LOUISIANA ENGINEERING SOCIETY

Suite 422 St. Charles Hotel

OFFICERS FOR 1946

President,	LEO JOS. LASSALLE, L. S. U., Baton Rouge, La.
1st Vice-Pres.,	CLAYTON L. NAIRNE, 317 Baronne St.
2nd Vice-Pres.,	W. STONE LEAKE, 1004 Richards Bldg.
Sect.-Treas.,	JOHN P. FERNANDEZ, P. O. Station 20

DIRECTORS

LIONEL J. CUCULLU, 317 Baronne St.
H. L. LEHMANN, La. Dept. of Hwys., Baton Rouge, La.
JOHN K. MAYER, P. O. Station 20
J. A. McNIVEN, 2 Canal St.
REINHARD A. STEINMAYER, 7933 Oak St.

BATON ROUGE SECTION OFFICERS FOR 1945

President,	J. T. O'BRIEN
1st Vice-Pres.,	P. J. GUELFI
2nd Vice-Pres.,	WM. WHIPPLE
Sect.-Treas.,	J. J. SAURAGE

STATE BOARD OF ENGINEERING EXAMINERS

DONALD DERICKSON, President
B. W. PEGUES, Vice-President
LEO M. ODOM, Secretary
B. H. GREHAN, Member
F. N. BILLINGSLEY, Member

DISTRICT CONTACT REPRESENTATIVES

3rd Dist.	ANDRE J. DUBUS, P. O. Box 605, Lafayette, La.
4th Dist.	A. F. FLOURNOY, 1st Nat'l. Bk. Bldg., Shreveport, La.
5th Dist.	J. E. JARMAN, La. Dept. of Hwys., Monroe, La.
6th Dist.	LEO M. ODOM, Capitol Bldg., Baton Rouge, La.
7th Dist.	E. H. GOODLOE, 1011 S. Division St., Lake Charles, La.
8th Dist.	CHARLES A. MYERS, 912 Fifth St., Alexandria, La.

OFFICERS FOR 1945 OF WOMAN'S AUXILIARY

President,	Mrs. John A. McNiven
1st Vice-Pres.,	Mrs. Ernest L. Mire
2d Vice-Pres.,	Mrs. Arthur J. Naquin
3d Vice-Pres.,	Mrs. L. K. Nelson
Honorary Vice-Pres.,	Mrs. Allan S. Hackett
Recording Secretary,	Mrs. George A. Heft
Coresponding Secretary,	Mrs. C. Glenn Cappel
Financial Secretary,	Mrs. Harry H. Blakeslee
Treasurer,	Mrs. Ben H. Bell

Members may obtain key to rooms at hotel desk
All business communications should be addressed to John P. Fernandez, Secretary, P. O. Station 20, New Orleans 15, La.

OFFICERS OF VARIOUS ENGINEERING GROUPS

New Orleans Section, American Institute of Chemical Engineers

J. J. Ganucheau, Chairman, Southern Cotton Oil Co. Box 360.
F. M. Taylor, Head of Deartment of Chemical Engineering, Tulane University.

American Institute of Electrical Engineers, New Orleans Section

W. Stone Leake, Chairman, General Electric Co.
S. L. Kennedy, Secretary-Treasurer, La. Power and Light.

American Public Works Association, New Orleans Chapter

A. H. Guillot, President, 317 Baronne St.
L. J. Buja, Secretary-Treasurer, City Hall.

American Society of Civil Engineers, Louisiana Section

C. Glenn Cappel, President, W. Horace Williams Co.
J. M. LeDoux, Secretary-Treasurer, 5700 Garfield St.

American Society of Heating and Ventilating Engineers, Delta Chapter

Walter H. Grant, Jr., Vincent Bldg.
John Burke, Secretary-Treasurer, 317 Baronne St.

American Society of Mechanical Engineers, New Orleans Section

A. M. Hill, Chairman, Tulane University.
M. C. Abrahm, Secretary-Treasurer, 317 Baronne St.

Illuminating Engineering Society, New Orleans Chapter

Raymond Frischhertz, Chairman, Times-Picayune Publishing Co.
C. Paslay, Secretary-Treasurer, La. Power and Light.

Society of American Military Engineers, Louisiana Post

C. M. Kerr, President, American Cresote Works.
Major A. McRae, Secretary, U. S. Engineer Office, Foot of Prytania St.

Delta Society of Safety Engineers, P. O. Box 2522, New Orleans 16, La.

Stanley Stumpf, Johns-Manville Corp., Marrero, La.
L. Dale Bailey, Recording Secretary, P. O. Box 2522.

NOTE—Please advise editor of any changes in officers.

PRESIDENT L. J. LASSALLE

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXII FEBRUARY, 1946 NO. 1

CONTENTS

EDITORIAL NOTES AND COMMENT

A MESSAGE FROM THE PRESIDENT

I wish to avail myself of this opportunity to thank every member of the Louisiana Engineering Society for the honor you have paid me and the Baton Rouge Section of the Society by electing me your President for 1946.

I bespeak your whole-hearted support and cooperation for the following program for 1946:

1. A live, vigorous society that accepts its responsibility as the representative and the spokesman of the Engineering Profession in Louisiana.

2. An all-out effort to have every practicing engineer, in

all branches of engineering, as an active member of the Louisiana Engineering Society.

3. Organization of Sections of the Louisiana Engineering Society in Shreveport, Lake Charles, Monroe, Alexandria, and Lafayette, similar to the Baton Rouge Section.

4. Organization of and cooperation with the National Engineering Societies which have sections in Louisiana for the purpose of making a careful survey of the situation that now exists with reference to a professional engineers license law or laws for Louisiana that will meet the desires and the needs of the professional engineers of the state. This piece of constructive work will claim the time and attention of the leaders in the various branches of engineering and will probably require all of 1946 for its proper completion.

5. Epecial emphasis on helping in every way possible returning G.I. engineers.

6. Realization of the meaning to the world of the release of atomic energy, and a dedication of the strength of the Louisiana Engineering society in supporting the outlawing of the use of atomic energy for destructive purposes and the assurance that it will be used for the advancement and the well being of all humanity.

Our New President. Dean Leo J. Lassalle, College of Engineering, Louisiana State University, is a man of quiet dignity with a keen analytical mind. Under his leadership the Society's affairs will be ably managed; progress is inevitable. Dean Lassalle enjoys a wide circle of friends, both in this state and in national engineering and scientific organizations. Born in the city of Opelousas he has enjoyed an interesting career as shown in the following biography.

He attended Louisiana State University, graduating in 1908 with the degree of B. S. in C. E. and winning the Faculty Medal for highest class average. He worked for Southern Pacific Railroad as engineer on construction, summer 1908. Further experiences are:

Assistant in Physics, La. State Univ., 1908-09; Instructor in Physics, Penn. State College, 1909-11; Fellow, University of Chicago, 1911-12; Assistant Professor of Physics, Univ. of the

Philippines, 1912-13; Associate Professor of Physics, Penn. State College, 1913-17; Professor of Physics, Penn. State College, 1917-18; Engineer Physicist and Head of Optical Mfg. Dept., Recording and Computing Machines, Dayton, Ohio, 1918-20; Professor of Mechanical Engineering, La. State Univ., 1920-24.

He spent summer of 1923, as Student Engineer and faculty member in S. Philadelphia Plant of the Westinghouse Company; Mechanical Engineer, U. S. Dept. of Agriculture, summer of 1924; Professor of Engineering Mechanics, La. State University, 1924; Dean, College of Engineering and Director, Engineering Experiment Station, La. State Univ., Jan. 1931; Head Ordnance Engineer, Optical Procurement, Frankford Arsenal, Philadelphia, Pa., while on leave from La. State University, Nov. 7, 1941 to Sept. 7, 1942; M. S. Degrees in Physics and Math., Penna. State College, 1911; Received the Degree of Ph. D., magna cum laude, in Physics and Mathematics, University of Chicago, summer, 1917.

Dean Lassalle is the author of the following papers:

"A Null Method for Measuring Relative Intensities of Roentgen Rays," Ham, Lassalle, and Smith, Journal of the Franklin Inst., July, 1911, (Master's Thesis.); "Diurnal Variation of the Earth's Penetrating Radiation at Manila, P. I.", L. J. Lassalle, Phys., Rev. N. S. Vol. V. No. 2, Feb. 1913; "On the Motion of a Sphere of Oil Through CO_2 and a determination of the Coefficient of Viscosity of that Gas by the Oil Drop Method," L. J. Lassalle, Physical Review N. S. Vol. XVII, No. 3. March, 1921, (Doctor's Thesis); "The Mechanical Engineer in the Sugar Factory," L. J. Lassalle, Journal of the Sugar Planters Association, issue of March 29, 1921; "Equipment and Costs for Making Syrup on a Large Scale," L. J. Lassalle and J. J. Munson, p.p. 39 through 57, U. S. Dept. of Agriculture Bulletin, No. 1370, October 1925.

