	Other Industrials	Retail Dealer Deliveries	Total of Classes Shown (E)	Exports	Imports
				Beehive	Ovens							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1935	30,936	1,576	77,109	1,469	49,046	11,747	3,516	96,937	83,990	356,326		
1936	38,104	1,622	86,391	2,658	63,244	13,471	4,771	113,792	84,200	408,293		
1937	41,045	1,832	88,080	4,927	69,575	12,853	5,247	127,142	80,076	430,777		
1938	36,440	1,352	73,921	1,360	45,266	8,412	4,483	96,527	68,520	336,281		
1939	42,304	1,477	79,072	2,298	61,216	9,808	5,274	103,279	71,570	376,098		
1940	49,126	1,426	85,130	4,833	76,583	10,040	5,633	110,463	87,700	430,910		
1941	59,888	1,643	97,384	10,529	82,609	10,902	6,832	124,868	97,460	492,115		
1942	63,472	1,585	115,410	12,876	87,974	10,434	7,570	135,979	104,750	540,050		
1943	74,036	1,647	132,283	12,441	90,019	11,238	5,851	145,518	122,764	593,797		
1944	76,656	1,559	132,049	10,858	94,438	10,734	3,789	134,610	124,906	589,599		
1945	71,603	1,785	125,120	8,135	87,214	10,084	4,215	129,626	121,805	559,567	27,956	
1946	68,743	1,381	110,166	7,167	76,121	8,603	7,009	120,610	100,586	500,386	41,209	
1947	86,009	1,689	109,296	10,475	94,325	10,048	7,938	126,948	99,163	545,891	68,667	
1948	95,620	1,057	94,838	10,322	96,984	10,046	8,554	112,741	89,747	519,909	45,930	
1949	80,610	874	68,123	5,354	85,882	7,451	7,988	98,957	90,299	445,538	27,842	
1950	88,262	717	60,969	9,088	94,757	7,698	7,943	98,164	86,604	454,202	25,466	
1951	101,868	890	54,095	11,418	102,030	7,973	8,525	105,634	76,531	468,904	36,726	
1952	103,309	723	37,962	6,912	90,702	6,820	8,073	95,863	68,393	418,757	47,643	
1953	112,283	605	27,735	8,226	104,648	6,207	8,362	97,437	61,295	426,798	33,760	
1954	115,235	427	17,370	980	84,411	4,944	8,124	78,953	52,616	363,060	31,041	1988
1955	140,550	445	15,473	2,867	104,508	5,221	8,728	91,856	53,762	423,412	51,277	337.1
1956	154,683	500	12,308	4,043	101,870	5,109	9,270	95,650	49,125	432,858	68,546	3557
1957	157,378	442	8,401	3,336	104,635	4,921	8,821	89,418	36,273	413,609	75,931	

Note: (A) All figures are from U. S. Bureau of Mines except those marked (B), (C), (D).
(B) Figures from Federal Power Commission.
(C) Figures from Bureau of Census, U. S. Department of Commerce.
(D) Figures from Association of American Railroads. The Interstate Commerce Commission reports that consumption in 1956 of Class I railways, plus Class II and Class III railways, plus purchases by all switching terminal companies was 12,920,456 tons.
(E) The Total of classes shown approximates total consumption. It is not possible to calculate consumption closely from production, imports, exports, and changes in stocks because certain significant items of stock are not included in year-end stocks.

TABLE NO. 5

Estimated Coal Reserves in the United States, and in Illinois, Indiana, and Kentucky as of January 1, 1951, and January 1, 1953 (A)

State	Recoverable Reserves of Coal as of Jan. 1, 1953 Assuming 50% Recovery—Million Short Tons	1956 Production Rate—Thousand Tons	Number of Years of Coal Supply at 1956 Production Rate
(1)	(2)	(3)	(4)
United States	949,870	500,874	1,896
Illinois	68,504	48,102	1,424
Indiana	17,607	17,089	1,030
Kentucky	59,487	74,555	798
Total for 3 States	145,598	139,746	1,042

Note: (A) Figures in Columns 2 and 3 are from U. S. Bureau of Mines.

It may seem surprising that the price of coal, f.o.b. mine, has remained relatively constant since 1948, in spite of the fact that the average hourly earnings in the coal industry have increased steadily over the past 15 years — in fact, doubling from 1946 to 1956. It has been possible to hold the price of coal at the mine practically constant by increasing the productivity, particularly through the use of machinery, especially for loading and cleaning the coal. A similar factor has been the increasing percentage of coal mined by stripping. In the last 15 years the number of men employed has decreased by 50% while the average output of coal per man per day has increased by 100%. The average output per man in 1956 was 10.28 tons per day, which was higher than the average output for any other country in the world.

In Western Kentucky, three seams of coal are available from a number of mines. These seams are called Nos. 9, 11, and 12. The No. 9 coal has a heat content of about 12,000 to 12,200 BTU per lb., has about 7 to 8% ash, and has a fusion temperature of about 2180°F. The present price varies from about $3.80 to $4.10 per ton, f.o.b. barge at the mine.

The No. 11 coal has a heat content of about 12,500 BTU per lb., has about 5 to 6% ash, and a fusion temperature of about 2200°F. The present price is approximately $3.90 to $4.35 per ton, f.o.b. barge at the mine.

The No. 12 coal has a heat content of about 11,400 BTU per lb., has 6 to 12% ash, and a fusion temperature of about 2300°F. to 2350°F. The present price of this coal is approximately $3.20 to $3.50 per ton, f.o.b. barge at the mine.

The barge rate to Baton Rouge is about the same for all three coals from Western Kentucky, $2.20 to $2.50 per ton, depending on the location of the mine.

Coals in the Belleville, Illinois area have a heat content of about 11,400 BTU per lb., have 9% ash, and a fusion temperature of 2150°F. These cost at present from $3.30 to $3.70 per ton. The barge rate on these coals is approximately $2.15 to $2.45 per ton. In the Southern Illinois area, the coals are approximately the same as the Western Kentucky No. 12, insofar as the analysis is concerned, and have about the same price at the mine. The barge rate is approximately $2.15 to $2.25 per ton. However, some of these mines have a mine-to-river rail charge of 80 to 90¢ per ton, which will increase the total cost of transportation.

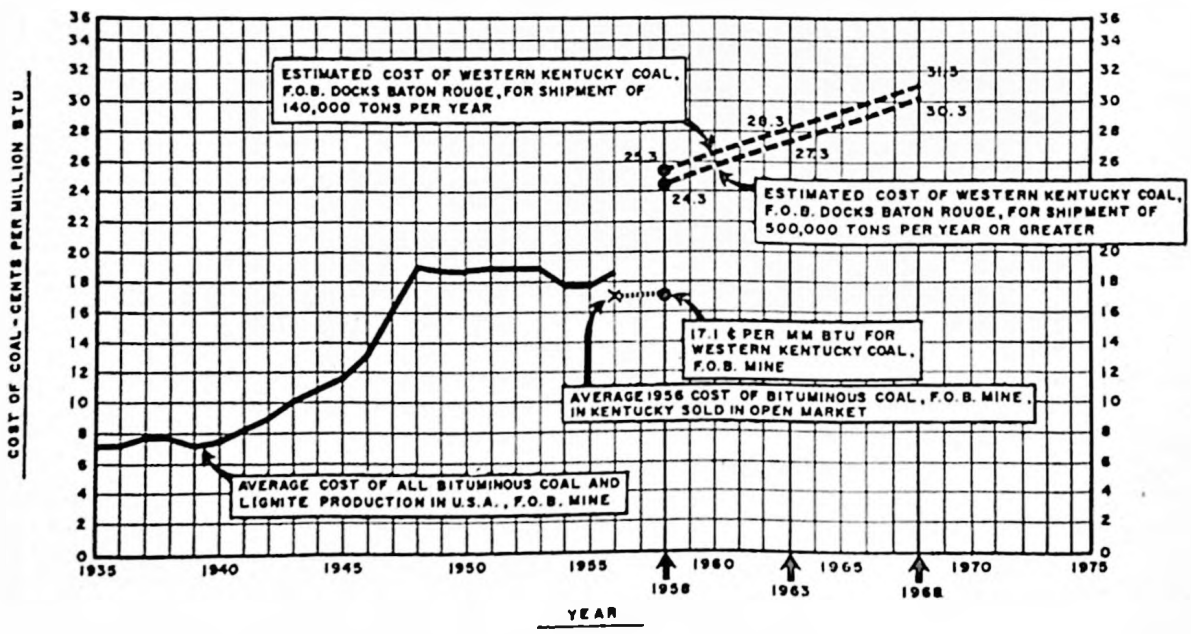
These are spot prices. Contract prices for appreciable tonnage (where part of the output of a mine might be assigned to a given plant over a period of many years) would probably show a lower cost, both for the coal, f.o.b. mine, and for the transportation charge. The average price for large quantities delivered to Baton Rouge would range from approximately 24 to 26¢ per million BTU.

At the present time, barge rates average approximately 3 mills per ton mile, whereas railroad rates are almost twice this figure. The all-rail freight rate to Baton Rouge from the various districts enumerated above would be on the order of $4.24 to $4.67 per ton, which of course would not be competitive with barge rates, nor with barge rates plus the cost of trucking from some river or canal unloading point to a plant location.

Chart No. 4 sets forth the average cost of coal in the United States f.o.b. mine, from 1935 to 1956, and also the average 1956 cost of coal sold in the open market in Kentucky. (These figures are from the U. S. Bureau of Mines.) It also shows an estimated 1958 cost of 17.1 cents per million BTU for Western Kentucky coal, f.o.b.

CHART NO. 4

ESTIMATED COST OF WESTERN KENTUCKY BITUMINOUS COAL, F.O.B. DOCKS BATON ROUGE, 1958-1968
PLUS AVERAGE COST OF COAL, F.O.B. MINE, IN U.S. FOR 1935-1956 AND IN KENTUCKY FOR 1956



mine, and an estimated cost of 24.3¢ and 25.3¢ per million BTU, f.o.b. docks at Baton Rouge, for shipments of 500,000 tons per year or greater and for shipment of about 140,000 tons per year, respectively. These estimates of the 1958 cost of Western Kentucky coal, f.o.b. mine and f.o.b. docks, at Baton Rouge, are based on recent conversations with mine representatives and barge transportation companies.

Chart No. 4 also contains a ten-year projection of the two estimated costs of coal delivered to Baton Rouge, based upon an estimated annual increase of 0.6 cents per million BTU in each case. This annual increase is based on a 5% increase in the following mine costs: labor, mining supply costs, fringe benefits, power used at the mine, and explosive costs. It also assumes a 5% increase in the cost of labor and supplies used for barge transportation. For shipments of 500,000 tons per year or greater, the 1963 cost of coal, f.o.b. docks Baton Rouge, is estimated to be 27.3¢ per million BTU, and in 1968, 30.3¢. Similarly, for shipments of about 140,000 tons per year, the delivered cost of coal will be 28.3¢ per million BTU in 1963, and 31.3¢ in 1968.

A typical contract for the sale of coal on a long-term basis includes a Base Price per ton delivered, either f.o.b. Seller's mine or at the Purchaser's Plant, subject to escalation due to any changes in the average labor rates, fringe benefits, etc., at the mine, or in the cost of labor and supplies used for barge shipping.

IV - Comparsion of the Use of Coal Versus Natural Gas for Industrial Plants In the Baton Rouge Area

In determining the relative economics of using coal and natural gas at industrial plants in the Baton Rouge area, many other factors besides the cost of each fuel should be carefully analyzed for the proposed installation. These factors include primarily the increase in investment and in the cost of operations and maintainance of industrial plants, attributable to coal as a fuel "at the burner." These factors are discussed briefly below.

Based on the assumption that coal would be delivered in the Baton Rouge area either to docks on the Mississippi River or on a navigable canal, it would be necessary to provide docking and coal unloading facilities. For a large plant which would use on the order of 500,000 tons of coal per year, it is adviseable for the plant to install its own docking and unloading facilities. (In such a case, any use of the facilities for loading and unloading of other industrial materials would, of course, defray a part of the cost of the facilities.) For smaller plants, it may be more economic to establish one or more central unloading points and use trucks to transport the coal to the smaller plants. The cost of trucking coal for distances of 60 or 70 miles is about 60¢ per ton, or approximately 1¢ per ton mile.

From the unloading facilities, coal may be moved by conveyors to stockpile or directly to boilers. Provisions may also be made for conveying coal from stockpile to the bunkers. Coal storage will, of course, require additional plant site area. Coal is piled usually 20 to 25 feet high and compacted with a bulldozer, or with some other similar equipment, to a density of approximately 70 lbs. per cubic foot. 12,000 tons of coal stored in this manner requires an area of approximately 13,700 square feet. Compaction of coal is necessary to prevent spontaneous combustion. In storage, coal loses a small amount of its heating value. In the first six months it will lose approximately 1.5% and very little thereafter.

For larger plants, bunkers may be installed at the boilers to provide storage readily available for firing. For smaller plants, it is possible to eliminate bunkers and feed directly from outdoor hoppers.

Stokers may be used in coal boilers having a capacity limited to approximately 100,000 to 150,000 lbs. of steam per hour, depending upon the ash content of the coal. The size of coal used is usually limited to 1¼" maximum. However, the use of pulverized coal offers a greater latitude in the selection of coals and usually results in better overall economy for boilers producing more than 25,000 to 50,000 lbs. of steam per hour.

Where pulverized coal is used, the coal is received from the bunkers, pulverized to a fineness of 70 to 80% (passable through a 200-mesh screen) and blown by air to the burners. Power consumption of the pulverizers depends primarily on the grindability factor of the coal, and amounts to approximately 14 to 18 KWH per ton of coal, including the requirements of the forced draft fan. Maintenance cost of the pulverizers amounts to about 5¢ per ton of coal, including labor.

For most designs of boiler furnaces, the use of coal will require a larger furnace volume than with natural gas. Thus, if it is planned to convert a boiler designed for the use of natural gas to the use of coal, it can be expected that the capacity will be reduced to about 75% of the capacity using natural gas. Also, a different employment and tube spacing of the heating surface is required to cope with slagging (i.e. the deposit of ash particles on the tubes). It may even be necessary to change the tubes for control of steam temperature. Many present gas-fired boilers cannot be economically converted to fire coal for these reasons, and also because there is no provision for removal of ash. The burners must be redesigned, and there is no provision for soot blowing (which is necessary to clean the tubes in the convection zone as well as in the radiant zone.) Soot blowing requires a certain amount of steam and more water make-up, and increases the heat losses.

Another factor increasing the cost of investment and operation with coal over natural gas is the necessity for the removal of ash. This is usually done with an ash hopper at the bottom of the furnace and with a dust collector to remove ashes from gases exhausted from the stack.

For power plants, the total station auxiliary power requirements with coal are approximately 17% greater than with natural gas and amount to approximately 2% of the gross generation.

For the prevention of air polution, it may also be necessary to install electrostatic precipitators or some other means of removing fine particles of dust in the stack gases. This will increase the power required for the induced draft fan. Also, it will probably be necessary to install a higher stack than with natural gas in order to disperse the sulphur dioxide (formed during combustion) and the remaining dust particles.

Boiler efficiencies using coal are on the order of 3 to 6% higher than with boilers of similar size designed for natural gas. The reason for this is that the ratio of hydrogen to carbon is much greater in natural gas, so that the amount of water vapor in the stack gases is much greater.

A boiler plant using coal will require more men for operation and maintenance than a similar plant using natural gas. For small plants, one man is needed at the dock and one or more men at the coal pile and conveying equipment. These men usually work 5 days a week, 8 hours a day. Also, one man is needed continuously at the plant pulverizers, bunkers, ash handling equipment, etc.

For a plant using approximately 50,000 tons or more of coal per year, an approximate figure for the incremental cost of operation and maintenance (for the use of coal over natural gas) is 30¢ per ton. This figure includes the costs of conveying in and out of storage, coal handling, operation and maintenance of pulverizing equipment and ash handling, plus all power requirements. This figure is an average established in many plants over a wide range of sizes.

As previously mentioned, many of the large electric utility companies in Louisiana are presently investigating the possible use of coal in proposed power plants. Some of the major features of one such study in which the relative economics of coal and natural gas are compared, are included in Table No. 6. This study was prepared by

Mr. Horace J. Guillory, Superintendent of Electrical Production, of Central Louisiana Electric Company.