Civic, engineering and scientific activities are: Member of Kappa Sigma, Sigma Xi, American Society of Mechanical Engineers, Phi Kappa Phi, Phi Eta Sigma, Omicron Delta Kappa, Knights of Columbus and Kiwanis Club; Governor, La.-Miss.-W. Tenn. Kiwanis District, 1938; Chairman, New Orleans Sect.

A. S. M. E., 1940; Member, Nominating Committee A. S. M. E., 1941; President, S. W. Sect. S. P. E. E., 1941; Chairman, Baton Rouge City Planning Commission, 1941; Member, at large, National Council Boy Scouts of America.

Newly Elected Officers. The new first vice-president of our Society is Clayton L. Nairne; second vice-president, W. Stone Leake. Our efficient and genial secretary-treasurer, John F. Fernandez, was re-elected. Lionel J. Cucullu and H. L. Lehmann will each serve two years as directors. Those continuing as directors are J. A. McNiven, J. K. Mayer, and Past President Steinmayer.

The Annual Meeting. General Chairman Abrahm and his associates may well heave a sigh of relief, now that the annual meeting is a thing of the past. It was indeed an outstanding success. Technical Papers Chairman Levey with the aid of his committee secured excellent speakers for the occasion. The subject matter was varied and well chosen.

It is not possible to print all the papers in the February issue of the "Proceedings"; they will be carried in remaining numbers.

Banquet Chairman Dugan with his committee staged a grand dinner-dance, with everyone who was present in excellent spirits.

Our Severance Tax—A Pitiful Return

Beneath the surface of our state lies great wealth in the form of oil, gas and minerals. A pitiful severance tax is collected when these precious resources are withdrawn, never to be replaced. Our state could have the best in educational facilities if the tax were a reasonable percentage of the value of the natural resource removed. The solution lies with our state legislators, whether they want the citizens of our state to enjoy their just birthright, or to continue, as we have in the past, to enrich other communities at the expense of our own natural resources. Let's give the children of Louisiana the complete educational program that could be obtained from a reasonable severance tax.

The Editor's Dilemma

Geting out a magazine is fun, but its no picnic.
If we print jokes, people say we are silly.
If we don't, they say we are too serious.
If we clip things from other magazines, we are too lazy to write them ourselves.
If we don't, we are too fond of our own stuff.
If we don't print contributions, we don't appreciate true genius.
If we print them, the page is filled with junk.
Now, like as not someone will say we swiped this from some other magazine—we did and it was from LaPlant-Choate Topics.

Address of Retiring President Steinmayer

"Wisdom is ofttimes nearer when we stoop
Than when we soar." —Wordsworth

Before retiring from the office of President, I desire to extend words of appreciation, collectively, to those who have been associated with me for the past year as Officers, Editor, Members of the Board of Direction, and Chairmen and Members of Standing and Special Committees of the Louisiana Engineering Society. It would be just as embarrassing to all concerned to have me mention the names of a few that I might single out for their meritorious services due to the out-in-front duties connected with the offices which they have held, as to have me fail to mention the names of others who did not make the klieg-lights because of their tail-back positions. After all, in an organization like ours, it's the coordinated efforts of the entire organization working in harmonious unison that really perform the Society's technical missions.

Every engineer, like every worker or soldier, regardless of whether he is a self-made engineer or a product of the best engineering school, brings with him when he affiliates himself with the Louisiana Engineering Society three elements, but in varying degrees. These are: Capacity, Interest and Opportunity. No engineer can think, feel or dream without these elements being determined, continued and modified toward an ever-present objective. Our Society must provide the Opportunity for the engineer to exercise his inherited and acquired Capacity to satisfy his special Interest, and when these three elements have been coordinated into a harmonious balance

there arises a societal unit which seeks to excel in the performance of its duty to the Society.

Generally speaking, a Society like ours is but a human group working together for a common purpose, which, having been once defined should never be altered, and every effort should be made to make that purpose the Society's goal. Therefore, all matters not directly related to the purpose should be treated as extra-curricular activities of the Society. In conducting the affairs connected with the Society, errors are bound to occur, hence their recognition, their correction, and their subsequent elimination should be the duty of each individual member as well as of the group. While team work is the essence of a well disciplined organization, this does not necessarily mean that each member of the team must think, see, and act alike in performing his duty on the team; contrarily, a harmonious welding together of divergent view points frequently produces the best result. Every societal problem should be carefully weighed, both positively and negatively, as to its probable or actual present and future value. A Society grows best by evolution and least by revolution. There are, however, two types of the former, namely; expansional and repressive evolution. A dynamic membership tends to cause a Society to expand, whereas a static membership brings about stagnation or retardation. The history of every Society is punctuated by critical periods, and during such times proper remedial measures should be taken to prevent a waning of interest and a faltering of the financial integrity of the Society. Finally, confident as we are of today's accomplishments, the little present must not be allowed to wholly elbow the great past out of view.

Throughout the year my associates and I have tried to keep you informed at all times, by public statements, readings of minutes, and reports, including the well prepared statistical and financial reports of your Secretary-Treasurer; as well as by published records in your Proceedings, on the administrative, social, sectional, financial and other matters, directly and indirectly, related to your Society. I am, therefore, going to forego repeating in a summary form the year's happenings

because I neither wish to bore you nor will anything I say, in my opinion, at this closing phase of my administration, add to or detract from the past events.

Further, I do not profess to be a seer; hence I cannot look into the future and thereby prophesy events that are about to happen to the Louisiana Engineering Society. A study of the activities trend curves of the Society, however, leads me to believe that your technical organization, barring internal revolutions and external critical periods, has before it many decades of healthy progressive life.

Neither do I feel that I have the privilege or the right to instruct or even suggest to my successor, in whose ability I have implicit confidence, the courses of action he should follow during his administration.

In conclusion, I desire to state that I had a unified organization working under my direction during the past year, although we did, at times, differ in the modes of procedure, and that is as it should be in a democratic society. Whether or not we succeeded in our missions, modesty in the interests of my associates prompts me to state that, "discretion is the better part of valor".

I thank you.

R. A. STEINMAYER.

January 10, 1946.

New Members. During December eighteen new members were elected to the Society. We welcome them, and look forward to working with them in the various phases of the activities of the Society.

Thomas E. Alexander, Jr., New Orleans; age 33. Endorsed: D. W. Stewart, Allen W. Betz, W. P. Oster, Tulane University, M. & E., 1935; U. S. Engineers, Levee Construction Inspector, 9 mos.; Equitable Equipment Co., Draftsman, Air Conditioning & Refrigeration Engineer, Designer, Estimator, and Supervisor of Construction, also Application Engineer covering heavy machinery such as pumps, boilers, air compressors, turbines, etc., for 8 yrs. Crane Packing Co. as Service Engineer for the past year.

Thomas H. Bean, Jr., New Orleans; age 33. Endorsed: M. C. Abrahm, C. L. Nairne, K. P. Kammer. University of Illinois, C. E., 1934; Track Supervisor, Wabash R. R., 1934-37; Air Conditioning Engineer, Fairbanks Morse & Co., 1937-40; Industrial & Utilization Engineer, N. O. Public Service Inc., 1940-present. Member American Society Heating & Vent. Engineers.

George D. Cobaugh, New Orleans; age 39. Endorsed: Allen W. Betz, Allan J. Harris, D. W. Stewart. Gettysburg College, B. S. in Chem., 1928; Carnegie Tech., graduate work in Chemistry & Metallurgy, 1929-31 (evening courses); Mining engineering for Harrison Walker Refractories Co., 1928-29; Laboratory Technician, 1929-34; Research & Technical Sales, 1934-36; Sales Engineer, 1936-40; all in St. Louis Territory. New Orleans territory, 1940 to date. American Ceramic Society, 1929-36.

George E. Core, Baton Rouge; age 26. Endorsed: H. O. Marquart, J. T. O'Brien, T. E. Peak, L. S. U., B. S. in M. E. Instrumentman, Inspector and Maintenance Engineer, Standard Oil Co. of New Jersey, La. Div., 4½ yrs.

J. Owen Evans, New Orleans; age 37. Endorsed: R. P. Bassich, H. A. Levey, R. L. Nall. Chas. R. Speaker Co., Washington, D. C., machine shop work, 1926-27; own consulting eng. & drafting office, Washington, D. C., 1930-40; worked in various war plants in engineering capacity, 1940-45 (tool design div., Republic Aviation; eng. dept., Kellett autogiro; tool design dept., McDonnell Aircraft; various eng. depts., Higgins Industries; eng. dept., Rheem Mfg.) Own consulting engineering office, New Orleans, 1945 to date. Senior member, American Society of Tool Engineers; Member, American Mathematical Society; Sr. mbr., Soc. of Aeronautical Weight Engineers; mbr., Army Ordnance Association.

John D. Haverkamp, New Orleans; age 39. Endorsed: Geo. Elmer May, R. F. Legeai, Daniel Hallaron, Jr. Tulane University, B. E. in E. E., 1927. 1927-28, General Electric Co., Schenectady, Test Engineer; 1933-42, N. O. Public Service Inc., Ind. Sales Engr.; 1942-45, U. S. Army Corps of Engineers, Cap-

tain; 1945-present, N. O. Public Service Inc., Industrial Sales Engineer.

Frank Melville Heroy, New Orleans; age 48. Endorsed: John P. Fernandez, Chas. M. Kerr, Adloe Orr, Jr., 1 yr. Tulane U. College of Eng., 1915-16; 1 yr. Geo. Washington, 1916-17; correspondence courses, I. C. S. & Wilson Eng. Corp., 1918-22. Empire Gas & Fuel Co., Bartlesville, Okla., Asst. Chief Draftsman; 1918; U. S. Engineers, Chief Draftsman in responsible charge, 1919-41; Civil & cartographic engr. in responsible charge of drafting, computations and reproduction, 1941 to date.

Thomas S. Keaty, Baton Rouge; age 40. Endorsed: Melvin H. Gross, Leo J. Lassalle, J. T. O'Brien. L. S. U., B. S. in Chem. Eng., 1927, M. S. in Chem., 1928. Employed by Standard Oil Co. of La. as Chem. Engr., 1928-31; Sales Engr., 1931-35; Safety Engr., 1935-37; Training Director, Standard Oil of N. J., 1937-45. Member American Chemical Society, La. Academy of Science, ASME, Baton Rouge Astronomy Society; President, American Society Training Directors.

Ned Scruggs Muse, Alexandria; age 43. Endorsed: W. Stone Leake, Soule Butler, R. W. Bringhurst. Univ. of Ark., E. E., 1933. State of Ark., Toll Bridge Dept., 3 yrs. La. field representative, The Graybar Electric Co., 8 yrs.

Marion B. Reed, Baton Rouge; age 28. Endorsed: S. L. Hebrard, H. O. Marquart, A. E. Porter. L. S. U., B. S. in Chem. Eng., 1941. Standard Oil Co., Jr. Elect. Engr. in Venezuela, 1941-42; Transferred to Baton Rouge Refinery as Inspection Engr., 1942-date. Member Tau Beta Pi.

Samuel S. Stanton, Baton Rouge; age 31. Endorsed: F. A. Hannaman, Jr., J. T. O'Brien, T. E. Peak, L. S. U., B. S. in E. E., 1939. Employed 6 yrs. Standard Oil Co. Refinery, Baton Rouge, in responsible charge of engineering work.

Orlando W. Stephenson, Jr., New Orleans; age 30. Endorsed: A. L. Dunlap, J. K. Mayer, M. G. Zervigon. Univ. of Michigan, B. S. in M. E., 1938. 1939, Chief Draftsman, Detrola Radio;

1940, Maint. Supervisor, Seagram's; 1940-41, Instructor Mech. Eng., Tulane U. 1941-45, U. S. Army Signal Corps 1945-present, Asst. Professor Mech. Engr., Tulane university.

Carl B. Whyte, Lake Charles; age 42. Endorsed: Robert E. Gosa, C. Glen Cappel, B. P. Babin. Georgia Tech, B. S. in Eng. 1925. Employed since then with Cities Service affiliated or predecessor companies. 20 yrs. engineering work including responsible charge consecutively as Chief Engr. Refining Div., Ark. Fuel Oil Co., 5 yrs.; Chief Engr. & Gen. Supt., Cities Service Defense Corp., 1½ yrs.; Res. Engr. in chg. construction, Cities Service Refining Corp., 1½ yrs.; Chief Engr., Tutweiler Refinery, in charge gen'l engineering, inspection, power, mechanical & warehouse depts., 1½ yrs.

For Affiliate Member

W. J. Keating, Alexandria; age 42. Endorsed: R. W. Bringhurst, Soule Butler, Chas. A. Myers. Supt. of elec. const. for E. Levy & Co., Electrical Contractors, for past 7 yrs.; Lacaze Battery & Elec. Co., Dept. Mgr., 4 yrs.; Montgomery Ward as Mgr. Elec. Appliance Dept., 3 yrs.; Pineus & Murphey Inc., mgr. sales & service, radio & refrig. dept., 7 yrs.

Eugene Levy, Alexandria; age 50. Endorsed: R. W. Bringhurst, Soule Butler, Chas. A. Myers. Entered electrical contracting business in 1918 and has been actively engaged in same since. Owns and operate firm known as E. Levy & Co., Elctrical Contractors.

Robert Martin, Alexandria; age 26. Endorsed: R. W. Bringhurst, Soule Btuler, Chas. A. Myers. Louisiana College, Pineville, La., graduate 4 yr. course in water treatment & chemistry. Water Chemist, City of Alexandria, 4 yrs.

Stayton Love Perry, Alexandria; age 42. Endorsed: R. W. Bringhurst, Soule Butler, Chas. A. Myers. Supt. Power, Light, Water & Sewer Dept., Natchitoches, La., 15 yrs., Foreman, Water Dept., Alexandria, La., 2 yrs.; present position, Supt. of Water Works, Alexandria, La.

Curtis D. Stubbs, New Orleans; age 35. Endorsed: Paul F. Oswald, Leon Savage, James M. Todd. 1933-38, operated own engineering business (air conditioning); 1938-44, Asst. to Chief Engr., York Air Conditioning Corp., Los Angeles; present position, Chief Engineer, Southern Electric Corp., New Orleans; duties: design and application of industrial air conditioning and refrigeration equipment. Member Am. Soc. Refrig. Engrs.

For Junior Member

George Calvert Felton, Baton Rouge; age 30. Endorsed: S. L. Hebrard, H. O. Marquart, A. E. Porter, Jr. Univ. of Minn., B. of Met. Engr., 1941; U. S. Army Officer, 1941-44; Inland Steel Co., Metallurgical Observer; Standard Oil Co. of N. J. (La. Div.), July 1945 to date.

For Student Member

Carl J. Park, R. W. Seidler, T. J. Williams, Jr., Junior Mechanical Students; John A. Laurent, Jr., Junior Electrical Student; all at Tulane University.

For Transfer from Junior to Full Member

Franklin D. Caldwell, age 43, M. E. 1944; S. Steve Carnegie, age 31, C. E., 1940; C. L. Fischer, age 27, C. E. 1940; Arthur C. Porter, 29, M. E. 1940; John E. Pottharst, Jr., 27, M. E. 1940; C. O. Weilbaecher, 28, E. E. 1940. All began their association with the Society as Student Members.

Engineering Briefs—"Natural" Steam Plant. One of the most interesting natural resources of the world are the steam wells in Italy. In 1777 it was discovered that this natural steam issuing from fissures in the earth contained boric acid. Other substances carried by the steam were carbon dioxide, ammonie, hydrogen sulphide, hydrogen and nitrogen. Wells were drilled to depths of sixteen hundred feet. At the beginning of the war, the installed capacity of the generating station was 180,000 KW. Approximately sixteen tons of borax were recovered each day.—Southern Power & Industry.

Teacher: "What is it that binds us together, sustains us and makes us better than nature intended?"

Tommy: "Girdles."

Smoke Free Passenger Coaches. The electostatic precipitator has found a new application. A unit has been designed comprising a precipitator and filter to be attached to one end of a railroad coach. The smoke from cigarettes, cigars and pipes will be drawn through the unit; the smoke particles will be removed. An experimental unit now operating on an eastern railroad brings in six hundred cubic feet of outside air each minute; eighteen hundred cubic feet of recirculated air per minute are filtered and treated.

C. Glenn Cappel Awarded Prize. Mr. Cappel recently received a construction engineering prize from the American Society of Civil Engineers.

The award was in recognition of his paper on "Timber Hangar Erected from Sixteen Story Scaffold".

Some years ago Mr. Cappel gave an interesting paper before L.E.S. on the moving of a large brick building.

Sprinklings—The various jokes and ditties in this issue were contributed by Past President Kerr. Thanks, Charles.

PAPERS AND DISCUSSIONS

"OUR FUTURE ENGINEERS"

By Prof. H. McCormack*

There are disturbing questions in the minds of all of us connected with the engineering profession as we contemplate the future.

These questions are related to—

(a) The supply of young men and perhaps women preparing to practice in the various lines of engineering.

(b) The educational training of these young people that they may possess a basic understanding of the practice of their particular line of engineering and be technically competent to engage in it.

(c) The extraneous conditions surrounding all of us in our future engineering practice.

It is questionable, in my opinion, as to whether the best "raw material" flows to the engineering schools to be prepared for professional practice.