The study includes figures for one generating unit having a capacity of 150,000 KW., and also for two such units. The turbo-generator units included in the study

TABLE NO. 6

Comparison of Estimated Total Investment and Differential Annual Costs (Operation and Maintenance Plus Fixed Charges) for Proposed Power Plant in Louisiana, Based on One Generator Unit Rated at 150,000 KW and on Two 150,000 KW Units and on Using Coal Only vs. Using Natural Gas Only for Boiler Firing (A)

ITEM	NUMBER OF UNITS INSTALLED: First Unit Only	Increment Required for Second Unit	Total For Two Units
A. GENERAL DATA COMMON TO BOTH FUELS:			
1. Rating of Generator Units—KW	150,000	150,000	300,000
2 Annual Net Power Output (Approx. 75% L. F.)—1,000 KWH	985,500	985,000	1,971,000
3. Turbine Heat Rate—BTU/KWH	8,200	8,200	8,200
B. OPERATION BASED ON NATURAL GAS-FIRING:			
1. Annual Quantity of Natural Gas Required:			
a. MCF (B)	10,126,000	10,126,000	20,252,000
b. MM BTU (C)	10,126,000	10,126,000	20,252,000
2 Total Investment Required—$1,000			
a. Cost of Construction			
(1) Structures	1,032	808	1,840
(2) Boiler Plant Equipment	4,625	4,396	9,021
(3) Turbine Generator Unit(s)	6,355	6,355	12,710
(4) Accessory Electric Equipment	889	606	1,495
(5) Miscellaneous Power Plant Equipment	169	56	225
(6) Total	13,070	12,221	25,291
b. Engineering and Other Overhead	1,830	1,711	3,541
c. Total Investment (D)	14,900	13,932	28,832
3. Computed Cost of Natural Gas in Cents per MCF Equivalent to Total of Differential Annual Costs and Cost of Coal at:			
a. 25.0¢ per MM BTU (E)	33.54		32.02
b 26.0¢ per MM BTU (E)	34.51		32.99
c. 27.0¢ per MM BTU (E)	35.47		33.95
C. OPERATION BASED ON COAL-FIRING:			
1. Annual Quantity of Coal Required:			
a. Tons (F)	387,500	387,500	775,000
b. MM BTU	9,766,000	9,766,000	19,532,000
2. Annual Cost of Coal at:			
a. 25.0¢ per MM BTU	$2,441,500	$2,441,500	$4,883,000
b. 26.0¢ per MM BTU	2,539,200	2,539,200	5,078,400
c. 27.0¢ per MM BTU	2,636,800	2,636,800	5,273,600

TABLE NO. 6 (continued)

	NUMBER OF UNITS INSTALLED		
	First Unit Only	Increment Required for Second Unit	Total For Two Units
3. Total Investment Required—$1,000:			
a. Cost of Construction:			
(1) Structures (G)	1,644	1,100	2,744
(2) Boiler Plant Equipment	8,879	7,185	16,064
(3) Turbine Generator Unit(s)	6,355	6,355	12,710
(4) Accessory Electric Equipment	1,600	1,171	2,771
(5) Miscellaneous Power Plant Equipment	227	105	332
(6) Additional Land		30	30
(7) Total	18,705	15,946	34,651
b. Engineering and Other Overheads	2,619	2,232	4,851
c. Total Investment	21,324	18,178	39,502
4. Increase in Total Investment Required with Coal-Firing Over Natural Gas-Firing—$1,000 (H)	6,424	4,246	10,670
5. Differential Annual Costs (Operation and Maintenance and fixed Charges) for Coal Firing Rather than Natural Gas—$1,000:			
a. Fixed Charges (J)	803	531	1,334
b. Interest on Coal Inventory (K)	25	25	50
c. Additional Labor (L)	69	33	102
d. Maintenance, etc. at 15¢ per Ton	58	58	116
e. Total	955	647	1,602
6. Total Annual Cost of Coal Plus Differential Annual Costs—$1,000:			
a. Coal at 25.0¢ per MM BTU	3,396.5	3,088.5	6,485
b. Coal at 26.0¢ per MM BTU	3,494.2	3,186.2	6,680.4
c. Coal at 27.0¢ per MM BTU	3,591.8	3,283.8	6,875.6

NOTES:

(A) The figures in this table, except for minor revisions, are taken from a study prepared by Mr. Horace J. Guillory of Central Louisiana Electric Company to determine the economics of using coal vs natural gas for boiler firing at a proposed power plant in Louisiana. In his study it was assumed that coal would be shipped from Western Kentucky by barges and unloaded at the proposed plant.

(B) Based on 84% boiler efficiency with natural gas firing, 5% station-use, and 1,000 BTU per MCF, 0.010275 MCF of natural gas are required per net KWH (10,275 BTU per net KWH).

(C) Million BTU is represented by the symbol MM BTU.

(D) This investment does not include the cost of the substation.

(E) Figures on lines B.3.a., B.3.b, and B.3.c are computed by dividing figures on lines C.6.a, C.6.b, and C.6.c by the respective figures on line B.1.a.

(F) Based on 89% boiler efficiency with coal firing, 7% station-use and 25.2 MM BTU per ton, 0.0003932 tons (0.7864 pounds) of coal are required per net KWH (9,910 BTU per net KWH).

(G) These figures include cost of barge unloading facilities having a capacity of 500 tons per hour.

(H) Figures on line C.4 are computed by subtracting figures on line B.2.c. from the respective figure on line C.3.c.

(J) Fixed charges are based on 12.5% of the figures on line C.4.

(K) Interest on coal inventory is based on a cost of $6.50 per ton of coal, 60 days storage, and an interest rate of 6%.

Total coal in storage	63,700 Tons
Value of coal in storage	$414,000
Interest at 6%	$ 24,800

(L) For one-unit operation, the increase in cost of labor for coal-firing rather than natural gas-firing is computed as follows:

5 Additional Operators (1 per shift)	$ 30,000
1 Laboratory Technician, for coal test, etc.	6,000
6 Additional men for coal handling, maintenance, etc.	33,000
Total for One Unit	$ 69,000
For two-unit operation, six additional men are needed for coal handling, maintenance, etc.	33,000
Total for Two Units	$102,000

were of the tandem-compound triple-flow type, having throttle steam conditions of 1800 lbs., 1,000° superheat, 1,000° reheat. The boilers are rated at 1,250,00 lbs, of steam per hour. An annual load factor of 75% is assumed. The study is also based upon coal being delivered by barge to an unloading terminal with a capacity of 500 tons per hour, located at the power plant site.

A comparison of the total investment required for one unit shows that the investment with coal would be $21,324,000, and with natural gas $14,900,000, for a difference of $6,424,000. For two units, the difference is $10,670,000. Fixed charges, based upon 12.5% of the difference in the total investment figures, amount to $803,000 per year for one unit, and $1,334,000 per year for two units.

Another charge that must be made against coal is the interest on the cost of the coal held in storage. Based upon 60 days storage, coal costing $6.50 per ton and an interest rate of 6%, this charge amounts to $25,000 per year for one unit and $50,000 per year for two units.

The additional labor requirements amount to $69,000 per year for one unit, and $102,000 per year for two units; the additional maintenance charge is $58,000 per year for one unit and $116,000 per year for two units.

The total differential annual costs chargeable to coal amount to $995,000 for one unit and $1,602,000 for two units.

In Table No. 6, the annual costs of coal at 25, 26, and 27¢ per million BTU are also set forth. By adding these annual costs of coal to the differential in annual costs (fixed charges, operation, maintenance), the total annual costs applicable to coal are determined. By dividing these total costs for coal by the quantity of natural gas required, the equivalent (or competitive) price of natural gas is determined. To state this differently, if the actual price of natural gas is less than the price so computed, it is more economical to use natural gas, and vice versa. Based on a coal price of 25¢ per million BTU, the equivalent price of natural gas is 33.5¢ per MCF for one unit and 32.0¢ per MCF for two units. For each 1¢ increase in the price of coal per million BTU, the equivalent natural gas price is increased by slightly less than 1¢ per MCF.

CHART NO. 5

ESTIMATED FUTURE COST OF COAL AND NATURAL GAS FOR INDUSTRIAL PLANTS IN THE BATON ROUGE AREA IN CENTS PER MILLION BTU OF EACH FUEL

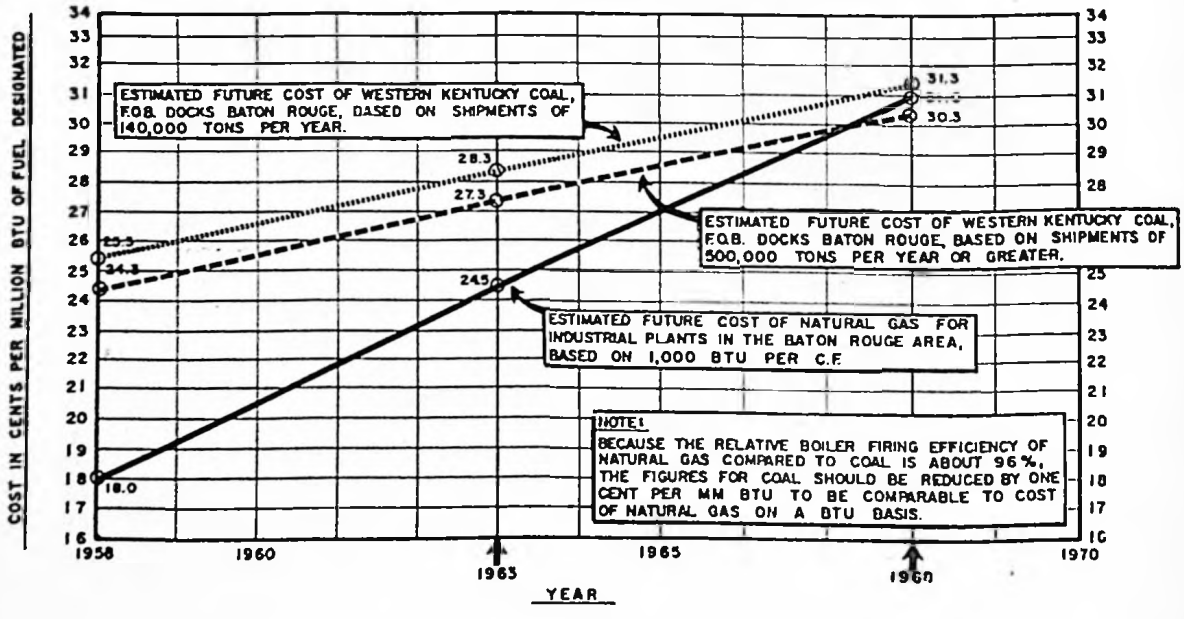


Chart No. 5 sets forth the estimated future cost of coal (before unloading) and of natural gas for industrial plants in the Baton Rouge area for the period 1958 through 1968, both costs being per million BTU. This Chart shows that the cost of coal f.o.b. docks Baton Rouge is estimated to be about the same as the cost of natural gas in 1968.

In Chart No. 6, we have set forth a graphical determination of the estimated future time at which coal will be as economical as natural gas for the two 150,000 KW units discussed in Table No. 11. It projects the estimated cost of coal (for deliveries of 500,000 tons per year or greater) and the cost of natural gas, for industrial plants in the Baton Rouge area through the year 1983, at the same rate of annual increases as used in Chart No. 5. Naturally, these costs become increasingly subject to error the further they are extended; however, in spite of this, we believe this curve has value in estimating the year in which coal will be as economical to use as natural gas for this size of power plant, if the present price trends continue unaltered by competitive sales policy.

This Chart contains another curve, which is the price of natural gas economically equivalent to the estimated cost of coal for the year designated. This projection of the competitive price of natural gas crosses the estimated cost of natural gas between 1976 and 1977, which means that prior to this time it will be more economincal to operate with natural gas rather than with coal, and the opposite thereafter.

In both Charts Nos. 5 and 6, it is assumed that taxes on natural gas and on coal will remain at their present levels. Any increase would cause the price of the fuel to increase correspondlingly.

Independent studies have been prepared, comparing the use of coal with natural gas in boiler plants more typical in size of industrial plants in the Baton Rouge area. The sizes of boiler plants investigated were three 50,000 lbs. steam per hour boilers; three 70,000 lbs. per hour boilers; and three 175,000 lbs, per hour boilers. In these studies we have considered only the facilities required for fuel use and the boiler plant itself, because the conditions of steam use vary widely from plant to plant. Some plants generate power and some do not; the ratio of power to process steam will vary. The results of these studies are set forth in Table No. 7.

CHART NO. 6

GRAPHICAL DETERMINATION OF ESTIMATED FUTURE TIME AT WHICH COAL WILL BE AS ECONOMICAL AS NATURAL GAS, BASED ON FIGURES IN TABLE NO. II FOR TWO — 150,000 KW UNITS

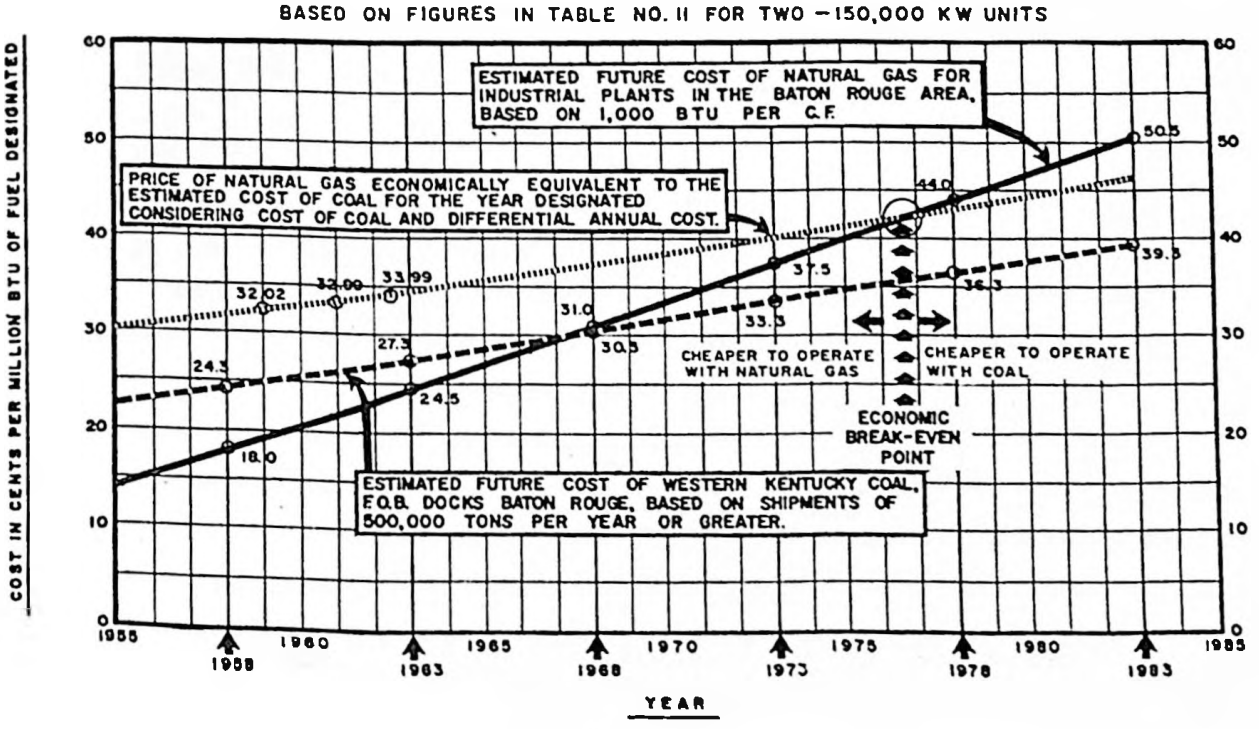


TABLE NO. 7

Comparison of Estimated Total Investment and Differential Annual Costs (Operation and Maintenance Plus Fixed Charges) for Typical Boiler-Plant Installations in Industrial Plants in the Baton Rouge Area, Based on Using Coal Only Vs. Using Natural Gas Only for Firing

ITEM	Number and Capacity of Boilers in Lbs. Steam Per Hour		
	3—50,000 (A)	3—70,000 (B)	3—175,000 (C)
A. GENERAL DATA COMMON TO BOTH FUELS			
1. Total Steam Capacity—lbs. steam per hour	150,000	210,000	525,000
2. Annual Output at 65% L.F.—1,000 lbs. steam	854,100	1,195,700	2,989,000
B. OPERATION BASED ON NATURAL GAS-FIRING			
1. Boiler Efficiency—%	76.5	78.7	80.5
2. Annual Quantity of Natural Gas Required (D)			
a. MCF	1,127,600	1,534,500	3,898,700
b. MM BTU	1,127,600	1,534,500	3,898,700
3. Total Investment Required—$1,000			
a. Cost of Construction	840	1,180	2,810
b. Engineering and Other Overheads at 14%	118	165	393
c. Total Investment	958	1,345	3,203
4. Computed Cost of Natural Gas in Cents per MCF Equivalent to Total of Differential Annual Costs and Cost of Coal at			
a. 25.0¢ per MM BTU	34.63	32.68	30.11
b. 26.0¢ per MM BTU	35.59	33.63	31.06
c. 27.0¢ per MM BTU	36.55	34.59	32.03
C. OPERATION BASED ON COAL FIRING			
1. Boiler Efficiency—%	80.0	82.2	84.0
2. Annual Quantity of Coal Required (E)			
a. Tons	42,800	58,300	148,300
b. MM BTU	1,078,000	1,469,000	3,736,000
3. Annual Cost Coal at			
a. 25.0¢ per MM BTU	$ 269,500	$ 367,300	$ 934,000
b. 26.0¢ per MM BTU	280,300	381,900	971,400
c. 27.0¢ per MM BTU	291,100	396,600	1,008,700
4. Total Investment Required—$1,000			
a. Cost of Construction	1,450	1,840	3,920
b. Engineering and Other Overheads at 14%	203	258	549
c. Total Investment	1,653	2,098	4,469
5. Increase in Total Investment Required with Coal-Firing Over Natural Gas Firing—$1,000	695	753	1,266
6. Differential Annual Costs (Operation and Maintenance and Fixed Charges) for Coal-Firing Rather than Natural Gas—$1,000			
a. Fixed Charges at 12.5% of Line C.5.	87	94	158
b. Interest on Coal Inventory	4.2	5.7	14.6
c. Additional Labor	17	17.	23.
d. Maintenance, Auxiliaries, etc.	12.8	17.5	44.4
e. Total	121.	134.2	240.
7. Total Annual Cost of Coal Plus Differential Annual Costs—$1,000			
a. Coal at 25.0¢ per MM BTU	390.5	501.5	1,174.
b. Coal at 26.0¢ per MM BTU	401.3	516.1	1,211.
c. Coal at 27.0¢ per MM BTU	412.1	530.8	1,248.7

NOTES (A) It is assumed that the discharge conditions of the steam are 250 psig and saturated, that the heat absorbed is 1010 BTU per lb. of steam, and that the boilers are not equipped with either air heaters or economizers.