You as practitioner and I as a teacher of engineering, are at least partially to blame for this in that we have not exerted ourselves to see that more specific information is supplied to our young people about what is involved in the practice of the engineering professions.

Contact with students in one line of engineering over a period of forty years convinces me that they reach the decision to prepare themselves for an engineering profession having only the most vague ideas of the necessary preparation, as well as of the activities, duties and responsibilities involved in their future engineering practice.

They do not know the lines of industry where there are possibilities for their employment, the specific things they

* Chairman, Dept. of Chemical Engineering, Illinois Institute of Technology. Delivered before the October 8 meeting of the Society.

may be asked to do should they secure such employment nor what would be the average remuneration in such a position.

Such information is available, not as definite and complete as it could be, but reasonably satisfactory. There is available a publication by the Engineering Counsel for Professional Development which should be read and considered by the engineer who has in his mind the prospect of being able to assist young men contemplating a collegiate career followed by a professional one.

There are certain general references which should be in every libarary and to which young men contemplating an engineering profession should direct his attention. These are "Vocational Guidance in Engineering Lines" by Wadell, Skinner and Wessman, and "Engineering Opportunities" by R. W. Clyne.

"The Engineer" by John Hayes Hammond contains ideas on various engineering projects and in the main gives some information as to how they may be carried out.

"The Story of Engineering in America" by Chelsea Fraser is a general account of the development of engineering in this country and is interesting reading, but does not answer many of the questions in the mind of the young man.

It was of interest to me, when I took these books from our library shelves, to note how often they had been withdrawn, as indicative of how much they had been read. "Vocational Guidance in Engineering Lines" had had twenty-two readers during the period, May, 1943 to September, 1945. "The Engineer" had had no readers between October, 1943 and September, 1945. "Engineering Opportunities" had had twenty readers in the period between August, 1943 and September, 1945.

The most satisfactory and complete analysis covering any line of engineering was prepared by a committee of the American Chemical Society and it covers an analysis of the economic status of the chemist and the chemical engineer. This is published in Chemical and Engineering News, Vol. 22, numbers ten to thirteen, inclusive.

This covers rather completely all of the items in which the prospective chemical engineer might be interested, such as

graduate and under-graduate training, lines of employment, salaries, at various training levels. It also enumerates the number engaged in chemistry and chemical engineering.

The fault of these general publications, together with that cited from the American Chemical Society, is that they leave the young man guessing as to just what he may be asked to do in the various positions which may be open to him. This, of course, is something in which he is intensely interested and it is regrettable that there is no source where he may obtain such information. It seems that the responsibility for getting such information to the young man comes back clearly to you and to me through personal contacts. For example: A young man may be engaging in research or development work in some engineering line. Just what does he do? What is involved in doing research work, and what is involved in doing development work? What particular qualifications do these lines require other than those possessed by the average practitioner of this particular type of engineering?

My opinion is that the young engineer has his mind filled with the glamour attached to certain lines of engineering. He does not realize just how much hard work is required in the preparation for engaging in these "glamorous" phases of engineering; nor does he at all realize how much hard work is involved in these lines and how little glamour actually is attached to them; solely the glamour of accomplishment.

Predicting the future from past experiences, I expect to find our departments of electrical engineering overcrowded with young men who want engage in the applications of radar; and our departments of chemistry and physics over-loaded with young men who want to learn how to make atomic bombs.

The young man can not be relied upon to search for, find and use this information himself so there are some duties for you to assume. See that your juniors in high school hear about the engineering professions, tell them what engineers do and be sure to tell them the joys accompanying the doing, tell them, truthfully, what the remuneration is likely to be, how important the work is with reference to our daily life, and tell them where they can obtain additional information should

they be interested. It would be excellent for you to say that you would spend the time to talk with them about an engineering education.

Be sure that your local library has a file of the publications previously mentioned.

It is hoped that you are now considering the advisability of having a committee on professional education as one of the permanent committeees of your local engineering organization. There is much valuable work for it. You can reach these young men and help them because they are your neighbors and they have confidence in you.

Last, but not least, tell them that there are engineering schools and engineering schools and that they are most likely to receive the most for their effort when attending a school having E.C.P.D. approval.

Don't misunderstand me here. Many excellent engineers have graduated from mediocre schols, but only God knows how much better they would have been had their preparation been better.

Suppose all these ideas have been acted on, the young man reacts favorably; do we succeed in enrolling him in an engineering school? Not if he is in the age limit 18-26. We live under a so-called Selective Service Act. Justification for the use of the word selective would be difficult on the current interpretation of the act, though its Congressional sponsors must have had some vision of selectivity when giving the act its title.

As applied today, any young man reaching the age of 18 and who is sound physically is in the armed forces. We have not shown as much sense in this respect as have many of our allies.

During the past six months, I have talked with educators from Australia, Canada, England and Russia in regard to the exemption of the talented young student. The opinion expressed by all of these men was: "You are making the same mistake we made in World War I; we are not making it now. Students with ability are exempt." In addition to my own experiences in talks with educators from other countries, "Chemi-

cal and Engineering News'' in the issue of September 25, 1945, has these statements: ''Many directors of research who were interrogated in Germany said that in their opinion a major factor in the loss of the war was the early drafting of their young chemists and physicists. Documentary evidence was obtained that in 1943 the German authorities saw the seriousness of the situation and stopped the drafting of such men.''

Present indications are that we are going to continue our short-sighted policy for some years to come.

Our shortage in engineer production in the past five years has been between 35,000-40,000 and the probability is that this will continue at the rate of about 7,000 per year for the next four years. The Bush Report, prepared at the request of the late President Roosevelt, gives much higher figures than my own as to the shortage in engineer production and higher figures also as to the rate at which this shortage will continue.

All the engineering societies are deploring the conditions which are bringing this about, but their voice is as one crying in the wilderness.

It is a deplorable state of affairs and should be remedied. If we had had a Selective Service Act in 1925, administered as it is today, there would have been no millions of units of blood plasma, no tons of penicillin, no hundreds of tons of D.D.T., no hundred thousands of tons of synthetic rubber, no rivers of high octane gasoline, no B-29's to use it, and no atomic bombs, because our supply of research and development engineers would have been so restricted at its source that there would not have been available sufficient talent to have developted these things.

Projecting this into the next decade, this is a dark picture. What can we do about it? One suggestion is that we come out of the wilderness to do our crying and that at every opportunity, we express our opinions of present conditions in no uncertain terms.

The industrial future of our country can be assured only when there is an uninterrupted flow of ''raw material'' to our engineering schools.

Assume that through some methods, such as those presented,

or some better ones not yet visualized, the embryo engineer has been induced to enroll in some engineering school; What is to be his course of study? This, to one in the teaching profession is an item of major importance.

What does a professional engineer need to know to make a living? What related subjects are likely to assist him in making a better living? What sequence of courses leads to the most orderly and profitable advance in his professional achievements?

These are questions that must be answered as one builds an engineering curriculum. The correctness with which they are answered determines the value of the curriculum.

The standard curriculum has been one of four years, during which the student is in school about 36 weeks per year, and the remainder of the time "on vacation." This has been the set-up for the past hundred years. It has taken no cognizance of the remarkable expansion in technological information which has happened in this period. Great grandfather went to college this way, therefore, its good enough for Sonny.

Some of us think this allotted time is too short and we are not thinking in terms of the time necessary to teach an engineer all he needs to know.

We are thinking in terms of the time necessary for laying the firm foundation upon which he may build for the remainder of his life.

It is thought that you will not be interested in the specific items entering into this proposed course of study, but it is believed that you will be interested in the general objectives in mind when it was formulated. These were:

(1) Introduction of some engineering and something of the engineering concept early in the course.

(2) Make every possible course a course in English composition and in public speaking.

(3) Include some courses in history, public relations, business procedures and modern language other than French and German.

(4) Make a substantial percentage of the subject matter elective, 30 semester hours out of a total of 170, so that the

young man can choose lines of study in which he has the greatest personal interest.

Having these statements before you, do you longer question the soundness of asking for a longer time?

The curriculum, as proposed, is composed of eight semesters of 18 weeks each, these will coincide with the customary collegiate year. In addition, there will be three summer terms of 10 weeks each.

There is an analogous division of subject matter, the customary general material of an engineering course in the 8 semesters, while the more specialized subjects will be presented in the 3 terms.

This has been visualized for chemical engineering, but no reasons are apparent which make it inapplicable to any or all engineering curricula.

The completion of such a course is believed to be a satisfactory foundation for the student, should he decide either to continue in graduate work or to engage in the immediate practice of his profession.

Certain scholastic achievements must be met before the student is permitted to elect this course and certain other scholastic requirements are necessary for him to remain in the chosen course.

Physical training is required during each semester and each term. The speaker is a firm believer in the doctrine of "A sound mind in a sound body."

The student would graduate knowing something, not too much, about his profession and about the world in which he will have to practice it.

The major part of his education regarding these extraneous conditions is yet to come. He must face this with resolution and with an open mind. His behavior with respect to these things will, in the main, determine whether he will become a great engineer or only a mediocre one.

Some suggestions for this post collegiate training are offered without specific applications.

He should have a part in the civic affairs of the locality in which he lives. He should be a member of an engineering

society in his particular line and should take a part in its activities, not limit his endeavors only to paying his dues and reading the society publications. This is better than nothing, but is not enough.

It is believed that much of the onus for lack of interest on the part of members can be ascribed to the customary way in which the various engineering societies are operated. They meet, on stated occasions, for the presentation of scientific papers, many of them of value, but very few of them ever leaving us all hot and bothered about something which we think we should do.

Possibly a few meetings devoted to the discussion of these things affecting our professional status and development might stimulate interest among the membership. Some meetings of this type have been attempted, but in the main they have been failures because we can't or won't talk. What makes us this way can not be explained. Certainly there are enough things being done or which someone is contemplating doing which vitally affect all engineering practitioneers to afford ample material for discussion.

Chemical and Engineering News published in the August 25th issue the essential portions of the report of Vannevar Bush to the late President Roosevelt, "Science—The Endless Frontier", and summarized in the September 10th issue various bills affecting research and industrial development which Congress will consider in the near future. "Every scientist should study with care the Bush Report and the proposed measures. Three of these bills are identical and embody the basic proposals of the Bush Report. Others going much further in the degree of control, direction, and supervision of research given to government and contain a very different type of philosophy on the relationship of government, research, industry, science, and scientists. It is the duty of chemists and chemical engineers to express to their Senators and Congressmen their considered opinions of a program that represents in many ways a decided departure from the past and that will have a profound effect on the whole future of research. Can we afford to remain silent when not only the future of our country is at stake but the

future of every scientist is involved? Now is the time and the opportunity of demonstrating to Congress and to America that scientists can be a potent constructive force to be considered seriously when legislation affecting the future welfare of our country hangs in the balance."

In all of the millions and millions of printed and spoken words employed by the press and radio in acquainting America with the discovery of the ways and means of utilizing atomic energy, we believe none were employed to suggest that scientists be given a direct role in the shaping of the world that is to be. Praise, to be sure, was heaped upon those who pioneered in their roles as scientists, yet few venture the opinion that scientists be invited to participate in the control of the use of atomic energy. Why?

Some will say that this refusal comes from a lack of sufficient publicity for the men and women of science. But is this really so? Scientists receive tremendous amounts of publicity, but almost universally that publicity is solely based on outstanding scientific achievements. "When the men and women of science come out of their laboratories and in large numbers acitively participate in the affairs of the world, when they contribute to the shaping of social, cultural, governmental, and international policies in common with other professions and groups and with the same force and conviction, then they will be publicized, not only for their scientific achievements, but also for their roles as molders of public opinion. Until we as individuals and in large numbers are willing to divide our time and energy between scientific pursuits and the affairs of government and of the world, we will continue to be largely ignored. We have a moral responsibility to mankind to assist it in so governing itself that the forces we release are reserved for good, not for evil. No one man, no small group can perform this service. It is the responsibility of every individual who rightfully calls himself a scientist and cannot delegate that personal responsibility to others."

Congress, at the present time, is crowded with bills seeking to do something for the benefit of the scientists, the technologists and the engineers, or bills which will make it more dif-

ficult and hazardous for these individuals to practice their profession in the future. We should be informed in regard to these bills and, as scientists, technologists and engineers, should express our opinions as to their advisability or inadvisability. Some of these bills are on such material as follows:

1. Government sponsored and controlled research.
2. Placing all research and research laboratories together, with personnel, facilities, data and patents ensuing, under the control of a governmental appointed board.
3. Bills galore stating how we should treat our knowledge of the atomic bomb.
4. Legislation on taxation which recognizes the propriety of deducting from income, expenses incurred for research.
5. In many states, not now having legislation regarding the licensing of professional engineers, there is agitation seeking to secure the passage of such legislation.

It seems to the speaker, therefore, that our engineering organizations of all kinds have, at the present moment, ample subjects for discussion transcending the customary presentation of papers purporting to be of a scientific nature.

1946

MEMBERSHIP LIST

C. M.: Charter Member
H. M.: Honorary Member
L. M.: Life Member
A.: Affiliate Member
Assoc.: Associate Member
J.: Junior Member

— A —

ALFRED E. ABAUNZA, (1938), *Civil Engineer*, General Manager, Gulf Engineering Co., *Mail*: 7307 Barthe St., New Orleans, 18.

CARL E. ABRAHAMSON, (1940), *Civil Engineer*, Bridge Detailer, La. Dept. of Highways. *Mail:* P. O. Box 1002, Baton Rouge 2.

NILS C. C. ABRAHAMSON, (1944), *Highway Engineer*, Department of Highways, *Mail:* P. O. Box 1008, Shreveport, La.

MICHAEL C. ABRAHM, (1936), *Mechanical Engineer*, Principal Mechanical Engineer, New Orleans Public Service, 325 Fairway Drive, *Mail*: 317 Baronne St., New Orleans, 9.

LT. (j.g.) WILLIAM S. ADAMS, (J), (1944), *Civil Engineer*, U. S. Naval Reserve, foreign duty. *Mail:* 2101 Elliot St., Alexandria, La.

FELIX L. ALCUS, (1922), *Mechanical Engineer*, owner, Engineering Specialty & Mfg. Co., 1621 Audubon St. *Mail*: 532 So. Peters St., New Orleans, 12.

LEWIS SCHERCK ALCUS, (1923), *Mechanical Engineer*, Chas. Dennery, Inc., 524 Magazine St. *Mail*: 474 Audubon St., New Orleans, 18.

ALBERT M. ALEXANDER, (1944), *Civil Engineer*, Principal Engineer, Godat & Heft, 314 Terminal Bldg. *Mail:* 3318 Coliseum St., New Orleans 15.

LESTER F. ALEXANDER, (1915), (L. M.), *Civil Engineer*, Partner, Lester F. Alexander Co., Contractors. 28 Audubon Place. *Mail:* 830 Audubon Bldg., New Orleans 16.

THOMAS E. ALEXANDER, JR., (1946), *Mechanical and Electrical Engineer*, Service Engineer, Crane Packing Co., *Mail*: 7731 S. Claiborne Ave., New Orleans 18.

WALTER J. AMOSS, (1943), *Civil Engineer*, Director of Advertising, N. O. Public Service Inc. 6102 Prytania St. *Mail*: 317 Baronne St., New Orleans 9.

DOUGLAS S. ANDERSON, (H. M.) (L. M.), (Jan. 1, 1909), Dean Emeritus, College of Engineering, Tulane University. *Mail*: Ogunquit, Me.

ERNEST JAMES ANGELO, JR., (1942), *Electrical Engineer*, Assistant Professor of Electrical Engineering, Tulane University. 6106 Willow St. *Mail*: College of Engineering, Tulane University, New Orleans 15.

PHILIP P. ANGIER, (1942), *Highway Engineer*, District Construction Engineer La. Dept. of Highways. *Mail*: Box 562, S. L. I. Sta., Lafayette, La.

ENS. WILBERT L. ARGUS, (1938), *Civil Engineer*, U. S. Naval Reserve. *Mail:* "Relaxation", Bay St. Louis, Miss.

GABRIEL C. AURIOLES, (1938), *Chemical Engineer*, Supervisor of Edible & Peanut Oil Plants, Sabates, S. A. (Subsidiary of Proctor & Gamble Co.) *Mail*: Calle A, No. 459, Vadado, Havana, Cuba.

— B —

BENTON P. BABIN, (1945), *Electrical Engineer*, Sales Engineer, Westinghouse Electric Corp., 238 S. Saratoga St. *Mail*: 1220 Short St., New Orleans 18.

JEROME C. BAEHR, (1931), *Civil Engineer*, Head, Hydraulic Section U. S. Engineers, New Orleans District, Foot of Prytania St., 3502 Octavia St., New Orleans 15. *Mail*: Foot of Prytania St., New Orleans.

MARTIN S. BAER, (J), (1942), *Chemical Engineer*, Research Chemist, Humble Oil & Refining Co., Baytown, Tex. *Mail*: P. O. Box 675, Baytown, Tex.

JOHN C. BAINE, JR., (1938), *Mechanical and Electrical Engineer*, General Superintendent, Railway Dept., New Orleans Public Service Inc. 1414 Eleonore St. *Mail:* 317 Baronne St., New Orleans 9.

ALONZA A. BALCOM, JR., (J), (1940), *Civil Engineer*, 2154 Cherokee Ave., Baton Rouge 11.