(B) It is assumed that the discharge conditions of the steam are 400 psig and 680° superheat, that the heat absorbed is 1010 BTU per pound of steam, and that the boilers are equipped with an economizer only.

(C) It is assumed that the discharge conditions of the steam are 600 psig and 825°F., that the heat absorbed is 1050 BTU per lb. of steam, and that the boilers are equipped with air heaters but not economizers.

(D) Based on 1000 BTU per C.F. of natural gas.

(E) Based on 25.2 MM BTU per ton of coal.

For the three 50,000 lbs. of steam per hour boilers, the total investment with coal is $1,653,000 and with natural gas $958,000, making a difference of $695,000. The differential in annual costs is $121,000.

On the basis of coal costing 21¢ per million BTU, the computed cost of natural gas which is competitive with coal, including the differential in annual cost, is 34.63¢ per MCF (with an increase in the cost of gas of slightly less than 1¢ per MCF for each 1¢ increase in the cost of coal per million BTU).

For the three 70,000 lbs. steam per hour boilers, the comparison is: with coal costing 25¢ per million BTU, the equivalent cost of natural gas is 32.68¢ per MCF, and for each increase of 1¢ per million BTU in the price of coal, the equivalent cost of gas is increased by slightly less than 1¢ per MCF.

For the three 175,000 lbs. steam per hour boilers, the comparison is: with coal costing 25¢ per million BTU, the equivalent natural gas price is 30.11¢ per MCF. Again, for each 1¢ per million BTU in the price of coal, the equivalent natural gas price is increased by slightly less than 1¢ per MCF.

These studies for industrial plants were made independent of Mr. Guillory's study for public utilities, and represent our experience and judgment. However, both studies clearly point to the following conclusions:

(1) Coal is not at present competitive with natural gas in the Baton Rouge area, (or, for that matter, in the State of Louisiana) even before considering the differential in annual cost due to fixed charges, cost of coal unloading, storage, conveying and pulverizing, etc.

(2) Due to the difference in price trends of the two fuels, and in spite of the additional costs of handling coal as just mentioned, this competitive margin is gradually closing. For the next 10 years, however, the margin will still be great enough to make gas the more economical fuel.

(3) After the next 10 years (and apparently, by the year 1976), the margin will have narrowed to a point where the competitive situation may force the natural gas industry to curb the increases in gas prices, in order to maintain a satisfactory competitive sales position with respect to coal.

(4) Natural gas reserves in Louisiana (and the annual increase in these reserves) are sufficient and adequate to assure potential industrial users of a satisfactory supply of gas for at least the next 20 years.

(5) Industries considering building plants in the Baton Rouge area, (and in Louisiana generally), can start their evaluation of economic factors by listing an adequate supply of low cost fuel as one of the definite advantages of locating in this area and State.

(6) Also, in the event that coal should become more economical than natural gas at some future date, the Baton Rouge area has the economic advantage of being served by waterways which would cause the price of coal delivered to be less here than in other nearby areas not similarly served.

Obituary of Milton "Irish" Levy

It is with sorrow that we record the passing of Milton "Irish" Levy on April 26, 1958 in his native city, New Orleans, Louisiana. "Irish" was beloved by all with whom he came in contact and his death will be keenly felt by all the members of the groups to which he belonged; these include, in addition to this Society, the American Institute of Electrical Engineers, Illuminating Engineering Society, International Association of Electrical Inspectors, the American Ordinance Association, Tulane Alumni T Club and Zeta Beta Tau Fraternity. He will be missed, particularly by his Tulane University classmates, and the members of the Tulane football teams of 1922-23-24 and 25.

"Irish" was born in New Orleans on December 22, 1903, the son of Lazare Levy and Isabella Cain. He was educated in the public grade schools, Warren Easton High School, and Tulane University, from which he was graduated in 1927 with the degree of Bachelor of Engineering in Mechanical and Electrical Engineering.

After graduating from Tulane "Irish" became associated in an electrical contracting business and later that firm bore his name, "Irish Levy Electrical Company." He pursued this endeavor until shortly before World War II when he joined the staff of Higgins Industries Incorporated as Chief Electrical Engineer and Electrical Superintendent. He was also consulting Electrical Engineer for Mr. Higgins' other interests such as the Michaud Plant and the Engine Plant. His wide experience in the practical side was of tremendous help in developing the landing craft and PT boats which were then in the experimental stage but were later to play such an important role in winning the war.

Above all things "Irish" was modest, mild mannered and kind, and was a tremendous morale builder regardless of the situation in success or failure. He had the happy faculty of getting a laugh at the critical time a laugh was most needed. His modesty and mildness belied his actions on the football field where he was one of the roughest, toughest players of his time and probably the finest running guard of that decade. He was named to the Mythical All Southern Conference Team in 1925 with considerable mention for All American. This was high tribute because the Southern Conference at that time comprised many more universities than now, having since been split into the Southern, Southeastern, and Atlantic Conferences.

"Irish" is survived by his wife, the former Nile Moore, two daughters, Mrs. John Milandin and Donna Levy, and two grandchildren, his sister, Mrs. Edward Bernstein, and three brothers, Alphonse, Edward, and Lazare Levy.

Be it resolved that this obituary be read at a meeting of the Louisiana Engineering Society, entered into the minutes and published in The Louisiana Engineer, and that copies be sent to the members of the family.

LEAL C. H. McLEAN AND W. J. DRAWE, JR.

Obituary of August Hoffman Douglas

On January 31, 1958, August Hoffman Douglas, Sr., was called to his Heavenly reward — after having so ably served his fellowman, in business and as a member of the Louisiana Engineering Society. His passing is keenly felt by his many friends and associates.

He was born in New Orleans, Louisiana on November 16, 1892 of Scotch and German parentage. His father, Harry Steward Douglas having distinguished himself as an engineer with the United States Corps of Engineers.

Mr. Douglas was educated at Jesuit High School, New Orleans, Springhill College in Mobile and Louisiana State University where he studied Civil Engineering.

He served in France, during World War I, as a Captain in the Corps of Engineers.

His business career includes many years as Sales Engineer for Dixie Mill Supply Company, a position for which he was so well qualified and ever-ready to assist in any engineering problems related to items furnished by his company. This experience, which gave him a broad knowledge of engineering materials and equipment fitted him most ably for the position he held the last three years of his life and that was as Vice-President and General Manager of the Baton Rouge office of the Oliver H. Van Horn Company, Incorporated.

He was a member of the Catholic Church.

Besides the Louisiana Engineering Society, Mr. Douglas was also a member of the following organizations: Military Order of World War I, Propeller Club, Toastmasters, Knife and Fork Club, Bal Masque and Baton Rouge Country Club.

"Doug," as he was affectionately called, was one of those individuals who made a definite point to make friends and to keep them. His love for people was contagious — once he knew you, you were recognized always.

Mr. Douglas is survived by his widow, the former Edna Louise Prudhomme, and their children, Edna Marie Colton, Carol Therese Elder and August Hoffman Douglas, Jr. and also six grandchildren.

Be it resolved that this obituary be read at a meeting of the Louisiana Engineering Society, entered into the minutes, published in Proceedings of the Society and that copies be sent to members of the family.

W. L. SUTTON AND H. L. LEHMANN

Obituary of Kenneth Tillery Price

The death of Kenneth Tillery Price on May 11, 1958, was a great loss to the Louisiana Engineering Society, the state sulphur industry and the engineering profession which he loved so well.

With his death, his firm, Freeport Sulphur Company, lost one of its most devoted officers whose years of sulphur mining experience helped make its Louisiana operations successful in spite of many technical obstacles.

A native of Whitesboro, Texas, Mr. Price was born on March 17, 1903. He attended public schools at Whitesboro and was graduated from the University of Texas in 1925 with a degree in civil engineering. He joined Freeport the same year as an engineer in the production department at the Hoskins Mound, Texas, sulphur mine.

With his technical skill and his inherent ability for administration, it was inevitable that he should rise rapidly through the engineering and executive ranks of his company.

After working on a number of sulphur prospects, he was assigned in 1930 to Freeport's Houston office and in 1930 he was appointed superintendent of scouting.

In February, 1934, Freeport chose Mr. Price to head the production department of its new Louisiana mine, Grande Ecaille, which was destined to become the world's second largest sulphur producer.

In 1940 he was named assistant general superintendent of the mine. Two years later he became acting general superintendent and in 1943 he was made general superintendent.

In 1951 Mr. Price was elected an assistant vice president of the company while retaining general superintendency of the Grande Ecaille mine. In 1952 he was elected vice president of the company.

During the period from 1952 to 1954, Freeport's operations in Louisiana increased from one to four mines with Mr. Price becoming manager of the company's Louisiana division. With the completion of expansion in 1954, Mr. Price assumed responsibility for all producing properties.

From the very beginning of his career Mr. Price's easy, warm personality helped make him a host of friends, and it was only natural for them to shorten his name to "K. T." and then "Katy," an affectionate nickname used by the hundreds of persons who knew him.

To the many employees in his company, Mr. Price was a well-known and highly regarded executive. Because of his sincere interest in each employee who worked in his organization, he was able to call hundreds of employees by their first names. The door to his office was open to any employee and those seeking an appointment always knew their problems and comments would receive fair and patient consideration.

His business ability was well known, and when a group of business men formed the Delta Bank & Trust Co. at Port Sulphur in 1956, Mr. Price was their choice as its first president.

He gave invaluable aid in charting the young institution's course and, following an unusually successful first year of operation, was re-elected to a second term as president.

His professional affiliations included the Louisiana Engineering Society and the American Institute of Mining & Metallurgical Engineers. He also was active in the Red Cross, the Boy Scouts, the Metropolitan New Orleans Safety Council, the Petroleum Club of New Orleans, Carnival organizations, the New Orleans Chamber of Commerce, the Houma Chamber of Commerce, and numerous Plaquemines Parish civic organizations.

He is survived by his widow, Mrs. Lois Blunt Price; one daughter, Mrs. Joan Price Stainton of New Orleans; his mother, Mrs. Fay Humphrey Price of Whitesboro; and a brother, Dr. Richard O. Price of McKinney, Texas.

Be it resolved that this obituary be read at a meeting of the Louisiana Engineering Society, entered into the minutes and published in the Proceedings of the Society and that copies be sent to members of the family.

Z. W. BARTLETT AND J. E. MONROE

Engineering Briefs

Big and Little Raindrops — Determining raindrop size is being regarded as one of the first steps toward possible weather control. There is little scientific knowledge of raindrop sizes. A professor of meteorology believes the knowledge will be useful for a variety of things, such as helping to reduce erosion of newly planted land and improving radar detection of storms so as to determine the amount and type of rain in them. *—Electronics*

o o o o

Generous Uncle Sam — In Washington, The Office of Technical Service has a billion-dollar patent pool just waiting for businessmen to dip into. The pool is an outgrowth of World War II's government contracts for defense production. Out of these contracts with private business have come a whole raft of new products, and the patents are assigned to Uncle Sam. Mostly there is no charge, sometimes only a small royalty payment. *—Purchasing Week*

o o o o

Russians Pump Coal — A 38-mile pipeline to handle coal is under construction in Russia. The line will operate from the Lvoc coal seams in Valhynia to Dobrotvorskaya power station — one of the largest in the Ukraine. The coal will be first reduced to a "maize kernel" size at the coal pit before it is put into the pipe. Cost of pumping coal to the power station, the Russians say, will be three times cheaper than shipping by rail. *—Engineering News-Record*

o o o o

Autos With Radar — A radar safety system for cars may be on the market soon. The radar antenna, part of the auto's front grillwork, will send out a radiation pattern. If the radar-equipped car approaches another car too fast, beeps will be produced by a tone generator mounted on the dashboard. The signal will get louder as the danger becomes greater. *—Electronics*

o o o o

Warmer North Pole — The Russians have come up with a plan that they claim will make the polar region 60 degrees warmer. By building a 43½-mile dam from the Chukchi Peninsula to the coast of Alaska, they say Pacific cold currents will be stopped from flowing into the Artic Sea, causing the water level of the sea to drop. Then, more of the Gulf Stream will flow into the polar region and it will warm Siberia and Alaska. *—Engineering News-Record*

o o o o

Remote Controls for Industry — Remote controls for manufacturing processes are just a matter of time in view of advances already made in the handling of atomic materials. There is now a remotely-controlled device that cuts out a piece of corroded, radioactive piping, replaces it with fresh piping, welds it into place, televises the welding operation so that it may be inspected while it goes on, and tests it by ultrasonic waves. *—Electronics*

o o o o

Era of Inventions Coming — Ninety per cent of all the scientists who ever lived, are living now. Therefore, in the next half century, discoveries as far reaching as electricity and atomic energy, or the invention of the airplane and radio can be expected. *—Product Engineering*

o o o o

Dry 'Em to Death — A new approach to control cockroaches is to dry them to death. Recent experiments showed startling results when a new powder was sprinkled on the floor of cages. The inert, nontoxic dust achieved 100 per cent kills in shorter times than currently used insecticides. *—Chemical Engineering*

Reds Use Wind Power — Russian scientists say they have succeeded in utilizing the accumulated force of the winds. A wind-electrical power station has been set up for the storage of wind energy. Storing wind energy will help solve the problem of obtaining electric power where there is no fuel for thermal power stations or large rivers which could make hydropower stations. *—Product Engineering*

° ° ° °

Chemicals Store Sun's Energy — Chemical storage and release of solar energy is being tried out by a West German firm. Certain artificial dyestuffs, exposed to the sun, use about 25 per cent of the radiation to form new chemical compounds. In the dark, the process is reversed, with release of previously absorbed energy.
—Chemical Engineering

Field Notes

By action of the Board of Directors, on July 10th, following acceptance by the members, EJC became "Engineers Joint Council, Incorporated," a membership corporation of the State of New York.

° ° ° °

Elvin J. Dantin, Assistant Professor of Civil Engineering at Louisiana State University, has been awarded a National Science Foundation Science-Faculty fellowship. The stipend from the fellowship will enable Mr. Dantin to pursue his doctorate studies at Stanford University for a period of 15 months. This award was one of 54 awarded out of 440 applicants throughout the U. S. and territories.

° ° ° °

The School of Engineering, Louisiana Polytechnic Institute, Ruston, Louisiana, announces the Seventh Annual Instrumentation Conference to be held on the campus on November 6-7, 1958. An interesting program is being arranged which includes the following papers to be presented at the technical sessions:

"Fundamentals of Instrumentation and Controls" by Dr. Virgil Orr, Head, Department of Engineering Research, Louisiana Polytechnic Institute, Ruston, Louisiana;

"Instrumentation for Continuous Digesters" by Mr. E. F. Barber, The Foxboro Company, Foxboro, Massachusetts;

"Automatic Control and Instrumentation of a High Pressure, High Temperature Steam Generating Unit" by Mr. Harold McMichael, Leeds & Northrup, Houston, Texas;

"Design and Application of Orifice Fittings and Meter Tubes" by Mr. Ralph Clemons, Daniel Orifice Fitting Company, Houston, Texas.

Exhibits of new equipment in instrumentation and process control will be displayed by representatives of the leading manufacturers of such equipment.

° ° ° °

A steel highway bridge design competition offering 15 awards totaling $44,000 to engineers and college engineering students is being sponsored by the American Bridge Division of United States Steel Corporation. The competition poses the problem of designing an overpass structure in steel to carry a two-lane highway at right angles over a four-lane interstate highway on level ground. Complete information may be secured from American Bridge Division, United States Steel Corp., 525 William Penn Place, Pittsburg 30, Pennsylvania and from the American Institute of Steel Construction, 101 Park Avenue, New York 17, N. Y. Deadline for entries is May 31, 1959.

° ° ° °

A "Check List For Managers of Engineering and Scientific Organizations," has been published by the U. S. Civil Service Commission to aid managers who wish to assess, for their own guidance, the effectiveness with which they use scientific and engineering manpower. The publication is composed of two sets of questions — the first set for top management, and the second set for middle management. Secure copies from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. at 15 cents per copy.

° ° ° °

The following item is taken from the *Texas Professional Engineer,* published by the Texas Society of Professional Engineers, July, 1958 issue;

"The State Registration Enforcement Committee, H. Q. Haile, Jr., of Austin, Chairman, has defended the title, 'Engineer,' on a national scale. Attention to the infraction was called by the Panhandle Chapter when an employee of Air Temp

Division, Chrysler Corporation, termed himself 'Field Engineer,' a label TSPE takes exception to because it is not always used to designate a registered or professional engineer. He is more often a field representative with technical training.

"Haile contacted Dayton, Ohio, headquarters of the Chrysler Corporation and presented TSPE's case to the Director of Personnel. Chrysler Corporation has acquiesced to TSPE and will discontinue use of the term 'Field Engineer' in Texas. The Director of Personnel expressed a desire to work with TSPE and lend technical assistance in the application and installation of mechanical equipment. He termed Chrysler Corporation a service organization and offered these services in helping engineers put equipment in the proper place."

° ° ° °

The 16th edition of the SOUTHERN PINE MANUAL OF STANDARD WOOD CONSTRUCTION, a revised and modernized version of the famous reference book is off the press and available from Southern Pine Association, P. O. Box 1170, New Orleans 4, La., at a cost of $2.00 per copy.