J. NELSON BALL, JR., (1942) *Highway Engineer*, District Engineer, Louisiana Dept. of Highways. *Mail:* P. O. Box, 595, Lafayette, La.

CHARLES CLIFTON BARNARD, (1937), *Consulting Engineer. Mail:* 312 Triad Bldg., Baton Rouge.

BEN BARNES, (J), (1944), *Highway Engineer*, Minden, La.

ROBERT LELAND BARNES, (1942), *Civil Engineer*, District Maintenance Engineer, La. Dept. of Highways. *Mail:* Fordoche, La.

Z. W. BARTLETT, (1945), *Petroleum Engineer*, Asst. General Supt., Freeport Sulphur Co., Port Sulphur, La.

JOHN C. BARTLEY, (1940), *Civil Engineer*, Loftis Utilities Constr. Co., 45 Mangum St., S. W., Atlanta, Ga. *Mail:* 2520 Joseph St., New Orleans 15.

RAYMOND P. BASSICH, (A), (1929), Manager, New Orleans Blue Print & Supply Co. Inc., 2929 Octavia St. *Mail:* 824 Union St., New Orleans 12.

ENS. WORTLEY BATTY, (J), 1945), U. S. Naval Reserve. *Mail*: 5007 Perrier St., New Orleans.

CLAYTON M. BEAMER, (1945), *Chemical Engineer*, Cost Coordinator, Standard Oil Co. of N. J., *Mail*: 4825 Greenside Lane, Baton Rouge 12, La.

THOMAS H. BEAN, JR., (1946), *Civil Engineer*, Consulting Engineer, 813 Hildago St., New Orleans 19.

COL. VICTOR J. BEDELL, (1936), *Civil Engineer*, Partner, V. J. Bedell Co., Consulting Engineers, Pan American Bldg. *Mail:* 7333 Jeannette St., New Orleans 18.

HARVEY M. BEGUE, (A), (1944), *Mechanical Engineer*, Engineering Inspector, Standard Oil Co. of N. J., *Mail*: 6503 Goodwood Ave., Baton Rouge, La.

BEN H. BELL, (1920), *Operating and Electrical Engineer*, New Orleans Public Service Inc., 317 Baronne St. *Mail*: 4604 S. Derbigny St., New Orleans 15.

MACE H. BELL, (1937), *Civil Engineer*, District Engineer, American Institute of Steel Construction, Inc., St. Louis, Mo. *Mail*: P. O. Box 935, St. Louis, Mo.

LT. JOHN C. BENDLER, JR., (1938), *Mechanical and Electrical Engineer*, U. S. Army Air Corps. *Mail*: 8815 Apricot St., New Orleans 18.

R. F. A. BENSON, (1938), *Mechanical Engineer*, 4465 Music St., New Orleans 17.

CHAILLE CLAUDE BERNARD, (1943), *Civil Engineer, Contracts Engineer*, La. Dept. of Highways. *Mail*: 2040 Oleander St., Baton Rouge.

JOHN H. BERNHARD, (1922), *Civil Engineer*, Consultant, Waterways & Harbors, 238 S. Saratoga St., New Orleans 13.

GEORGE BERTRAM, (1945), *Mechanical & Electrical Engineer*, Asst. Dept. Head, Cracking Dept., Shell Oil Co. Inc. *Mail:* Norco, La.

ALLEN W. BETZ, (1945), *Chemical Engineer*, Sales Engineer Gulf Engineering Co., Inc., 916-30 S. Peters St. *Mail:* 215 Rose Ave., New Orleans 20.

FRED A. BILLHARDT, (1943) *Mechanical Engineer*. Address unknown.

F. N. BILLINGSLEY, (L. M.), (1915), *Consulting Engineer*, Billingsley Engineering Corp., 2122 Jefferson Ave. *Mail*: 409 Interstate Bldg., New Orleans 12.

LT. CHARLES BITTENBRING III, (J), (1940), *Civil Engineer*, U. S. Naval Reserve. Foreign duty.

F. B. BLACKSTONE, (1944), *Mechanical Engineer*, Plant Supt. and Technical Advisor, Freeport Sulphur Co. *Mail*: c/o Freeport Sulphur Co., Port Sulphur, La.

HUGH M. BLAIN, (1941), *Gas Engineer*, Supt., Gas Distribution Division, New Orleans Public Service Inc., 2324 Octavia St. *Mail:* 527 Magnolia St., New Orleans 13.

SYLVESTER CLARENCE BLAIZE, (1945), *Civil Engineer*, Head, Structures & Revetment Section, U. S. Engineer Dept., Foot of Prytania St. *Mail*: 402 Millaudon St., New Orleans 18.

ENS. WALTER E. BLESSEY (J), (1943), *Civil Engineer*, U. S. Naval Reserve, foreign duty. *Mail:* 1900 Audubon St., New Orleans 18.

ALBERT R. BOELTE, (1937), *Civil Engineer*, Designer, Board of Commissioners, Port of New Orleans. *Mail*:6032 Patton St., New Orleans 15.

J. EDWIN BOELTE, (A), (1945), *Electrical Engineer*, District Manager, Sperry Gyroscope Co., Inc., 549 Baronne St., New Orleans. *Mail*: 19 Maryland Drive, New Orlaens 18.

WILLIAM H. BOHNE, (1940), *Civil Engineer*, Building Estimator R. P. Farnsworth, 1515 S. Salcedo St. *Mail:* 7616 Plum St., New Orleans 18.

CLARENCE N. BOTT, (1927), General Contractor, 514 Audubon Bldg., New Orleans 16.

HAMILTON J. BOUDREAUX, JR., (1944), *Mechanical Engineer*, Plant Engineer, Thibodaux Boiler Works Inc. *Mail:* 1206 Jackson St., Thibodaux.

FRANCIS A. BOYLE, (1942), *Civil Engineer,* 1712 White Plains Road, New York 60, N. Y.

SHIRLEY C. BRASELMAN, (1919), Vice-President, American Creosote Works, 1725 Palmer Ave. *Mail:* 1305 Dublin St., New Orleans, 18.

LOUIS A. BRAUD, (1945), *Mechanical Engineer,* General Mgr., Terrebonne Iron Works, Inc., Houma, La. *Mail:* P. O. Box 71, Houma, La.

GRADY L. BREECE, (1945), *Structural Engineer,* Chief Engineer, McWilliams Dredging Co., 860 St. Charles Ave. *Mail:* 3105 Metairie Road, New Orleans 20.

BRIG. GEN. EDWARD S. BRES, (1925), *Civil Engineer,* Executive for Reserve & ROTC Affairs, War Dept., 3B 948 Pentagon Bldg., Washington 25, D. C.

BARNET BREZNER, (1944), *Civil Engineer,* Private Practice 2833 Lee St., Alexandria, La. *Mail:* P. O. Box 654, Alexandria 4, La.

ROBERT W. BRINGHURST, (1943), Commissioner of Streets and Parks, Commission Council, Alexandria, La. *Mail:* 2301 Lee St., Alexandria.

ERNEST N. BRODNAX, (A), (1944), *Highway Engineer,* Locating Engineer La. Dept. of Highways, Baton Rouge, La. *Mail:* 203 W. Walnut St., Bastrop, La.

LT. (j.g.) AUGUST J. BRODTMAN, JR., (1936), *Chemical Engineer.* Address unknown.

JAMES P. BRODTMAN, (A), (1932), Sales Representative, Gulf States Creosoting Co., 415 Eliza St., Algiers, La. *Mail:* 901 United Fruit Co. Bldg., New Orleans 12.

ROBERT TERYL BROOKS, (1942), *Civil Engineer,* District Maintenance Engineer, Dept. of Highways. *Mail:* Box 595, Lafayette, La.

LT. THOMAS G. BROUSSARD, (1939), *Mechanical Engineer,* U. S. Army Air Force. *Mail:* 8016 Green St., New Orleans 18.

A. RINGGOLD BROUSSEAU, (1935), Chief Engineer, Housing Authority of New Orleans, 26 Carondelet St., New Orleans 12. *Mail:* 4738 Marigny St., New Orleans 17.

LAWRENCE C. BRUNE, (1933), *Mechanical and Electrical Engineer,* Assistant Engineer, U. S. Engineers, 2nd New Orleans District, Ft. of Prytania St. *Mail:* 4625 Spain St., New Orleans 17.

ENS. BENJAMIN S. BRUPBACHER, JR., (J), (1944), *Mechanical Engineer,* U. S. Naval Reserve, Foreign duty. *Mail:* 1556 Paul Morphy St., New Orleans 19.

J. T. BULLEN, (1925), *Civil Engineer,* Retired, 906 B Street N. W., Ardmore, Okla.

JAMES JOSEPH BULLIUNG, (1915), (L. M.), *Mechanical Engineer,* Market St. Steam Elec. Station, New Orleans Public Service Inc. *Mail:* 3423 S. Claiborne Ave., New Orleans 15.

HENRY J. BULTMAN, JR., (J), (1941), *Chemical Engineer. Mail:* 2320 Joseph St., New Orleans 15.

RAY E. BURGESS, (1945), *Civil Engineer,* Senior Engineer, Cities Service Ref. Corp., Lake Charles, La. *Mail:* R. R. No. 2, Box 197-C, Lake Charles, La.

JACK S. BURK, (1944), *Civil Engineer,* 312 Triad Bldg., Baton Rouge.

JOHN O. BURNETT, (1944), *Civil Engineer,* Construction Engineer, L. O. Raburn, Contractor, Box 2102, Baton Rouge. *Mail:* Denham Springs, La.

CHARLES A. BURTON, (1945), *Chemical Engineer,* 1029 Lowerline St., New Orleans 18.

R. T. BURWELL, (L. M.), (1908), *Mechanical Engineer,* Manager, New Orleans Dept., Hartford Steam Boiler Inspection & Insurance Co., 519 Hibernia Bldg., New Orleans 12.

ENS. ARTHUR B. BUSH ,(J), (1944), *Chemical Engineer,* U. S. Naval Reserve, foreign duty.

SOULE BUTLER, (1945), *Civil Engineer,* City Engineer, Alexandria, La. 2505 Vance Ave. *Mail:* City Hall, Alexandria, La.

— C —

FELIX B. CAMORS, (1943), *Highway Engineer,* La. Dept. of Highways, Baton Rouge. *Mail:* 942 Convention St., Baton Rouge, La.

PHILIP H. CAMPBELL, (1926), *Civil Engineer,* Supervisory Engineer Inland Waterways Corp., 611 Gravier St., New Orleans 12. *Mail:* 1523 Amelia, New Orleans 15.

KOHLMAN CAMPELL, (1945), *Chemical Engineer,* Chemist, International Lubricant Corp., New Orleans. *Mail:* 5537 Willow St., New Orleans 15, La.

C. GLENN CAPPEL, (L. M.), (1915), *Civil Engineer,* Vice-President, W. Horace Williams Co., Inc., Engineers & General Contractors, 2531 Milan Street. *Mail:* 833 Howard Ave., New Orleans 13.

MARTIN CARBONELL, (1939), *Civil Engineer*, War Dept., Engineer Office, Miss. River Commission, Vicksburg, Miss. *Mail*: 219 Hollywood Drive, New Orleans, La.

FRANKLIN D. CARDWELL, (1945), *Mechanical Engineer*, Consulting Engineer for various concerns, 110 W. 43rd St., New York, N. Y. *Mail*: 2436 Jonquil St., New Orleans 17.

LT.-COL. FRANK C. CAREY, (1943), *Civil Engineer*, U. S. Army, foreign duty. *Mail*: 1229 Calhoun St., New Orleans 15.

S. STEVE CARNEGIE, (1940), *Public Health Engineer*, Louisiana State Board of Health, 207 Civil Courts Bldg., New Orleans 7. *Mail*: 1320 Lowerline St., New Orleans 18.

HARRISON F. CARR, (1944), *Civil Engineer*, District Manager United Gas Pipe Line Co. P. O. Box 1628, New Orleans 11. *Mail*: 19 Neron Place, New Orleans 18.

LT. MARK CHARLES CARRIGAN, (J), (1942), *Mechanical Engineer*, U. S. Army, foreign duty.

JOE A. CARRUTH, (J), (1943), *Electrical Engineer*, Gulf States Utilities Co., Lake Charles, La., Residence, 1324 Blvd. *Mail*: Gulf States Util.

J. B. CARTER, (1939), *Civil Engineer*, Bridge Standards Engineer, La. Dept. of Highways, 302 Amherst Ave., Baton Rouge, La. *Mail*: Dept. of Highways, Baton Rouge, La.

WILLIAM H. CARTER, (1939), *Agricultural Engineer*, Associate Professor, La. State University, 1721 Hood Ave., Baton Rouge, La. *Mail*: 113 Atkinson Hall, University Station, Baton Rouge, La.

CHARLES E. CASSAGNE, JR., (1937), *Civil Engineer*, Asst. City Engr. City of New Orleans. *Mail*: 326 Pelican Avenue, New Orleans 14.

N. S. CATCHINGS, (1940), *Civil Engineer*, 918 Topic St., Baton Rouge.

D. B. H. CHAFFE, JR., (1920), *Mechanical & Electrical Engineer*, Partner Southern States Equipment Co. 1136 Second Street. *Mail*: 425 Celeste St., New Orleans 11.

RALPH CHAMBERS, (1943), *Civil Engineer*, Retired, 929 Camelia Ave., Baton Rouge, La.

CMDR. ARTHUR E. CHAMPEAU, USNR, (1943), *Marine Engineer*, District Supervisor, U. S. Merchant Marine Cadet Corps, 407 Richards Bldg., New Orleans. *Mail*: 313 Virginia St., New Orleans 19.

A. WATSON CHAPMAN, (1945), *Chemical Engineer*, Manager of Technical Operations, Celotex Corp., Marrero, La. *Mail*: 2329 Gen. Pershing St., New Orleans 15.

THEO. T. CHENET, (1923), *Civil Engineer, District Maintenance Engineer*, Dept. of Highways, Box 1482, Lake Charles, La

ROGER E. CHESNUT, (1941), *Marine & Mechanical Engineer*, U. S. Army Transportation Corps. 413 S. Genois St., New Orleans 19.

FRANK H. CLARK, (1943), *Mechanical Engineer*, Retired. *Mail*: P. O. Box 485, Chalmette, La.

GEORGE D. COBAUGH, (1946), *Refractories Engineer*, Sales Engineer, Harbison Walk Refractories Co., 603 Protective Life Bldg., Birmingham 3, Ala. *Mail*: 450 Fairway Drive, New Orleans 18.

C. M. COCKRELL, (1945), *Mechanical Engineer*, Supervisor of Engineering, Freeport Sulphur Co., Port Sulphur, La.

TOM F. COLBERT, (1942), *Highway Engineer*, District Maintenance Engineer, La. Dept. of Highways, 1205 Holly St. *Mail*: Box 523, Alexandria 2, La.

JAMES HOWARD COLLINS, (1929), *Mechanical & Electrical Engineer*, P. O. Box 957, Balboa Hts., Canal Zone.

JEFFREY H. COLLINS, SR., (1943), *Chemical Engineer*, General Supt. Gas Dept. New Orleans Public Service Inc., 5830 Memphis St. *Mail*: 317 Baronne St., New Orleans 9.

JAMES B. COLTHARP, (1942), *Electrical Engineer*, Supt. Transmission & Distribution Dept., Gulf States Utilities Co., Baton Rouge. *Mail*: 340 Florida St., Baton Rouge, La.

JOSEPH B. CONVERSE, (1921), *Civil Engineer*, President, J. B. Converse & Co., Inc., Consulting Engineers, Wilson Bldg., Mobile, Ala. *Mail*: P. O. Box 1084, Mobile 6, Ala.

ROBERT S. COOPER, (1940), *Civil Engineer*, Associate, E. M. Freeman & Associates, Consulting Engineers, 603 City Bank Bldg., Shreveport 23, La. *Mail*: 1915 Alexander St., Shreveport, La.

GEORGE E. CORE, (1946), *Mechanical Engineer*, Maint. Engr. Standard Oil Co. of N. J., La. Div. *Mail*: 3003 Hollywood Drive, Baton Rouge, La.

HUGH COUGHLIN, (1945), *Civil Engineer*, Vice-President & General Manager La. Ice & Elec. Co. 2133 Marye St. *Mail:* Box 111, Alexandria, La.

EDWIN R. COUSINS, (J), (1944), *Chemical Engineer*, U. S. Army. *Mail:* 3301 Baudin St., New Orleans 19.

JOHN E. COYNE, (1938), *Civil Engineer*, Assistant Supt. Intracoastal Terminal Co., Harvey, La. *Mail:* 735 Rupp St., Gretna, La.

EMMETT T. CRAIG, (J), (1943), *Chemical Engineer*, Box 513, Baton Rouge.

ROBERT M. CRAIG, (1943), *Electrical Engineer*, Gulf States Utilities Co., 340 Florida St., Baton Rouge. *Mail:* 416 Terrace Drive, Baton Rouge 12.

CHARLES C. CRAWFORD, (1921), *Mechanical Engineer*, Vice-President, A. M. Lockett & Co., Ltd., 1315 First St. *Mail:* 308 Whitney Bldg., New Orleans, 12.

L. VILLERE CRESSY (A), (1930), *Mechanical Engineer*, Manufacturers' Representative, 3217 DeSoto St. *Mail:* 423 Baronne St., New Orleans 12.