The Sale of Technological Services In Counsellor Capacity

Harold A. Levey

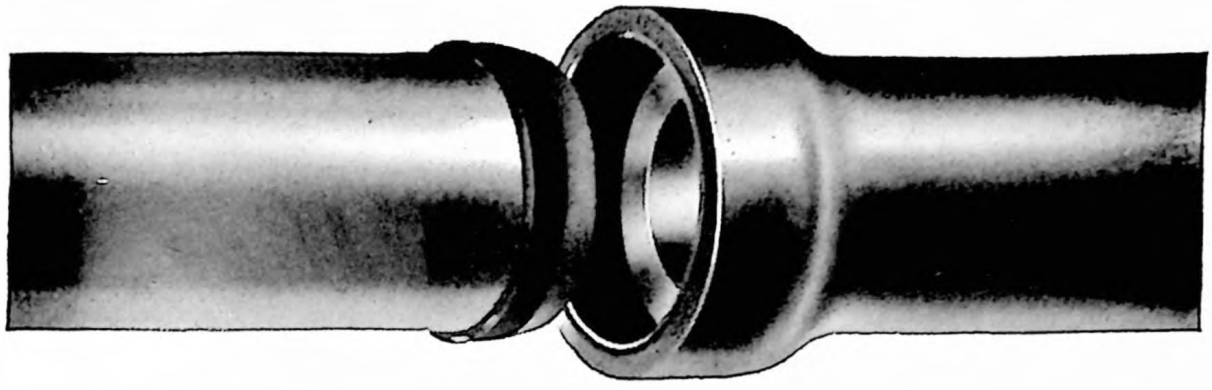
Probably one of the most potent forces militating against the earlier recognition of the chemist and the chemical engineer practicing as a "professional," is the fact that nearly 99% of this group are in the category of employees of one sort or another. The very small remainder are self-employed as "consultants" or as I prefer "counsellors;" either as their sole activity, or in conjunction with a teaching program, or some manufacturing or production work. This public reaction is based upon the fact that the presently recognized professional groups including medicine and law are nearly all self employed.

If we further examine these two types of professional chemists and chemical engineers, we find that in the final analysis the real difference is, that each member of the 99% usually has one employer, while the consultant has a large number of employers each year and at the same time.

There are of course other differences, but they are less significant. One of these is the basis of compensation for the consultant. Like the other professions, he may invoice his client based upon the time he has spent on the work; or he may set a fee estimated on what he feels to be the value of his services to this client; or lastly he may arrive at a fee based upon the ability of the client to pay.

Much of the services of the chemical consultant frequently involves the procurement of information not presently forming part of our store of knowledge. To supply this form of service obviously involves a program of research and development. It obviously becomes quite difficult to set an exact fee in advance for this type of service, as unless the problem has previously been solvent (which it obviously hasn't), it is not possible to set a price for the time to be spent on this work for its solution. With this thought in mind the consultant really has to gain the full confidence of his client to allow him to proceed with a project of any magnitude without advising the client of the probable overall cost. This situation may be partially overcome by establishing fees to be paid in stages as the work progresses or by budgeting a predetermined sum for which you agree to devote a certain number of "laboratory hours" to the probable solution of a portion of the problem, which would contribute to the attainment of the ultimate objective. The term "laboratory hour" or other related term may be a measure of time, effort, and material needed to attain the end desired. It usually includes one or more chemists, assistants, supervisory service, planning conferences, report writing and the materials and use of equipment needed. The amount of the budget or monetary sum assigned at the various stages is usually established by the consultant based on its apparent proximity to technical problems previously solved. An option is usually extended to the client to terminate the work on completion of any of these stages and a written report and samples resulting from the laboratory services directed toward the solution of the problem assigned. As you are paid specifically to do research and development work, frequently patent applications are filed to cover these new findings and should therefore be assigned to the sponsor, who sometimes pays an additional premium for such forms of success.

Another situation frequently prevails with reference to payment for professional services. Various branches of our city, state and federal governments issue requests for bids for professional services! This procedure impresses most professionals as being wholly unfitting. This method of bids on specifications attempts to establish fixed and uniform sets of conditions so that the only variable would be the price of the bidder. This is another aspect which distinguishes the professional technologist from the tradesmen. The variations in the capacities of the professional are based upon the extent of his training, types of experience, resourcefulness, and creative



NEW Dickey PVC Coupling stops infiltration

The new Dickey PVC Coupling of polyvinyl chloride, fused to Dickey Clay Pipe at the factory, now permits engineers and municipalities to specify sewer pipe sizes on the basis of actual flow . . . no allowance is necessary to compensate for infiltration because ground water just can't get in. And wastes can't get out, either.

This new Coupling, the first to be wholeheartedly endorsed by the Dickey Co., is completely resistant to root penetration and to the action of oil, gasoline, acids and other chemicals commonly found in sewers. The polyvinyl chloride from which it is made remains flexible for years . . . holds tight even when the pipe is moved slightly during normal back-filling, tamping and settling.

Send today for free fact-filled Bulletin 718

Providing improved sanitation for better living

DICKEY

sanitary salt-glazed clay pipe

W. S. DICKEY CLAY MFG. CO.

Birmingham, Ala. Chattanooga, Tenn. Kansas City, Mo. Meridian, Miss. St. Louis, Mo. San Antonio, Tex. Texarkana, Tex.-Ark.

If it's made of clay it's good . . . if it's made by Dickey it's better

MAIL THIS COUPON TO NEAREST DICKEY OFFICE

W. S. DICKEY CLAY MFG. CO.

Please send me, without cost or obligation, a copy of your illustrated Bulletin 718 — "The New Dickey PVC Coupling."

Name_____

Company_____

Address_____

City_____ Zone___ State____

8018

faculties. Obviously, the bidding process does not take into consideration these attributes. To overcome these shortcomings and to sustain the professional status of our technologists, a modification of the above scheme has been adopted by both many of the branches of government and business. This modified plan is based upon such groups contacting our professional engineering societies, ascertaining the present prevaling rates for certain types of technological services and a list of five or ten consultants, engineering firms or laboratories. These are arranged in alphabetic order, and based upon their respective professional status and background of experience, make the selections on this basis, viz, qualifications, as the price has previously been fixed. Without all of the above formality, many of us frequently select the physician or attorney on this basis when we are in need for their respective types of services.

There are of course other bases for compensation for services and some of these are established by custom or precedent and include the fees as technical counsel or expert in our various civil and criminal courts.

Last but not least our many retainers, usually on an annual basis are effected by negotiation. Then in addition to the relationship of client with counsellor, there are those of counsellor with his coprofessionals, and which may exist in a wide variety of forms. However, the temporary joint venture with its limited legal implications, is the form which appears in the broadest extent today. In this form neither is in the employ of the other, but merely arrange for a predetermined joint equity in the fees to be paid. If of short duration and when relatively small fees are involved our implied ethical code usually includes an exchange of information and possibly recommendations among specialists in the various branches of our profession without monetary compensation.

While range and variations in compensation more or less parallel those of the above referred to 99%, however, there is that real enjoyment of independence of action and responsibility that characterizes the self-employed. But with it that unique 1% periodically is reminded that even after a generation or more of that type of service, except for his annual retainers, he cannot take "a vacation with pay!"

Editor's note: This address was delivered by Mr. Levey when he was made the first Honorary Senior Fellow of the American Institute of Chemists in the South. Mr. Levey is a registered mechanical, electrical, and chemical engineer and has been an active member of the LES for many years. He is well known among the chemical engineers for his many accomplishments in that field as a research counsellor.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, Held at the Engineers' Club, New Orleans Monday, July 7, 1958

The meeting was called to order by President Freeman with Messrs. Domingue, Janssen, McLellan, Nelson and Fernandez present. Messrs. Chester Peyronnin and Claude Kelly, members of the Publications Committee, also were present by invitation. Mr. McLellan moved that minutes of the preceding meeting be accepted as read, seconded by Mr. Nelson and carried. The secretary presented the auditor's report for 1957, whereupon Mr. Nelson moved that it be accepted and published in THE LOUISIANA ENGINEER, seconded by Mr. McLellan and carried.

A report of Mr. Louis Duclos, Chairman, Legislative Committee, was read, in which he recorded the society's proposed amendment to the Engineering Registration Act as revised and passed by the House of Representatives of the Louisiana Legislature and subsequently tabled by the Senate.

A report from the Monroe Section on Engineers' Week activities was read. Mr. McLellan moved that all reports on Engineers' Week be forwarded to the chairman of that committee with the request that he prepare a composite article for publication in the December issue of THE LOUISIANA ENGINEER. The motion was duly seconded and carried.

Mr. Nelson, Chairman of the Publications Committee, gave a resume of its activities and explained the difficulties encountered in publishing and obtaining advertising. He presented a table showing comparison of THE LOUISIANA ENGINEER'S advertising rates with those of similar publications. Mr. Peyronnin, Editor, discussed some of the problems encountered by the Cypress Publishing Company in handling our publication.

A letter from Mr. J. P. Tucker of Lake Charles requesting information on plans for the 1959 section tour speaker was read, whereupon the secretary was instructed to refer it to First Vice-President Sessums, sponsor of the Section Coordination Committee.

A letter from Mr. Tom C. David, State-wide Vocational Guidance Chairman, submitting a suggested comprehensive guide for Vocational Guidance activities, was read whereupon Mr. Janssen moved that the suggestions be approved, seconded by Mr. McLellan and carried. After some discussion of the matter of appointing individual board members to sponsor standing committees, the board unanimously named the following with the approval of the president:

Vocational Guidance	Second Vice-President E. A. McLellan
Annual Outing	Board Member Francis M. Taylor
Civic Affairs	Board Member Walter H. Scales
Legislative	Board Member Ben T. Bogard

President Freeman agreed to contact these sponsors with reference to their appointments.

The secretary reported receipt of an offer of $75.00 for the society's conference table and that Mr. Abrahm, Chairman of the special committee which studied the advisability of purchasing new addressograph equipment, had recommended that it be sold in order to make room for the new equipment. Mr. Janssen moved that the offer be accepted and Mr. Abrahm be thanked for his service, seconded by Mr. Domingue and carried.

Mr. Janssen moved that Mr. R. J. Goss, formerly of Baton Rouge and now residing in Ohio, be dropped in accordance with his request, seconded by Mr. McLellan and carried. Mr. McLellan moved that the following persons be reinstated to the grades indicated, seconded by Mr. Nelson and carried: J. Gerald Hotard, Baton Rouge, Member; Frank R. Lyman, Crowley (L.C.), Member; James L. Self, Lake Charles, Affiliate.

After some discussion Mr. Janssen moved that board meetings held in New Orleans on the date of regular society meetings be called for 4:30 p.m., seconded by Mr. McLellan and carried.

A new form of application for society membership proposed by the chairman of the Membership Qualifications Committee was presented. The secretary was instructed to invite the chairman to attend the board's next meeting to discuss the matter, after which the meeting adjourned.

J. P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction, Held at the Engineers' Club, New Orleans August 11, 1958

The meeting was called to order by President Freeman with Messrs. Bogard, Domingue, Janssen, McLellan, Nelson, Scales, Sutton, Taylor and Fernandez present. The chairman of the Membership Qualifications Committee also was present by invitation. Dr. Taylor moved that minutes of the July meeting be accepted as read, seconded by Mr. McLellan and carried.

The order of business was dispensed with to permit the Qualifications Committee chairman to discuss a proposed new application form for society membership. After some discussion Mr. Scales moved that a committee consisting of Messrs. Sessums, Fernandez, and the Membership Qualifications chairman be appointed to study the proposed form. Motion seconded by Mr. Domingue and carried.

In behalf of the Finance Committee, the secretary presented a semi-annual financial report which was accepted upon motion by Mr. Bogard, seconded by Mr. McLellan and carried.

A report on the 1958 Outing submitted by Mr. T. Benbury Lockett, Chairman, was read, after which President Freeman announced that he had thanked the chairman for the excellent work of his committee in handling this year's outing. In accordance with a suggestion contained in the report, Mr. Sutton moved that the 1959 outing committee be advised that the Board of Direction favors holding next year's outing in October instead of July. Motion seconded by Mr. Janssen and carried.

Mr. Nelson moved that the following persons be reinstated to the grades indicated, seconded by Dr. Taylor and carried: Karl C. P. Muller, New Orleans, Member; Walter A. Gehrke, New Orleans, Affiliate.

Mr. McLellan moved that Mr. R. K. Wilkerson, Beaumont, Texas, be dropped in accordance with his own request, seconded by Mr. Domingue and carried.

Mr. Nelson moved that the election of Charles I. Mansur, formerly of Baton Rouge but now transferred to Ohio, be declared void in accordance with his request. Motion seconded by Mr. Domingue and carried.

A letter from the Kansas Engineering Society requesting the society's schedule of fees for consulting engineers was read, whereupon the secretary was instructed to answer same.

Mr. Bogard read Senate Resolution No. 21 and House Resolution No. 40 recently adopted by the Louisiana Legislature. After some discussion Mr. Nelson introduced the following resolution which was seconded by Mr. Scales and adopted:

> "WHEREAS certain resolutions recently passed by the 1958 Louisiana State Legislature (Senate Resolution No. 21 and House Resolution No. 40) tend to weaken the present Engineering Registration Act, and
>
> "WHEREAS the Board of Direction of the Louisiana Engineering Society is gravely concerned over the potential adverse effect of these resolutions on the engineering profession, therefore
>
> "BE IT RESOLVED, that the matter be referred to the Professional and Civic Affairs Committee for study and suggestions as to public expression of the society's view.
>
> "BE IT FURTHER RESOLVED that the State Board of Registration and the society's Legislative Committee be apprized of this resolution."

Mr. Scales reported that he had been assured that the engineering profession would be properly recognized at the forthcoming dedication of the new Mississippi River Bridge.

President Freeman stated that Mr. Paul Robbins of NSPE had requested the LES to contact Senator Long, a member of the Finance Committee that reported unfavorably on the Jenkins-Keogh bill. President Freeman advised Mr. Robbins that the secretary already had contacted all Louisiana senators and representatives urging them to support the bill.

The secretary read an announcement of the Lake Charles Section's July meeting, after which the Board agreed that the Lake Charles officers should be commended for its excellent programs and method of arousing interest in the section.

A letter from Dr. Wayne P. Wallace, Chairman of the Awards Committee, was read, in which he urged board members to submit their candidates for the society's awards. The president urged board members to give the matter their careful consideration, after which the meeting adjourned.

J. P. FERNANDEZ, Secretary-Treasurer

Minutes of Regular Meeting of the Society held jointly with the Louisiana Section, American Society of Civil Engineers
Monday, August 11, 1958

The meeting was called to order by President Freeman, who welcomed approximately 125 members and guests in attendance. The secretary read minutes of the July meeting of the Board of Direction.

Mr. Z. W. Bartlett was called upon to read an obituary of the late Kenneth T. Price, and the secretary read a similar memorial honoring the late August H. Douglas. A moment of silence then was observed in memory of these two departed members.

In behalf of the Awards Committee, the president urged members to send in their nominations for 1959 recipients of the society's two medal awards.

The chair was relinquished to Mr. Hu B. Myers, acting for the chairman of ASCE, who called on Mr. F. E. Hogan to introduce the speakers of the evening, Dr. Weldon Attelt and Mr. Frank R. Rodrigues, consultants for Monorail of Louisiana, Inc., who presented a timely and interesting illustrated lecture on "Monorail — Why, Where, When."

Following the lecture, the chair was returned to President Freeman, who closed the meeting with a rising vote of thanks to the speakers.

Secretary-Treasurer

Minutes of Meeting of the Alexandria Section, Louisiana Engineering Society
June 19, 1958

The June meeting of the Alexandria Section of the Louisiana Engineering Society was held at the Alexandria Community Center at 7:30 P.M. June 19, 1958 with 22 members and 2 visitors present.

The meeting was called to order at 7:30 P.M. by President Moore.

President Moore pointed out that the lack of attendance in monthly meetings still remains a serious problem and asked that each one participate in stimulating interest in attendance and to help support projects such as the proposed Junior College. It was suggested by Mr. O. E. Barron that we change our meeting date from the third Saturday of each month. Mr. D. G. Hunter was asked by the President to act in the absence of the Attendance Committee Chairman with the Secretary and make a study of this change.

President Moore advised that an Executive Committee meeting has been set up for the third Tuesday of each month and that each committee chairman is invited and urged to attend.

Mr. Howard L'Heureux asked the assistance of the secretary in mailing out a list of the professional engineers in this area to each member of this section and asked their assistance in enlisting them in our society.

Mr. J. B. Smith chairman of the Jets Club asked the assistance of each member in enlisting sponsors for the Jets Club in those high schools that do not have a sponsor.

President Moore introduced Mr. M. G. Myers, Engineering Manager of the Westinghouse Inc., as guest speaker for the evening.

There being no further business the meeting was adjourned.

D. C. ROBERTS, Secretary

Minutes of Meeting of the Alexandria Section, Louisiana Engineering Society
May 22, 1958

The May meeting of the Alexandria Section, Louisiana Engineering Society was held at the Southern Bell Telephone Company Office, 825 Murray Street, at 7:00 P.M., May 22, 1958, with nine members and two visitors present.

The meeting was called to order by President Moore.

Mr. J. B. Smith, Chairman of the Jets Club, reported that the following members had given their assistance in promoting the Jets Club at the various high schools in the Alexandria Section: Mr. Cryer, Bolton High; Mr. Chappuis, Bunkie High; Mr. Sims, Marksville High. Pineville, Tioga, Boyce and Menard are still needing sponsors.

A motion was made by Mr. J. B. Smith and seconded by Mr. O. E. Barron that the president write a letter to the Chamber of Commerce outlining the following resolution:

> WHEREAS, The Alexandria Section of the Louisiana Engineering Society is striving for better education of Central Louisiana youth and,
>
> WHEREAS, The proposed Junior College at Chambers will provide for this great need in Central Louisiana,
>
> THEREFORE, Be it resolved that the Alexandria Section is in favor of the Junior College and that it places itself at the disposal of the Area Planning Committee for whatever assistance it may be able to give to further this goal.

President Moore asked the support of every member of this section in attendance at each meeting and promoting the sections progress.

The president introduced the speaker for the evening, Mr. W. E. Brasher, Public Relations Manager, who gave a very interesting talk on "Direct Distance Dialing" followed by a tour of the Central Office.

There being no further business the meeting was adjourned.

D. C. ROBERTS, Secretary

NEW MEMBERS

MEMBER

Robert J. Atkinson, Jr., New Orleans; Johnnie J. Broussard, Lake Charles; John S. Burwell, New Orleans; Charles E. Craig, Jr., Baton Rouge; Harold L. Flettrich, New Orleans; Walter K. Frantz, Jr., New Iberia; James R. Gilbert, Baton Rouge; David C. Hendrick, Baton Rouge; David A. Hopkins, New Orleans; Joseph C. Jagers, Alexandria; Charles I. Mansur, Baton Rouge; Roger L. Maurice, Baton Rouge; George K. P. Munson, New Iberia; Edward A. A. Nelson, Jr., Shreveport; Alvin J. Pokorny, Baton Rouge; Raymond Sloss, Baton Rouge; Arthur D. Stancliff, New Orleans; Eugene Y. Stewart, Lake Charles; Alcee N. Turcan, Jr., Baton Rouge; Theodore F. Wallander, New Orleans; Joseph D. Weldon, Port Allen.

TRANSFER FROM AFFILIATE TO MEMBER

Harold A. Miller, New Orleans.

TRANSFER FROM JUNIOR TO MEMBER

Carl B. Whyte, Jr., New Orleans.

AFFILIATE MEMBER

Dudley C. Beene, Shreveport; John E. Helquist, Baton Rouge; Alvin R. Hudspeth, Lake Charles; Ainsworth V. Jordy, Metairie; David B. Lawrence, New Orleans; Donald D. Lincoln, Alexandria; Martin J. Ripp, New Orleans.

TRANSFER FROM JUNIOR TO AFFILIATE MEMBER

Dallas C. Roberts, Alexandria.

JUNIOR MEMBER

Lionel C. Allmand, Jr., Baton Rouge; Robert J. Breaux, New Iberia; Kenneth R. Chitty, Lake Charles; Marion E. Council, Baton Rouge; John F. Grosch III, New Orleans; Harvey D. Shaffer, Baton Rouge; Harry W. Stinchcomb, New Orleans; Jack B. Waltrip, Baton Rouge.

TRANSFER FROM STUDENT TO JUNIOR MEMBER

The following graduates of Southwestern Louisiana Institute: Wilbur C. Andrepont, Richard A. Arnaud, Ervin Baudoin, Dudley J. Bertrand, George Bivans, Jr., Joseph Curtis Broussard, Dudley J. Deville, John E. Dixon, John A. Doucet, John D. Dubois, Raymond A. Goulas, Melvin L. Green, Earl J. Guidry, Charles L. Guidry, Joseph T. Guidry, Gerald Laborde, Randolph A. LeBlanc, Elmer R. Leleux, William T. Lowrey, Larry L. Moreaux, Melvin Morgan, Jesse C. Odom, Glenn H. Ortego, Luke J. Piranto, Arthur M. Richard, Francis J. Robertson, Allen J. Rogers, Eugene M. Sellers, Sidney S. Smith, Hubert A. Vonderstein, Fred E. Watkins, Carrol J. Wyble.

JUNIOR MEMBER SCHOLASTIC AWARDS

Allan Roy Bundy, graduate of Tulane University

Jerry N. Garner, graduate of Louisiana Polytechnic Institute

JUNIOR MEMBERSHIP AWARDS

Donald P. Boudreaux, New Orleans, Graduate Tulane Univ., B.S.C.E.
John D. Charbonnet, New Orleans, Graduate Tulane Univ., B.S.C.E.
Darwayne W. Coburn, New Orleans, Graduate Tulane Univ., B.S.Ch.E.
Carl F. Dahlberg, New Orleans, Graduate Tulane Univ., B.S.C.E.
Henry G. Favrot, New Orleans, Graduate Tulane Univ., B.S.C.E.
Edward J. Foss, New Orleans, Graduate Tulane Univ., B.S.C.E.
Victor A. Friese, Jr., Fort Worth, Tex., Graduate Tulane Univ., B.S.C.E.
Gerald R. Fucich, New Orleans, Graduate Tulane Univ., B.S.M.E.
James O. Gundlach, New Orleans, Graduate Tulane Univ., B.S.M.E.
Harold W. Helmke, Jr., New Orleans, Graduate Tulane Univ., B.S.Ch.E.
Sidney F. Lewis IV, New Orleans, Graduate Tulane Univ., B.S.C.E.
George F. Liebkemann III, New Orleans, Graduate Tulane Univ., B.S.M.E.
Charles E. Loeb, Jr., New Orleans, Graduate Tulane Univ., B.S.C.E.
Daniel J. Mehn, New Orleans, Graduate Tulane Univ., B.S.C.E.
Arturo M. Molinari, Buenos Aires, Argentina, graduate Tulane Univ., B.S.M.E.
Harry W. Ollinger, Mobile, Ala., Graduate Tulane Univ., B.S.C.E.
Thomas M. Randolph, New Orleans, Graduate Tulane Univ., B.S.M.E.
Samuel Z. Scandaliato, New Orleans, Graduate Tulane Univ., B.S.C.E.
Robert H. Schroeder, Jr., New Orleans, Graduate Tulane Univ., B.S.C.E.
Arnold R. Smythe, Jr., Batesville, Miss., Graduate Tulane Univ., B.S.C.E.
Frederick L. Tilley, New Orleans, Graduate Tulane Univ., B.S.C.E.

THE LOUISIANA ENGINEER

OCTOBER 1958

"Patronize Our Advertisers"

INDEX TO ADVERTISERS

This Journal reaches the officials with whom rests the responsibility for the bulk of the municipal, state and industrial works in Louisiana and the surrounding territory. Its advertising pages afford you an effective and dignified means of cultivating a wider acquaintance among prospective buyers.

THE LOUISIANA ENGINEER

Vol. 44 DECEMBER, 1958 No. 6

CONTENTS

EDITOR: Chester A. Peyronnin, Jr.

Tulane University Station, New Orleans, La.

PUBLISHER: Cypress Publishing Company

724 Girod Street, New Orleans, La.

THE LOUISIANA ENGINEER is the official publication of the Louisiana Engineering Society and is published in February, April, June, August, October, and December. Subscription, $3.00 per annum; single copy, 50 cents.

Second Class mail privileges authorized at New Orleans, Louisiana. Acceptance for mailing at special rate of postage provided for in Section 1105, Act of October 3, 1917, authorized August 1, 1918

LOUISIANA ENGINEERING SOCIETY

404 Baronne St.

OFFICERS OF THE SOCIETY

ERNEST M. FREEMAN, *President*, 1103 Henry C. Beck Building, Shreveport

ROY T. SESSUMS, *First Vice-President*, P. O. Box 1520, New Orleans 5

EDWARD A. McLELLAN, *Second Vice-President*, P. O. Box 238, New Orleans 3

JOHN P. FERNANDEZ, *Secretary-Treasurer*, 522 Crystal Street, New Orleans 24

BOARD OF DIRECTION OF THE SOCIETY

BEN T. BOGARD, 36 University Drive, Ruston

JAMES S. JANSSEN, 317 Baronne Street, New Orleans 9

WALDEMAR S. NELSON, 1200 St. Charles Avenue, New Orleans 13

WALTER H. SCALES, 1822 Valence Street, New Orleans 15

FRANCIS M. TAYLOR, Tulane University, P. O. Station 20, New Orleans

OFFICERS OF STATE SECTIONS

Alexandria Section:

ANDREW M. MOORE, *President*, 1423 Donahue Ferry Road, Pineville

DALLAS C. ROBERTS, *Secretary-Treasurer*, 825 Murray Street, Alexandria

Baton Rouge Section:

WALTER L. SUTTON, *President*, 9653 Molly Lea Drive, Baton Rouge

HAROLD F. LEIENDECKER, *Secretary-Treasurer*, 657 Carol Marie Drive, Baton Rouge

Lafayette Section:

EMERY DOMINGUE, *President*, P. O. Box 485, S.L.I., Lafayette

WALTER C. VINCENT, *Secretary-Treasurer*, P. O. Box 595, Lafayette

Lake Charles Section:

GLENDON L. SMITH, *President*, 39 Horseshoe Lane, Maplewood

MARION D. GARRISON, *Secretary-Treasurer*, 1709 Kirkman Street, Lake Charles

Monroe Section:

FARRELL W. ADAMS, *President*, Box 2867, Monroe

DAN D. McDUFF, *Secretary-Treasurer*, 602 Balboa Sereet, Monroe

Shreveport Section:

JOHN S. MALAHY, JR., *President*, 330 E. Kings Highway, Shreveport

ORVILLE T. ICE, JR., *Secretary-Treasurer*, 522 Egan Street, Shreveport

STUDENT CHAPTER NO. 1 SOUTHWESTERN LOUISIANA INSTITUTE

CHARLES R. BAKER, *President*, Box 119, S.L.I., Lafayette

JAMES M. McCLANAHAN, *Secretary*, Gen. Delivery, S.L.I., Lafayette

MONORAIL

Weldon F. Appelt

INTRODUCTION

Transportation in large cities has developed from the omnibus through horse-cars, cable cars, to trolley, subway and elevated lines and is now entering a new era of suspended MONORAIL transit. Surface car transportation average speeds range from 8 to 12 miles per hour, the higher speeds occuring in suburban districts and the lower speeds in congested city sections. For a more rapid movement of passengers and to provide a greater passenger capacity, the suspended MONORAIL operates on an unobstructed right-of-way above the congested surface area. Average speeds on the MONORAIL system can be greater than on present-day subway or elevated lines with comparable station spacing. Maximum speeds of over 100 miles per hour are obtainable.

Because of the increasing automobile traffic, surface mass transportation has been slowed down tremendously and has become a real problem in recent years. Construction of multi-lane freeways leading into metropolitan areas has only necessitated the expansion of parking facilities and caused greater traffic congestion.

Rapid transit, free from all surface operation and congestion, is essential to the prosperity and growth of all large cities and the importance of adequate transportation facilities has been demonstrated in the development of all the larger cities throughout the world. The expansion of a city is seriously handicapped if a means of traveling from one section to another in a short period of time is not available.

MONORAIL serves as an economical and convenient means of access to the shopping and business districts. The territory available for residential purposes is increased and the concentration of workers in homes near offices and factories is avoided. Today, to meet the transportation requirements, the larger cities must have a system likened to arteries and veins. MONORAIL is the artery, supplementing or taking the place of subway and elevated lines, that will provide fast, economical transportation of passengers between the suburbs and central city areas. These in turn, are fed by veins in the suburban and city areas. These veins are bus or trolly lines which fan out from terminal points, providing local feeder services.

A BRIEF HISTORY OF MONORAIL

On February 18, 1956, the Skyway Monorail, designed and constructed by Monorail, Inc., was christened with a kiss and introduced to transit officials, the press and the public at Arrowhead Park in Houston, Texas. During the next few days the event was noted in virtually every newspaper in the United States and in many foreign newspapers. In the months since that time it has received world-wide attention. In the fall of 1956, the Houston installation was moved to the State Fair Park in Dallas, Texas. Now on a daily operating schedule it has surpassed all expectations of performance and public acceptance.

The idea of mass transportation by a conveyance traveling on a single rail has intrigued imaginations and looked very promising for a long time. It was discussed before the automobile and airplane were invented. Several short monorail lines were actually constructed in the eastern United States late in the last century, but for various reasons each of them failed.

———

Delivered at August 1958 meeting. *Mr. Appelt is the Vice-President and Director of Engineering for Monorail, Inc. of Houston, Texas.*

As early as 1826, a Mr. Robert Mills of Columbia, South Carolina, proposed to the Post Master General of the United States that a monorail line, with horse drawn vehicles, be constructed between Washington, D.C. and New Orleans for the purpose of carrying passengers and the mail. Mr. Mills claimed that the normal travel time of twenty-six days between the two cities could be reduced to only eight days over his monorail line.

The most important of the several short monorail lines constructed in the latter part of the 1800's, was a six mile line which ran between the towns of Bradford and Gilmore in the oilfields of northwestern Pennsylvania. The Bradford and Foster Brook Railway Co. was formed in 1878, and built the line primarily for hauling heavy oil field equipment which could not be transported by other means over the deeply mudded roads. Despite difficulty in loading freight into the cars, which were ten feet off the ground, and many unfortunate accidents, the line thrived for a time.

In order to compete with a narrow gage railway which had been built parallel to the Bradford and Foster Brook, the company ordered a new locomotive which was designed to increase the 20 mile an hour train speeds. On its trial run, January 29, 1879, it suddenly came to a stop and a moment later exploded, killing six men. Management suspended operations in the hope that the public would forget. They were mistaken, and in 1880, the line was seized by the Sheriff and sold to a junk dealer who dismantled it.

In 1892, a Mr. Boynton succeeded in running a locomotive at a reputed 60 m.p.h. on a non-elevated single rail in the section of land now called Brooklyn. The line soon came to be known as the Boynton Bicycle Railroad. Another gentleman named Meigs built a streamlined model monorail elevated streetcar in East Cambridge, Massachusetts in 1886, but it was only for demonstrations.

Construction costs of Monorail compare very favorably to subway and highway costs. As projected in these specifications, the cost of MONORAIL is less than $1,000,000 per mile when based on material and labor costs as found in Houston, Texas. Compare this to $25,000,000 to $30,000,000 for a mile of subway; $10,000,000 to $12,000,000 per mile of depressed highway and $4,000,000 to $6,000,000 for a mile of freeway or elevated highway.

In most cases, monorail rights-of-way are simpler to obtain because the only surface right-of-way needed is about four feet square at about 100 foot intervals and aerial right-of-way. The rail can vary in height from about 12 feet to 50 feet or more. It can travel underground as well as above.

Monorail is not restricted to passenger carrying; it will serve as an economical high speed freight carrier. A plan has been drawn up for marine application for loading and unloading ships, thereby eliminating the necessity for building more expensive harbor facilities. Also these systems can be set up and removed in a very short time and would be ideal in cases of national emergency.

But the primary aim of Monorail is to relieve the traffic congestion in urban and suburban areas. It is planned to supplement existing bus and trolley lines; the Monorail system being the express line and the bus or trolley systems being feeder systems. Stations on the edges of cities surrounded by parking lots for suburbanites to park their cars, board the Monorail and get downtown in a matter of minutes are envisioned.

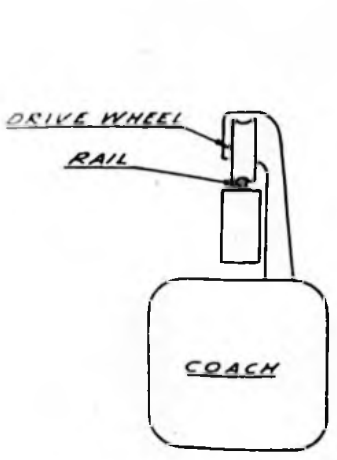
Thus far, the world has had only one successful monorail system, the one which has been in service the past 57 years in Wuppertal, Germany. This system has compiled an amazing record of safety. Since 1901 it has carried more than 1,000,000,000 passengers without a fatality.

Basically, there are three kinds of mass transportation type monorail. The Wuppertal system in Germany utilizes what has been referred to as classical Monorail – that is, steel drive wheels are mounted in line and travel on a single rail. The Monorail, Inc. concept has pneumatic tired drive wheels traveling on top of a triangular shaped box beam which is 17" wide at the top. All the drive mechanism is

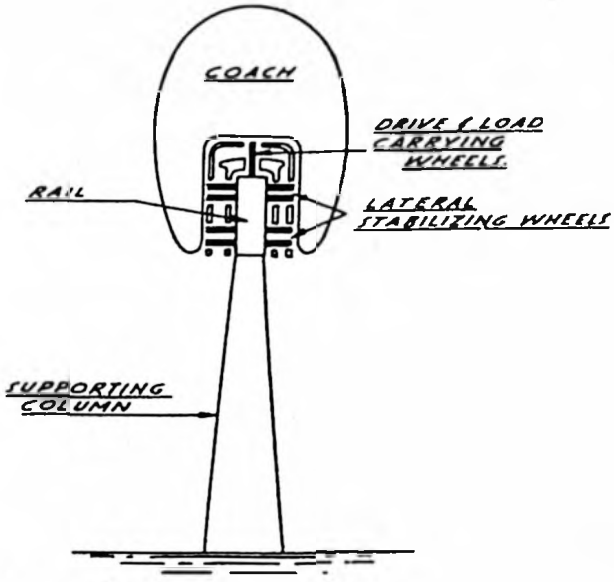
installed above the rail in the power nacelle which is connected to the coach below the rail by "C" shaped hangar arms.

Dr. Axel Wenner-Gren, a Swedish industrialist, has built still another concept of monorail near Cologne, Germany, called the ALWEG system. The coach straddles the rail with the drive wheels operating on the top surface and laterally mounted stabilizing wheels operating against the sides of the rail.

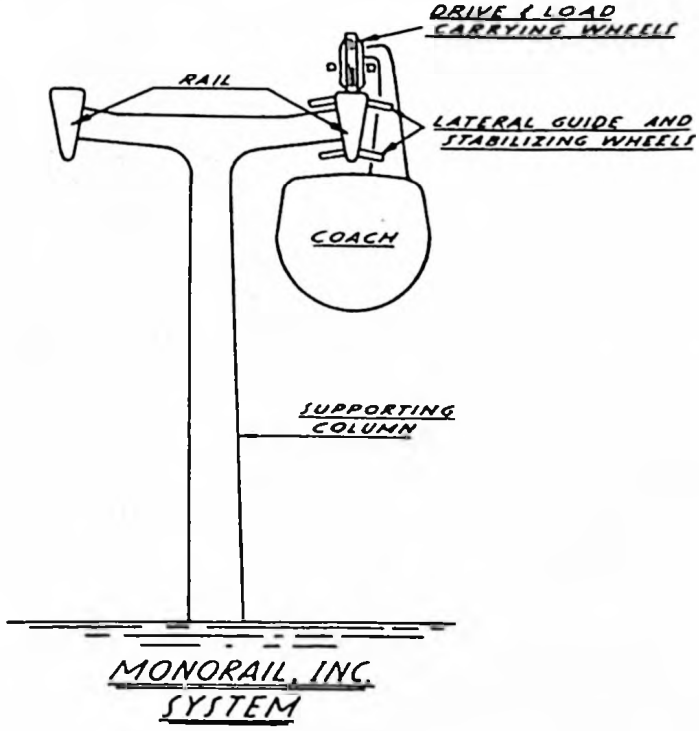
Many cities, both domestic and foreign, recently have been given proposals for monorail systems and many others are undergoing feasibility surveys which are being conducted by Monorail corporations and/or interested civic or business groups. It is quite possible that Monorail towers and beams may be popping up most any place in the world in the very near future.



WUPPERTAL OR "CLASSIC" SYSTEM



ALWEG SYSTEM



MONORAIL, INC. SYSTEM

DESIGN CONSIDERATIONS

The structural design of the foundations, towers and rail is based on a cantilevered loading consisting of loaded multiple-coach trains located in the various relative positions to cause maximum stresses to be set up in the structure. For the condition of a single track system the unbalanced weight of the rail and tower is also considered. An impact factor of 1.25 is used with reference to the live load of the train and passengers. Horizontal wind loading equivalent to 30 pounds per square foot is used on all projected surfaces of the towers, rail and trains. Maximum torsional moment is calculated as that caused by wind loading on the difference in area of the train above and below the neutral axis of the rail. Longitudinal loading caused by acceleration and deceleration equal to locked wheel condition for a loaded train is used. A centrifugal force 0.40 times the weight in pounds of the moving unit is used, this is equivalent to negotiating a 150' radius curve at 30 miles per hour or 60 miles per hour around a 600 foot radius curve. Necessary expansion joints are provided. The basic allowable design stress is 20,000 pounds per square inch for A.S.T.M. A-7 structural steel and 27,500 psi for A.S.T.M. A-242 (Tri-Ten or equal structural steel).

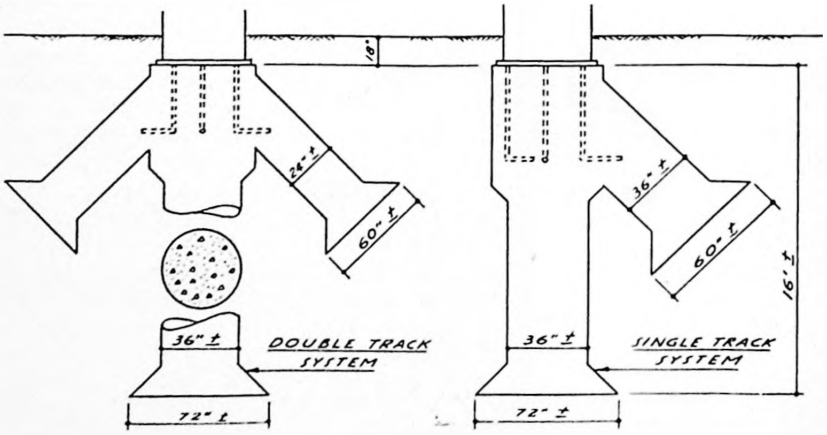
Basically, drilled and belled steel reinforced concrete foundations will be used; the exact size and shape to be determined by sub-surface borings and exploration.

FOUNDATIONS

The foundations basically consist of a vertical circular shaft of steel reinforced concrete (2500 PSI minimum) approximately 36 inches in diameter and a 30° "bell" on the bottom with an expanded diameter of approximately 72 inches.

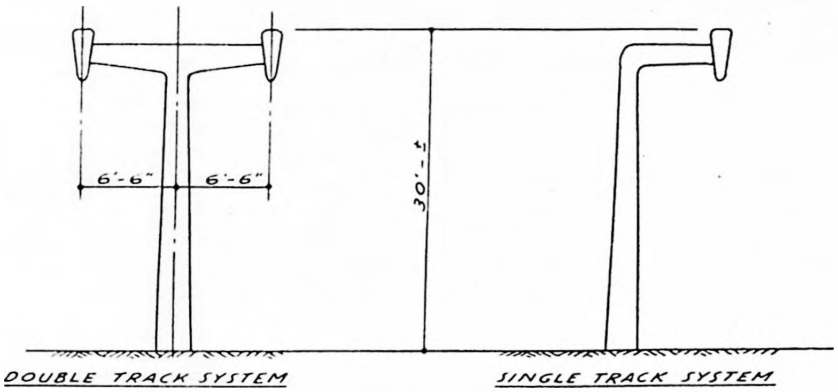
Foundations for single track towers are further balanced and braced by a second shaft of the same dimensions at an angle of 30° to 45° from the vertical projecting in the same direction as the cantilevered arm of the tower. Foundations for double track towers are further balanced and braced by two auxiliary shafts of reduced dimensions at an angle of 30° to 45° from the vertical projecting in a plane transverse to the rail. Because of the balancing effect of the double track, the dimensions of the auxiliary shafts for these foundations may be reduced to 24 inches with a 60 inch "bell." The depth and final dimensions of the shafts will be controlled by local soil and sub-surface conditions. In some cases where depth is not possible for this type of footing, a mass spread type footing may be used.

To assure adequate stress transfer from the tower to the foundation, a steel base plate of greater dimensions than the base of the column is anchored in the foundation. The tower is then erected by welding to this base plate.



THE TOWERS

The towers consist of a steel, hermetically sealed, rectangular cross-section, internally stiffened, welded box section. The towers are tapered in depth from the ground to the point of curvature of the cantilever arm. The cantilever arm is curved in a manner that gives it a pleasing appearance and at the same time reduces the stress concentration in the area of the change of direction. The towers are normally spaced on approximately 100 foot centers.



The single track towers consist of only one cantilevered arm and the double track towers consist of two cantilevered arms on the main tower body. It can be seen that, where possible, a double track system should be used because the only added cost of a double track over a single track system is the cost of the second rail itself. The savings effected in the foundation and the tower body due to the balancing effect tend to offset the added cost of the second cantilever arm.

In order to clear special obstacles, the tower height can be designed to allow clearance of the bottom of the coach to range from 0 to 50 feet or more above the normal grade of the street level.

The towers on the downtown curbs may be used as streetlight poles, street-markers, traffic control light supports, or otherwise used or painted to blend into the surroundings. The towers will be painted with a primer coat of red lead plus two metal protective color coats; the color to be determined by the purchaser.

THE RAIL

The rail consists of a steel, hermetically sealed, triangular shaped, welded box girder. The triangular design economically allows needed added depth while retaining a necessary streamlined and pleasing appearance.

The rail is approximately 30 feet above the street level and in the downtown area there will probably be only one rail per street. The 17 inch wide beam 30 feet in the air is designed to be esthetically acceptable to downtown locations.

The rail will normally span 100 feet between towers, but can be increased to 150 feet or more in special cases. The minimum turning radius will allow the negotiation of a 90° turn on a standard downtown street intersection.

With only pneumatic tires in contact with smooth steel and with the power unit riding on top of the rail, the train will be noiseless to the passengers and the man on the street, whether combustion engine or electrical traction motors are used.

Expansion joints are located at or near the point of contra-flexure of a span and are spaced in accordance with local condition requirements. An interwoven finger-type mitered track surface expansion joint affords bumpless and noiseless operation of the pneumatic tires over this joint.

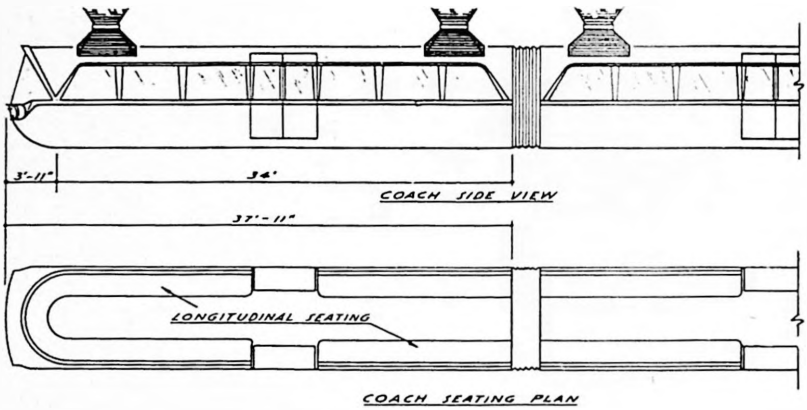
If an all electrical system is used, the conductors are attached to the lower portions of the rail with the main feeder line inside the rail. The interior of the rail may also be used as a conduit for other electrical, gas or water services where they would be protected and yet readily accessible for service.

The rail will be painted with a prime coat of red lead, plus two metal protective color coats; the color to be selected by the purchaser. Certain esthetic values can be obtained by the color scheme used on the towers and rail.

THE COACH BODY

The construction of the coach body employs the principle of aircraft design to achieve a strong yet light weight structure that is aero-dynamically correct and very modern and pleasing in appearance.

The exterior of the coach is anodized aluminum and green tinted solex type windows with natural aluminum or chrome trim. With this light weight, wear resistant and corrosion resistant construction, maintenance on the car body will be a very small factor.



SEATING FOR 40 PASSENGERS PER COACH

To insure a long lasting and pleasing appearance of the interior, rigidized metals and plastics are used almost exclusively. The floor is vinyl plastic tile; the wall panels below the window level are scratch and wear resistant rigidized metal; the ceiling is light-reflective fiberglass reinforced plastic; the seats are molded fiberglass reinforced plastic and are very comfortable, light and practically indestructible. The interior is lighted with fluorescent tubes running the full length of the coach. The coach is well ventilated by forced draft system which will, for safety and simplicity, allow the windows to be fixed panels rather than sliding sections. Windows comprise 25% of the total surface area of the coach body to afford an excellent view for both seated passengers and standees and will allow sufficient light to enter the coach.

Coaches are made in three basic types or styles. First is the powered head-end coach which is the primary control coach for all train operation. The trailing end of this coach is square cut for train operation but has an end closure so that it may be operated independently as a one-coach unit in off peak periods. Second is a train make-up coach that is squared off on both ends to be used between the head-end

coach and a trailing-end coach. Depending on the number of coaches required in any given train, this coach could be either a powered coach or a pure trailer. Third, is a trailing-end coach which is powered and equipped with modified controls for limited operation. All coaches in train hook-up may be designed for physical intercommunication, or closed compartments as desired.

The basic coach is 34 feet long, 8′ high and 7′-11″ wide with seats for 40 and room for 30 standees without crowding. This passenger loading allows 3.75 square feet per passenger, or 1.8 passengers per foot of car length as compared to 1.9 square feet per passenger, or 4.96 passengers per foot on the present subways.

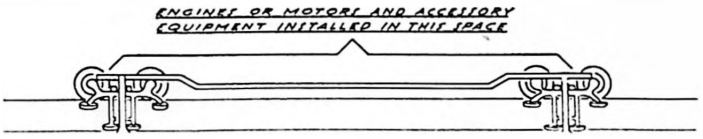
The head-end coach and the trailing-end coach are 3′-11″ longer to streamline the train. A three-coach train is approximately 115 feet long.

One door with a clear opening of 60 inches is located on one side of the coach at or near the center to afford maximum accessibility to all passengers and facilitate rapid loading and unloading. The door is equipped with sensitive edges for safety against accidental closure on a passenger or an object. The control equipment is also interlocked to avoid movement of the train before all doors are safely closed.

The operator is located in the forward end of the power nacelle of the head-end coach with all necessary control equipment for complete and safe operation of the train. All control apparatus is equipped with dead-man safety devices and all controls subjects to failure are of "fail-safe" design. In an all-electric system, the equipment is suitable for fully automatic operation.

THE POWER NACELLE

The power nacelle consists of propulsion equipment, truck assemblies or bogies, load wheels, guide wheels and accessory equipment. The power nacelle is an independent unit that is completely detachable from the coach body. Power nacelle units may be inter-changed on coach bodies of like control design. This will allow shop maintenance and repair on either the coach body or power nacelle without the other being idle.



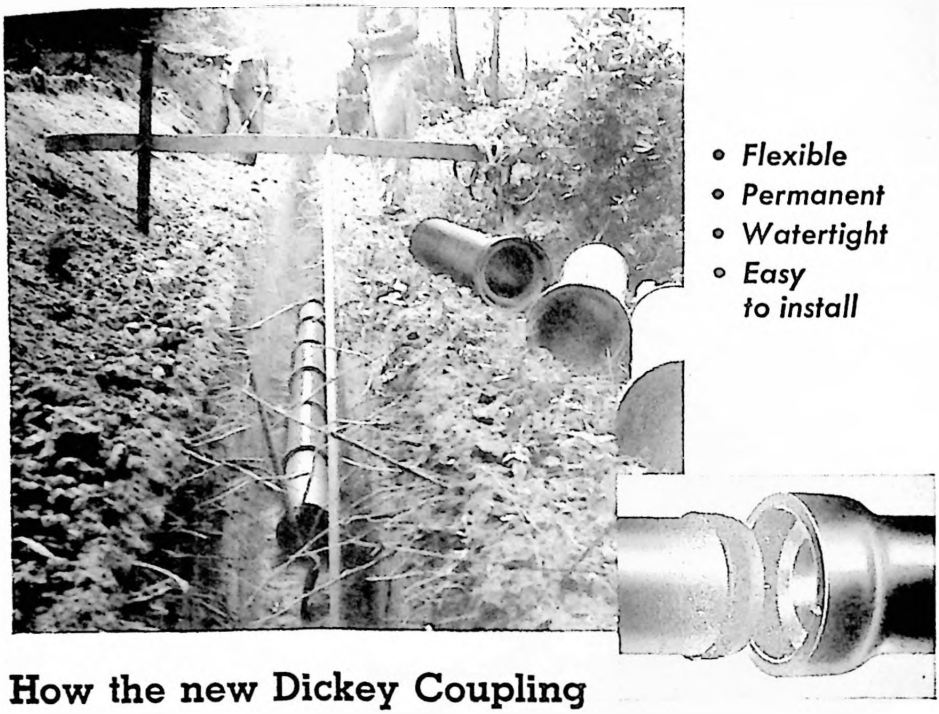
Each powered coach on an all-electric system has two to four 600 VDC traction motors varying with the individual system requirements, with complete automatic step control acceleration and dynamic braking. The powered coaches on a combustion engine system has either one or two engines of comparable operating characteristics as the electric traction motor system. The combustion engine drive unit is connected to a standard final drive unit through a torque converter to assure smooth and synchronous operation of multiple units.

The truck assemblies are tied together by the upper structural frame that supports all the propulsion equipment and accessory items. For an electric application, the motors are mounted on the frame with the accessory equipment.

For the combustion engine application, the engines are mounted on the frame with a universal joint connection to the final drive on the truck assembly.

Coupling is obtained by automatic or remote controlled standard lock-tight couplers with through connections for all controls.

Braking is accomplished by use of standard drum type air activated brakes on each load wheel. On the electric application, these drum brakes are installed on only one-half of the load wheels to be used in lieu of, or in combination with, dynamic braking in case of an emergency or at slow train speeds. The brakes are interlocked with the door operation and with the operator controls for maximum safety.



- *Flexible*
- *Permanent*
- *Watertight*
- *Easy to install*

How the new Dickey Coupling

locks in sewage - locks out roots

Now, the new Dickey PVC* Coupling makes it possible to build sewers with completely watertight joints—no infiltration and no root penetration. With this new Dickey Coupling, you can make joints so tight—in wet trenches and even under water—you literally lock in sewage, lock out roots. Easy and fast to install, just a firm push of the spigot into the bell forms a compression-type joint that remains flexible. Destructive sewer gas won't harm it... corrosive acids can't injure it. For generations of trouble-free sewers, always specify Dickey Salt-Glazed Vitrified Clay Pipe with the new Dickey PVC Coupling.

*Polyvinyl chloride

Send today for free fact-filled Bulletin 718

Providing improved sanitation for better living

DICKEY sanitary salt-glazed clay pipe

W. S. DICKEY CLAY MFG. CO.

Birmingham, Ala. Chattanooga, Tenn. Kansas City, Mo. Meridian, Miss.
, St. Louis, Mo. San Antonio, Tex. Texarkana, Tex.-Ark.

8012 If it's made of clay it's good... if it's made by Dickey it's better

SWITCHING

Switching of the suspended coach on the monorail track is accomplished by the pivoting of an 80 to 150 foot section of the main line. This is accomplished by two different types of operation. In one case, one end of an 80 foot section of the main line is moved horizontally a distance of approximately 8 feet, while at the same time, one end of a curved 80 foot section is pivoted into the position vacated by the main line section. In the other case, one end of a 150 foot section is pivoted to the main line and the other end is moved vertically a distance of approximately 10 feet and is locked into position with another track on this second level. Depending on the location and use of this switch it may be made to switch to a higher or lower level

The horizontal switch is used for making a right turn on a double track line or a right or left turn on a single track line. The vertical switch is used for making a right or left turn from either a single or double track line and also to switch "off-peak" trains to a storage area.

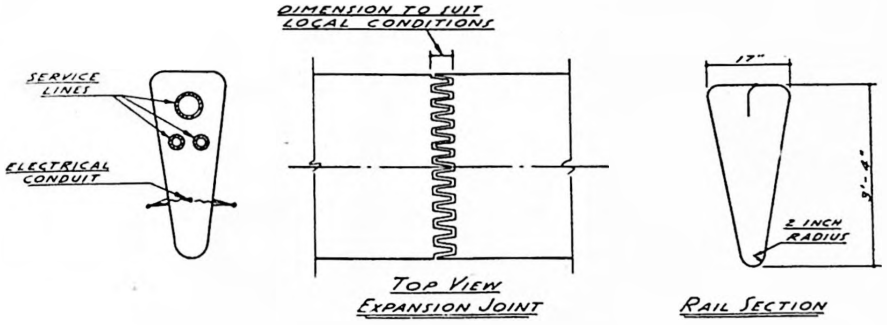
Safety interlock is provided that will apply the brakes of an incoming train in the event the switch mechanism is not positioned correctly and locked. Switching from one line to another is accomplished in 10 seconds or less.

STATIONS

Station design is so controlled by the particular location that no specific recommendation can be proposed until definite locations are determined.

Downtown stations will very probably be elevated platforms cantilevered from a building with access either through the building or store lobby, or by stairs and/or escalators from the street. The suburban stations may have elevated or ground loading facilities depending on the need and available room.

Stations will be equipped for turnstile operation to assure a minimum of dwell-time of the train caused by loading.



MAINTENANCE STATIONS

Maintenance stations will require little more than standard equipment that is used in present day transit maintenance stations. Their design and size will depend on the location and the number of units to be serviced.

As the coach body is easily detachable from the power nacelle, these sections may be handled as separate units in the shop. Because each coach body can be used with any power nacelle, a minimum reserve number of either will be necessary to keep a complete passenger unit in service.

The individual units are easily handled in the shop with tractor drawn trailers and with commercial material handling traveling cranes.

Field Notes

EJC INSIGNIA — The new insignia, chosen by a poll of the Board of Directors, from a large number of designs suggested, is shown here. This will be used in many ways in the future to identify materials from EJC and a modification of the design will be used as the EJC Corporate seal.

° ° ° °

NEW EJC MEMBER — Acceptance of the South Carolina Society of Engineers as an affiliate member of EJC was voted by the Board in September. This brings EJC's membership to a round 20.

° ° ° °

1958 SURVEYS — The most comprehensive study of engineering salaries ever made in the U. S. is now being completed by the EJC. Advance orders are being accepted now from EJC, 29 West 39th St., New York 18, $3.00 a copy. In addition the study on Demand for Engineers is expected to be completed in the near future.

° ° ° °

NO DEGREE — NO PROFESSIONAL STATUS — The NLRB has again indicated its newly-discovered emphasis on formal college degrees to establish professional status under the Taft-Hartley Act. The Board found "sales correspondents, special machinery," outside the professional definition because "unlike the Servo correspondents, they are not required to have a college engineering degree or its equivalent." (Kearney & Trecker Corp., 121 NLRB No. 107)

° ° ° °

At a recent meeting of the Texas State Board of Registration for Professional Engineers the board decided to re-instate their former practice of granting reciprocity to Louisiana Engineers who were licensed by virtue of engineering degree or examination. The Louisiana Board immediately announced that it will accept registrants from Texas on the same basis.

° ° ° °

ENGINEERING GRADUATES 1959 — Following, by curricula, is our forecast of engineering graduates for 1959. Mortality rates have been changing — for the worst — in recent years so the development of these figures is not as simple a statistical exercise as some may imagine. 1957 and 1958 figures are presented also to provide some idea of trends.

From Colleges With ECPD Accredited Curricula	(1956-57) 1957 Actual	(1957-58) 1958 Estimated	(1958-59) 1959 Projected
AERONAUTICAL	984	1150	1300
CHEMICAL	2712	3000	3100
CIVIL	4275	4900	5300
ELECTRICAL	7510	8500	9500
GENERAL	624	675	750
INDUSTRIAL	1595	1800	1900
MECHANICAL	6952	7900	8700
METALLURGICAL	572	650	750
MINING	481	525	600
PETROLEUM	644	750	800
ALL OTHERS	1399	1650	2300
TOTAL	27748	31500	35000
From Other Colleges	3463	3500	4000
GRAND TOTAL	31211	35000	39000

JENKINS-KEOGH PROPOSAL — The Jenkins-Keogh proposal, overwhelmingly passed by the House, languished in the Senate Finance Committee when Congress adjourned. Despite intensified last-ditch efforts by the American Thrift Assembly and its constituent organizations, including NSPE, the Finance Committee **failed to hold hearings on the bill or take any positive action to report the bill in time for Senate floor action.**

An attempt was made to pass the Jenkins-Keogh principle in the Senate when Senator Potter of Michigan offered the Jenkins-Keogh bill as an amendment to a technical tax adjustment measure then under consideration. However, on a parliamentary point of order, the Potter amendment was ruled "not germane" to the technical tax bill, and was eliminated on this technicality.

The American Thrift Assembly is already laying the ground-work for its campaign to have the Jenkins-Keogh principle passed by Congress during the 86th Session. Although the bill did not pass this year, the progress actually achieved is encouraging, for it represents a favorable popular sentiment among members of Congress toward the principle of equality for the self-employed.

o o o o

NATIONAL ENGINEERS' WEEK

FEBRUARY 22-28, 1959

Few members of the public have any conception of the vast impact engineers and engineering have upon their way of life. National Engineers' Week, sponsored nationally by the National Society of Professional Engineers and in our state by the Louisiana Engineering Society, is designed to translate the tremendous achievements of engineering into the terms an average citizen can understand and appreciate.

It is up to us as engineers, not only to realize this fact ourselves, but to do all within our power to enlighten the public on this score. Particularly is this true during National Engineers' Week. Every member of the Louisiana Engineering Society should do his part, either as a member of one of the committees appointed by the society for this purpose, or as a committee of one. This latter suggestion is one that could be put into effect the year round.

Every state section of L.E.S. has been asked to appoint an Engineer's Week Committee. These committees have been furnished with one of the very excellent kits of material furnished by the N.S.P.E. There are also additional aids that can be purchased or, in some instances, obtained free upon application. The society has granted each section a small budget for the purchase of these additional aids. The type of program each section puts on is only limited by their imagination and the amount of energy they put into it.

Some of the projects that have been successful in the past are given here for your consideration. Proclamations by the governor and the mayors of the various cities, articles in the newspapers and various other publications, meetings of engineering groups, addresses to engineering school student bodies and to high school juniors and seniors, talks before civic and business clubs, window displays, and radio and TV spot announcements and discussion sessions are highly recommended.

Your society is depending on you to make this year's observance of National Engineers' Week one that will be long remembered.

Engineering Research At An Undergraduate College

Dr. Virgil Orr*

The engineering college research council has stated "by its research as by its teaching, American engineering education contributes to the health, wealth, and well-being of free men—helping to assure an ever-higher standard of living in America and throughout the world." This statement embodied the desires of several of the members of the faculty of Louisiana Polytechnic Institute in 1952 when I joined that faculty. Some research was initiated without any formal organization within the school to nurture it, although a private corporation was utilizing school facilities on a reimbursed basis to do contract development and research work. Motivation of the administration to create a formal branch of the existing organization to expedite and promote basic and applied research came in 1953 through the efforts of the Dean of engineering and some interested faculty members. Impetus was given to this move by an E.C.P.D. inspection report of October 1953, to the effect that "while a basically undergraduate-teaching institution cannot be expected to compete with a graduate school in research activity, some personal participation in creative professional activity among an *appreciable fraction* of the faculty is increasingly regarded by the engineering profession as requisite for good teaching of undergraduate subjects." By implication "creative professional activity" means primarily "research and publications."

The Department of Engineering Research has been established as an administrative entity in a manner paralleling the academic departments for budget purposes. Two exceptions are notable in that no faculty or staff personnel are carried under this department. Even the head of the Research Department is carried under the appropriate academic department. The only funds appropriated by the school for personnel in this department are for student labor. The other distinguishing characteristic is that the operations of the department are free to cross all departmental boundaries within the School of Engineering and to go outside the School of Engineering to enlist the cooperation of other disciplines on the campus. To effectively control personnel drawn from various academic departments who were to be utilized in research projects a Research Coordinating Committee was established composed of the Head of Engineering Research as chairman, the Dean of the School of Engineering or his appointed representative, and each of the six academic department heads. All matters of policy are decided by this group.

The research projects undertaken thus far and the monetary support of these projects fall naturally into three categories:

First, projects originated and supported entirely within the School of Engineering. These are usually fundamental studies of relatively small scope that are of particular interest to the investigator. Several such pro-

---

* *Dr. Virgil Orr is a Professor of Chemical Engineering and Director of the Department of Research at Louisiana Polytechnic Institute.* *This paper was delivered at the Annual Meeting of the Southeastern Section of the American Society for Engineering Education in Miami, Fla., on Friday, April 18, 1958.*

jects are underway with the needed financial support supplied from the operating budget of the Department of Engineering Research or from the academic department in which the investigator teaches *or from both.* In such cases the only consideration shown the investigator is a teaching load reduction if the requirements of his department permit.

The second category is represented by a project originated within the School of Engineering for which partial or complete support is solicited from an outside agency. Usually the scope of such projects is sufficiently wide or the expected expenditures sufficiently high to preclude support entirely from school funds.

Projects originated and supported by an outside agency for whom the school is requested to conduct an investigation along specified and mutually agreed upon lines constitute the third group.

Policy making has been in the formative stage during these past few years of operation. Rigidity of policy has therefore been purposely avoided until experience has dictated the necessity of a rigid policy. Some of the policies of the department will be reflected in a discussion of problems encountered, but two policies that have been carefully considered should be mentioned here. The patent policy of the department is a very flexible one at the moment. Unless specified in a contract, patents will be handled by an agreement with the research corporation. Research corporation assumes the responsibility for securing patents and marketing the patent for a percentage. The remainder goes to the school and to the inventor in accordance with a pre-arranged split. Participation in this plan is an arbitrary choice of the school.

Publications are promoted and encouraged, but a firm policy of publication only when merited prevails. Some of the results of investigations that are of interest to specific applications but do not make an original contribution to the science of the subject and hence to the technical literature are printed by the Department of Engineering Research and distributed free of charge to the libraries of accredited engineering schools as technical bulletins.

PROBLEMS

The problems encountered in a research program such as that described are many and varied and could not be completely enumerated. However, a mention of some of the major problems encountered at our school should bring the picture into better focus. In the beginning, considerable "education" of faculty and administrative officers was necessary to sell the idea that an undergraduate institution not only could, but *was expected* to participate in research. Having overcome this hurdle, early investigations encountered inadequate laboratory equipment and a library that was only partially adequate. Every opportunity has been seized upon to upgrade laboratories, to procure precise instruments and basic laboratory equipment of general utility as well as items for specific projects. Upgrading of the library is proceeding more slowly since the age of interlibrary loan, microfilm, microcard, and contoura reproductions have reduced library deficiencies to a time lag rather than a complete blockade.

Inability to secure sponsorship at early stages placed an inordinate burden on the infant-sized funds from the normal budget sources. It seemed to be a case of proving research capability before sponsorship could be

obtained, but research could not be done to any extent to prove capability without funds from sponsorship—sort of a chicken and egg routine. It is doubtful that the success of a research effort should be measured by the magnitude of failures: nevertheless, this magnitude is indicative of the interest and efforts on behalf of this research. To date $10,803 have been secured as support from outside agencies for five projects. The remaining thirteen active projects are supported entirely from school funds. Support in the amount of $109,300 has been sought through formal proposals to industry and government which has been rejected or delayed. Two of these proposals have been dropped while support for others is being sought through different sources and one is being revised for resubmission to the same agency.

The problems involved with sustaining interest and application of effort to a project, once it is initiated, have been the most harassing, if not the most difficult to overcome. Three methods of direct stimulation of interest are in effect with varying success. These are (1) a subsidy above and beyond their regular salary to those performing the work, (2) a teaching load reduction to permit research effort in order to receive the regular salary, and (3) a combination of these. Perhaps it is needless to say that the supplementary pay has proven to be the most popular method of sustaining interest. It should be hastily added, however, that several faculty members are conducting projects without the benefit of either subsidy or load reduction. No uniform formula that was generally applicable to all academic departments was uncovered to interrelate the amount of load reduction, rate and amount of subsidy, and the teaching load of a given researcher, so a very flexible policy is in effect. Such cases are decided individually by common agreement of the researcher, his academic department head, and the head of engineering research with the approval of the dean. The interest and participation of faculty members have steadily grown during the five-year period since the formation of the Research Department from a few participants to the point that, at the present, twenty-one of the forty-five faculty members of the School of Engineering have actively participated in our research effort in some capacity. Our goal is to continue this growth of interest until a major fraction of our faculty are participating.

Sustaining interest during a given project which has just been discussed is closely allied with *maintaining* interest at the conclusion of a project so that another will be initiated.

The high rate of turnover of qualified and interested personnel has been a very real problem—one for which we have found no solution. I'm sure this problem is not unique with our school. Our experience is that of "exit personnel—exit project," since none of the projects originated because of the interest of *only one* person have been successfully translated to another upon loss of the originator. Emphasis has been placed on the "buddy system" of research whereby two or more faculty members are interested in the project. This is used as a means of stimulation of interest during conduct of the project and of elimination of lost projects and investments because of personnel turnover. Two are less likely to leave at a given time than just one.

A problem related to that of turnover is the seemingly inevitable staff shortage of recent years. The teaching load must be carried in an undergraduate institution whether or not the research gets done. With shortages existing in several departments, teaching loads have been high and prohibitive of effective participation in research even though the interest and ability were present. Hiring at fixed salary levels in times of widely prevalent shortages almost invariably tends to downgrade the quality of a faculty, and this has affected our research program in some areas.

Some small measure of difficulty has been encountered in the seeming reluctance of faculty members to bind themselves to a time schedule in research by entering into contract with outside agencies. Every assurance has been given to encourage this situation from the viewpoint of the administration relative to consideration on teaching load and committee assignments. In addition a loophole is usually provided by mutual agreement of the contracting parties in the event real difficulty occurs in maintaining the time schedule beyond the control of the investigators.

Although the encouragement of the administration, the expeditious nature of a formal organization, and the interest and support of outside agencies are of prime importance, no research can be accomplished at Louisiana Tech, nor indeed anywhere, apart from the basic scientific curiosity and abilities of scientists and engineers. Any success enjoyed by our school can be directly attributed to the desire of our faculty members "to contribute to the health, wealth, and well-being of free men" through research.

Obituary of Reginald A. McFarland

We record with sorrow the passing of a man who left his mark as one of the pioneers of engineering education at Louisiana Polytechnic Institute. Reginald A. McFarland joined the teaching staff at Tech in 1926 at which time graduates received their degrees in "Engineering." Two years later, in 1928, when departments of engineering were formed, Mr. McFarland was named head of the Department of Civil Engineering, a post he served well for thirty years.

Mr. McFarland was born November 22, 1900 in Baton Rouge where he later attended Baton Rouge High School and Louisiana State University, receiving the B. S. degree in 1923 and the M. S. degree in 1925, both degrees being in the field of Civil Engineeering. While in high school and at the university, Reggie was an athlete of no mean renown. In his senior year in high school he was named on the all-state football team; for four years he lettered in the L.S.U. backfield and was given honorable mention on the all-southern team. He played forward on the basketball team of the L.S.U. Tigers, ran the hurdles and high-jumped on the track team. In track, he won the freshman medal for scoring the highest number of points against Tulane, their traditional rival, in the annual track meet.

Several hundred graduates in engineering from Tech will attest that "Mr. Mac" taught with a zeal and singleness of purpose that made him one of the most outstanding teachers at Louisiana Polytechnic Institute. He was a man of sound judgment and good common sense; he had the ability to take a most difficult subject and explain it in a clear and simple manner. His teaching has inspired many a young engineer to work hard to please him and to continue on to greater achievements because of a seed he planted. Because of this it truly can be said his work will live on for generations to come. It was ironic that as he completed his thirty years as department head, for him it was indeed—30—.

Mr. McFarland died of a heart attack on September 9, 1958 after winning a game of chess with a dear friend. This seemed to be symbolic of the triumph of his years of service to his fellow man. He is survived by his widow, Mrs. Esther Pefferkorn MsFarland, and a daughter, Esther Lou McFarland, who make their home at 102 Everett Street in Ruston.

He was a member of the following societies: American Society of Civil Engineers, American Society for Engineering Education, Louisiana Engineering Society, Louisiana Teachers Association, Tau Beta Pi and Lambda Chi Alpha.

R. A. SMITH

Obituary of Bernard Graff

The passing of Bernard Graff on April 16, 1958 was noted with regret by his friends and associates, and particularly by his fellow-members of the Louisiana Engineering Society.

Bernard was born in Albuquerque, New Mexico, December 31, 1908. While he was very young his family moved to New Orleans and he was educated in the parochial schools here. Upon completion of his schooling he entered the electrical contracting business with his brother.

When the Louisiana State University Medical School was established he became associated with the Building Maintenance Department where he remained until World War II. At that time he joined the organization of the Mundet Cork Corporation as an Insulation Engineer. In 1952 he organized his own insulation contracting business and continued in that work until his death.

He is survived by a son, Bernard Graff, Jr. and a daughter, Lynn Graff, his mother, Mrs. William Gerchow, a sister, Mrs. Mayer Israel, and a brother, Gilbert Graff.

Be it resolved, that this memorial be entered into the minutes of the Louisiana Engineering Society and published in the LOUISIANA ENGINEER, and that copies be sent to the members of his family.

F. L. ALCUS

Engineering Briefs

Car Counter — Radar is being used to make traffic counts for the Florida State Road Department. The unit is suspended over the highway, rather than on it. Since it counts vehicles instead of axles, as the standard tube counter does, it has given a more accurate hourly vehicle count. It also can be used to tally traffic in individual lanes. —*Engineering News-Record*

° ° ° °

Automatic Train-Engineer — The Russians are testing a railway train operated by an automatic engineer. The human driver is replaced by an electronic computer and a programming device. The latter contains all information necessary for the normal run of the train along its route. Automatic drive, Russian railroad experts believe, should ensure greater safety and add up to an increase of railway-line capacity. —*Product Engineering*

° ° ° °

Brain Surgery Will Cut Food Bill — Medical researchers are looking for the part of the brain that controls the appetite. If they find it, a surgeon will be able to cut the food bill. —*Food Engineering*

° ° ° °

Service Station on Wheels — One oil company is planning to test a mobile gasoline-dispensing unit offering motorists everything but lubrication and washing facilities. The unit can be used as an additional island during rush hours, as a temporary station while a station is under construction, and as a mobile station for spot use. —*National Petroleum News*

° ° ° °

Who Uses It, And How Much? — Large industry accounted for less than one per cent of the total number of electric customers in 1957, yet they consumed 51 per cent of the electricity sold. Residential users, comprising 85 per cent of total customers, consumed 26 per cent of the electricity sold. Commercial used 17 per cent of total electricity sold, with 11 per cent of total customers. —*Electric Wholesaling*

NEW MEMBERS

MEMBER

Robert L. Atkinson, Jr., New Orleans; Robert P. Barbalich, New Orleans; Thos. B. Becnel, New Orleans; Lawrence G. Bodet, New Orleans; Russell Caffery, Lafayette; Fred C. Culpepper, Jr., Monroe; Lawrence J. Delaune, Baton Rouge; Thomas J. Dean, Plaquemine; Cecil I. Dobbs, New Orleans; L. J. N. duTreil, New Orleans; John V. Gaudet, New Orleans; Edward C. Gremillion, New Orleans; Carl E. Heck, Thibodaux; John S. Huey, New Orleans; E. R. Lank, Shreveport; Randolph A. LeBlanc, Sr., Franklin; Stanley J. Lewis, New Orleans; Col. William H. Lewis, New Orleans; John L. Lowery, Baton Rouge; Frank I. Marion, New Orleans; Ray Howard Marr, Lafayette; Henry G. Pylant, Baton Rouge; Gus G. Quinn, Lake Charles; Newton L. Roy, New Orleans; Howard T. Scott, Jr., New Orleans; Robert E. Swindoll, Lake Charles.

AFFILIATE MEMBER

John F. Hird, New Orleans; John M. Lane, Baton Rouge; Wm. M. Mooney II, New Orleans; Joseph H. Morgan, Lake Charles; Mrs. Willene S. Sandel, Maplewood.

JUNIOR MEMBER

Thomas W. Bloodgood, Baton Rouge; Jay L. Dalgetty, Baton Rouge; William W. Frye, Jr., New Orleans; Thomas G. Gaumnitz, Tallulah; Carl R. Hillman, Baton Rouge; John F. Marshall, New Orleans; Raphael Mayeux, Lafayette; Charles L. Peel, Baton Rouge; James E. Warren, New Orleans; Joseph L. Wax, Baton Rouge.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, Held on Monday, September 9, 1958, At the Engineers Club, New Orleans

The meeting was called to order by President Freeman with Messrs. Janssen, Nelson, Scales, Sessums, Taylor and Fernandez present. Mr. Nelson moved that minutes of the preceding meeting be accepted as read, seconded by Mr. Taylor and carried.

The secretary announced that Mr. Philip Bohne, Technical Paper Chairman for the 1959 Annual Meeting, had advised that he could get General Medaris as a speaker through Congressman Hebert, if the society would pay the general's expenses while in New Orleans. He also stated that International House had offered to pay his expenses if the meeting would be held on its premises and International House would be considered a co-sponsor of General Medaris' lecture. Dr. Taylor moved that Mr. Bohne be instructed to take steps to secure General Medaris for our 1959 Annual Meeting, with no co-sponsors. Motion seconded by Mr. Janssen and carried.

Mr. Scales read a preliminary report of Mr. Arthur Naquin, Chairman, Professional, Civic and Industrial Affairs Committee, on the matter of concurrent resolutions passed at the recent session of the Louisiana State Legislature. President Freeman reported that the Board of Direction had met with the members of the State Board of Registration to discuss these resolutions and that the members of our board were very closely in agreement with the preliminary report of the Professional, Civic and Industrial Affairs Committee.

Upon motion by Mr. Nelson, seconded by Mr. Scales, the following were dropped from the society's membership roll: J. H. Booksh, Jr., Lafayette (Member); J. D. Murry, Jr., Texas (Member); J. D. Wilkinson, Shreveport (Affiliate).

Mr. Scales reported on plans for the Mississippi River Bridge dedication ceremony, whereupon Mr. Freeman appointed Mr. Scales a committee of one to try to arrange for a representative of L.E.S. to sit on the speakers' platform on this occasion.

Mr. Freeman announced that the Lake Charles Section had invited members of the board to its meeting of October 20 and that the president, first vice-president and secretary-treasurer were planning to attend.

Mr. Scales moved that the secretary-treasurer be authorized to withdraw $1,500 from the Greater New Orleans Homestead Association to be used as part payment for the new Addressograph machine recently purchased. Motion seconded by Mr. Nelson and carried.

Mr. Nelson inquired whether any board members knew of advertisers who were dissatisfied with the new advertising rates of THE LOUISIANA ENGINEER, and, if so, he would be glad to contact them and iron out any misunderstanding.

Mr. Sessums, as Chairman of a special committee appointed for the purpose, read a draft of a letter to State Board of Registration concerning possibility of making LOUISIANA ENGINEER an organ of the State Board as well as the Louisiana Engineering Society. The Board approved the letter.

Mr. Nelson presented the following resolution, which was seconded by Mr. Scales and carried:

WHEREAS, the technology developed by the engineering profession has grown to govern the public health, safety, welfare and economy in every aspect of modern civilization; and

WHEREAS, there exists a general lack of understanding of the scope of engineering and of the functions of the engineer in the minds of the general public, the business management, the public administrators and the educators of our country, whether the engineers be engaged in public work, governmental function, utilities, industries, education or the private practice of professional engineering;

NOW, THEREFORE, be it resolved that the Louisiana Engineering Society shall create a standing public relations committee of five members to investigate every proper means of improving the public relations of the profession, including the dissemination of information thereon, and that such committee shall at the earliest opportunity, and annually thereafter, present a proposed schedule of operations with the budgeted cost thereof for the consideration of the Board and upon approval of such schedule and budget said committee shall continually, vigorously and aggressively prosecute such public relations program.

After some discussion on the amount of financing required to maintain an effective Public Relations Committee, the board adopted the resolution.

There being no further business, the meeting adjourned.

JOHN FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society, Held on Monday, September 9, At the Engineers' Club, New Orleans

The meeting was called to order by President Freeman with approximately ninety in attendance. Mr. Freeman welcomed members and guests, after which Mr. W. S. Nelson moved that the reading of minutes of the preceding meeting be dispensed with, seconded by Mr. Scales and carried. The secretary then read minutes of the August meeting of the Board of Direction.

Mr. Leal McLean read an obituary of the late Milton L. "Irish" Levy, after which a moment of silence was observed in honor of the deceased.

Mr. Walter Verlander, Chairman, Technical Paper Committee, then introduced the speaker of the evening, Mr. Al Warriner, who gave an interesting illustrated lecture on "Underwater Maintenance and Construction." After the usual question period, the meeting adjourned with a rising vote of thanks to the speaker.

Minutes of Meeting of the Louisiana Engineering Society Held Jointly with the Louisiana Post, Society of American Military Engineers, on Monday, October 13, 1958, At the Engineers' Club, New Orleans

The meeting was called to order by President Freeman with approximately ninety in attendance. The president welcomed the S.A.M.E., members and guests and introduced Admiral W. G. Schindler, Commandant of the Eighth Naval District.

Mr. Sydney Ellis moved that the reading of the minutes of the preceding meeting be dispensed with, which was duly seconded and carried. The secretary then read minutes of the September board meeting.

The chair was then relinquished to Mr. R. J. Dreuding, President of the Louisiana Post, S.A.M.E., who called on Captain Jules C. Tate to introduce the speaker of the evening, Mr. Charles H. Shuff, Deputy Assistant Secretary of Defense for International Security Affairs, who addressed the gathering on the Military Assistance Program.

After a brief question period, the chair was returned to President Freeman, who closed the meeting with a rising vote of thanks to the speaker.

Secretary-Treasurer

Minutes of Meeting of the Board of Direction, Held at the Engineers' Club, New Orleans, On Monday, October 13, 1958

The meeting was called to order by President Freeman with Messrs. Janssen, McLellan, Moore, Nelson, Scales, Sutton, Taylor and Fernandez in attendance. Messrs. R. M. Seago and A. H. Jensen also were present by invitation. Dr. Taylor moved that minutes of the preceding meeting be accepted as corrected, seconded by Mr. Janssen and carried.

The secretary reported that all applicants for membership named in the September ballot had been elected to their respective grades. A copy of the ballot is attached to these minutes.

Mr. Seago, Vice-Chairman of the Awards Committee, reported that his committee recommended that the Technological Medal for 1959 be awarded to William Brewster Gurney and that Mr. John Riess be made an honorary member of the society. The secretary advised that more than 80% of the living past presidents had voted to award honorary membership to Mr. Riess and that all constitutional requirements had been complied with. Mr. McLellan then moved that the Awards Committee's recommendations be accepted and the honors be bestowed in accordance therewith. The motion was seconded by Dr. Taylor and carried unanimously.

A letter from the Louisiana State Board of Registration for Professional Engineers and Land Surveyors was read, which advised that the term of office of board member A. D. Jackson would expire on November 16. President Freeman stated that he had appointed Messrs. Sessums, McLellan and Fernandez to consider the matter and make recommendations to the board, whereupon Mr.

McLellan reported that the committee offered the following recommendations for possible appointees to fill the vacancy on the State Board: Lionel J. Cucullu, New Orleans; A. D. Jackson, Baton Rouge; Thomas C. David, Alexandria; Waldemar S. Nelson, New Orleans; S. E. Huey, Monroe; Elmer E. Shutts, Lake Charles. Mr. Janssen moved that the names be submitted to the Governor as recommended, to be listed in alphabetical order without preference. Motion seconded by Mr. Moore and carried.

A letter from Mrs. George B. Walther Jr., President, Louisiana Parent-Teacher Association, concerning a possible conference between leaders in industry, professional groups, labor and parents, to discuss educational problems. Mr. Janssen moved that the secretary advise Mrs. Walther that the L.E.S. would participate to the extent of sending a representative to the conference, seconded by Mr. Sutton and carried.

The secretary read a letter from the U. S. Department of Labor offering to present a program on Population Growth and Economic Trends at the annual meeting. Mr. Nelson moved that the writer be advised that the meeting program was already filled and the society's regrets extended for its inability to accept the offer. Motion seconded by Mr. Sutton and carried.

Mr. Scales moved that the resignation of Gerald R. Manning be accepted with regret, effective at the end of the current year. Mr. Manning now resides in New York State. Motion seconded by Mr. Janssen and carried.

Dr. Taylor moved that J. Chris Nielsen be readmitted to the society as an Affiliate Member, seconded by Mr. Janssen and carried.

Mr. McLellan moved that Norvin L. Pellerin be readmitted as a full member, seconded by Mr. Nelson and carried.

With the concurrence of the board, President Freeman appointed Messrs. W. S. Nelson, Chairman, W. P. Wallace and R. M. Seago to constitute a Nominating Committee for the election of officers to serve the society for 1959.

The secretary read a letter concerning a N.S.P.E. Scholarship Committee, whereupon the secretary was instructed to advise the chairman of the state-wide Vocational Guidance Committee that his group would also serve as the N.S.P.E. Educational Scholarship Committee for Louisiana.

Mr. McLellan moved that the society's annual Certificate of Appreciation be awarded to Mr. William J. Drawe, Jr., for his sustained interest in and service to the society in many capacities over a period of years. Motion seconded by Dr. Taylor and carried.

President Freeman appointed Messrs. R. P. Lockett and F. Robert Mendow to prepare an obituary for the late Charles J. Wyler, and Messrs. W. T. Hogg and Charles R. Monteiro to do likewise for the late Commander Harry S. Salzer.

Mr. Moore advised that the Alexandria Section would like to hold the 1959 State Planning Conference on March 14, whereupon Mr. McLellan moved that this date be accepted. Motion seconded by Dr. Taylor and carried. Mr. Moore then presented an outline of plans for the conference, which will parallel those of 1958, and Mr. Nelson moved that the agenda be approved and the Alexandria Section be assisted wherever possible. Motion seconded by Mr. Sutton and carried.

Mr. Nelson read a letter from absent board member Ben T. Bogard on the subject of the Public Relations Resolution passed at the board's last meeting, wherein he suggested that similar committees be created within the sections to work in collaboration with the state committee. After some discussion it was decided not to expand the resolution, since it was the intent to have the statewide committee include members of each section and thus a more unified effort could be obtained.

There being no further business, the meeting adjourned.

JOHN FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Baton Rouge Section, Louisiana Engineering Society September 24, 1958, Agricultural Engineering Auditorium, Louisiana State University

Mr. Joseph L. Nanney, General Foreman of the Oxo Cracking Department at Esso's Baton Rouge Refinery, spoke on the construction and operation of underground storage cavities for liquefied petroleum gases at Sorrento, Louisiana. The obituary of Mr. A. H. Douglas was read. Total attendance was approximately 35. Refreshments were served after the meeting.

HAROLD F. LEIENDECKER, Secretary

Minutes of Meeting of the Baton Rouge Section, Louisiana Engineering Society October 23, 1958, Agricultural Engineering Auditorium, Louisiana State University

Mr. R. B. Richardson, Director of the Louisiana Department of Highways, spoke on the Baton Rouge section of the Interstate Highway Program. This was a joint meeting with the American Institute of Electrical Engineers. Total attendance was 108. Refreshments were served after the meeting.

HAROLD F. LEIENDECKER, Secretary

Lake Charles Section, Minutes of the August 11, 1958 Meeeting

The Lake Charles Section of the Louisiana Engineering Society featured their regular August meeting with a shrimp boil at the Columbia Southern recreation center. The Vice-President Mr. Fred Adams was chairman of the refreshment committee. The committee provided a fine supply of large Gulf shrimp, well prepared and served with all the condiments. Forty-five members and guests attended and the social hour around the well filled tables was enjoyed by all.

In the absence of our President, the Vice-President Mr. Fred Adams called the section together for a brief business meeting at 8:00 p.m. Announcements of coming meetings were given by the Program Chairman Mr. Gus Hill. All present voted the meeting and fellowship developed by the shrimp boil recommended it as a good feature to copy on future summer meetings. The meeting adjourned at 8:30 p.m.

M. D. GARRISON, Secretary-Treasurer

Lake Charles Section, Minutes of September 8, 1958 Meeting

The Lake Charles Section of the Louisiana Engineering Society held its regular monthly meeting on September 8, 1958 at Chateau Charles banquet hall. The meeting was called for 7:00 p.m. and after an excellent dinner, Mr. Glendon Smith, the Section President, called the meeting to order. Reading of the minutes was omitted on motion of Mr. Fred Adams. The President recognized and introduced our guests and each member introduced himself and identified the company with which he is associated.

Mr. Smith gave a brief talk on professional recognition and Mr. Ray Burgess gave a report on recent legislative actions. Mr. R. R. L. Ward reported that progress is being made in organizing JET clubs in several high schools. The Sulphur and LaGrange schools are making the most progress on their clubs at this time.

Mr. Smith announced that he appointed a nominating committee composed of past presidents Mr. W. M. Davis, Mr. R. R. L. Ward and Mr. G. B. Wooten to prepare a slate of officers for 1959. This committeee will present their nominations at the November meeting. At that time nominations will be entertained from the floor.

Mr. Smith introduced the speaker of the evening Mr. Rodney Vincent, Engineer for the Calcasieu Parish Police Jury. Mr. Vincent gave a very interesting and well prepared review of the proceedings during the development of the Lake Charles Municipal Airport. His talk outlined clearly the many legislative and engineering requirements that confront an engineer in municipal airport design.

The meeting adjourned at 10:00 p.m. Present were 43 members and three guests.

M. D. GARRISON, Secretary-Treasurer

Minutes of Meeting of the Monroe Section, Louisiana Engineering Society August 5, 1958

The meeting was the annual Bar-B-Que held in Bernstein Park, at Monroe. No business was conducted at the meeting. State President Freeman addressed the meeting concerning the advantages of the individual members belonging to the National Society of Professional Engineers. He stressed several favorable points relative to becoming a member of NSPE. President Freeman also reported that the main reason the amendments to the Louisiana Engineers Registration Law failed to get through the legislature this year was that the Senators were not contacted at all prior to their receiving the bill from the Representatives where it passed easily.

An announcement was made that the next regular meeting would be held in Ruston, on October 7th.

DAN McDUFF, Secretary, Monroe Section

THE LOUISIANA ENGINEER

DECEMBER 1958

"Patronize Our Advertisers"

INDEX TO ADVERTISERS