LT. (j.g.) MARCEL E. CRETTET, JR., (1940), *Mechanical and Electrical Engineer*, U. S. Naval Reserve. *Mail:* Box 1638, Long Beach, Miss.

THOMAS EDMUND CROSSAN, (1942), *Mechanical Engineer*, System Supt. of Production ,Gulf States Utilities Co. *Mail:* P. O. Box 2431, Baton Rouge.

HORACE E. CRUMP, (L.M.), (June 8, 1906), *Mechanical and Civil Engineer*, Assistant Engineer in Charge of Plans and Specifications, Board of Commissioners, Port of New Orleans, 2 Canal St. *Mail:* 1422 Peniston St., New Orleans, 15.

CORNELIUS C. CRUSEL, (1944), *Civil and Mechanical Engineer*, Application & Service Engineer, A. M. Lockett & Co., 308 Whitney Bldg. *Mail:* 1418 Seventh St., New Orleans 15.

LIONEL J. CUCULLU, (1928), *Mechanical Engineer*, Assistant to Chief Engineer, New Orleans Public Service Inc. 4630 Arts St. *Mail:* 317 Baronne St., New Orleans 9.

LT. JOHN C. CULBERTSON (J), (1941), *Chemical Engineer*, U. S. Naval Reserve. *Mail:* 328 Audubon St., New Orleans 18.

DAVID L. CULLOM, (L.M.), (1916), *Maintenance Engineer*, Board of Commissioners of the Port of New Orleans. *Mail:* 4032 Prytania St., New Orleans 15.

GEORGE L. CUNNINGHAM, JR. (J), (1944), *Chemical Engineer*, U. S. Army. Special Engineering Detachment, P. O. Box 180, Santa Fe, N. M.

— D —

THOMAS C. DAVID, (1940), *Civil Engineer*, Treasurer, Pan American Engineers, 1032 Tenth St. *Mail:* 912 Fifth St., Alexandria.

ALBERT B. DAVIS, JR., (1938), *Civil Engineer*, Engineer, U. S. Engineer Office, Post Office Bldg. *Mail:* 3219 Ave. N1/2, Galveston, Tex.

LT. (jg) DAVID D. DAVIS (J), (1944), *Civil Engineer*, U. S. Naval Reserve. *Mail:* 3016 Tulane Ave., New Orleans.

EDWIN A. DAVIS, (1943), *Civil Engineer*, Works Program Engineer, La. Dept. of Highways. *Mail:* 604 Laurel St., Baton Rouge 8.

GEORGE H. DAVIS, (L. M.), (Oct. 14, 1909), *Civil Engineer*, 20 Exchange Place, New York 5, N. Y. 150 Central Park South, New York 19. *Mail:* 20 Exchange Place, New York 5, N. Y.

RATHBONE DEBUYS, (C. M.), (Jan. 1, 1898), Architect-Engineer, Private Practice, 1514 Calhoun St., New Orleans, La.

KENNETH M. DECOSSAS, (J) (1945), *Chemical Engineer*, U. S. Dept. of Agriculture So. Reg. Research Lab., 2100 R. E. Lee Blvd. *Mail:* 5028 Burgundy St., New Orleans 17.

WALLACE V. deGRUY, (1939), *Electrical Engineer*, Property Accounting Engr., N. O. Public Service, 317 Baronne St. *Mail:* 2539 Jonquil St., New Orleans 17.

A. H. DEMERS, (1943), *Electrical Engineer*, Station Engineer Gulf States Utilities, Baton Rouge. *Mail:* 1915 Walnut St., Baton Rouge 7.

EDWIN LAMAR DENNIS, (1941), *Consulting Engineer*, 425 North 6th St., Baton Rouge 8.

DONALD DERICKSON, (L. M.), (1912), *Civil Engineer*, Professor of Civil Engineering, Tulane University, 1311 Henry Clay Ave. *Mail:* College of Engineering, Tulane University, New Orleans, 15.

JAMES H. DERR, JR., (J), (1944), *Mechanical Engineer*, Gulf States Utilities Co. *Mail:* 2733 Jackson Ave., Baton Rouge 7.

LEON deSALIGNAC, (1936), *Civil Engineer*, Chief Engineer Pan American Petroleum Corp., 944 St. Charles Ave. *Mail:* 5122 Baronne St., New Orleans 15.

ENS. WALLACE B. DIBOLL, JR., (J), (1944), *Mechanical Engineer*, U. S. Naval Reserve. *Mail:* 7428 Benjamin St., New Orleans 18.

THEODORE W. DIETZE, (J), (1942), *Electrical Engineer*, Test Engineer, General Electric Co., 1 River Road, Schenectady, N. Y. *Mail*: 13 State St. Y.M.C.A., Schenectady 6, N. Y.

FARRAR R. DODGE (1940), *Chemical Engineer*, Engineering Aide, U. S. Engineers, N. O. Dist. *Mail*: 5352 Perrier St., New Orleans 15.

MAJOR BERNARD M. DORNBLATT, (1937), *Civil Engineer*, U. S. Army, Corps of Engineers, Foreign Duty. *Mail*: 2121 E. Capitol Dr., Apt. 209, Milwaukee 11, Wis.

AUGUST HOFFMAN DOUGLAS, (A), (1942), *Industrial Engineer*, Representative Dixie Mill Supply Co., Inc., 901 Tchoupitoulas St. *Mail*: 4711 Baronne St., New Orleans 15.

LT. (j.g.) WALTER E. DOUGLAS, JR., (J), (1942), *Civil Engineer*, U. S. Naval Reserve. *Mail*: 5534 S. Liberty St., New Orleans 15.

FLETCHER G. DOWNS, (1940), *Mining Engineer*, State of La. Highway Dept., Baton Rouge. Mail 2068 Myrtledale Ave., Baton Rouge 15.

JAMES M. DOYLE, JR., (1943), *Civil Engineer*, P. O. Box 687, Ferriday, La.

JAMES T. DOYLE, (1944), Assistant Engineer, M. W. Kellog Co., P. O. Box 1432, Lake Charles, La.

JESSE D. DRAKE, (J), (1945), *Electrical Engineer*, Owner, Drake Electric Co., Raymond Road, Jackson, Miss. *Mail*: Route 1, Box 369, Jackson, Miss.

WILLIAM J. DRAWE, JR., (1933), *Mechanical and Electrical Engineer*, Rate Analyst, New Orleans Public Service, Inc., 317 Baronne St. *Mail*: 2611 Burdette St., New Orleans, 18.

ROBERT J. DREUDING, (1926), Sr. Civil Engineer, U. S. Naval Air Station, Houma, La. *Mail*: 4455 Lafaye St., New Orleans 17.

ANDRE J. DUBUS, (1940), *Surveyor*, District Supt., Gulf States Utilities Co. 523 Taft St. *Mail*: P. O. Box 605, Lafayette, La.

JOHN V. DUGAN, JR., (A), (1941), *Mechanical Engineer*, Sales Engineer Murray-Baker-Frederic, Inc., 628 S. Peters St. 85 Dream Court. *Mail*: 628 S. Peters St., New Orleans 6.

ENS. JOHN S. DUHE, (1943), *Mechanical Engineer*, U. S. Naval Reserve, foreign duty.

ARCHIBALD LEE DUNLAP, (1925) *Mechanical Engineer*, Professor of Mechanical Engineering, Tulane University. 1318 Nashville Ave. *Mail*: Tulane University, New Orleans 15.

EDGAR M. DUNN, (1942), *Electrical Engineer*, Assistant Engineer, Plant and Facilities, Higgins Aircraft, Inc. *Mail*: 934 Howard Ave., New Orleans, 13.

AUGUSTUS W. DURNING, (1943), *Chemical Engineer*, Louisiana Power & Light Co., 142 Delaronde St. *Mail*: 12 Forrest Ave., New Orleans, 20.

ALLAN T. DUSENBURY, (L.M.), (May 25, 1909), *Consulting Engineer*, 1637 Octavia St. *Mail*: 2207 American Bank Bldg., New Orleans, 12.

JAMES T. DWYER, JR., (J), (1941), *Chemical Engineer*, Gulf Oil Co., Port Arthur, Texas.

JAMES O. DYAL, (1937), *Civil Engineer*, Associate, Dyal-Scott, Ltd., Puerto Cabezas, Nicaragua.

— E —

LT. HOLMES EARL, (J), (1942), *Civil Engineer*, U. S. Naval Reserve, foreign duty.

RALPH EARL, (L.M.), (1913), *Civil Engineer*, 2125 Leonidas St., New Orleans, 18.

R. H. EARL, (1945), *Sulphur Mining Engineer*, Asst. Supt. Engineering & Maintenance Dept., Freeport Sulphur Co., Port Sulphur, La.

THOMAS C. EARL, (1941), *Mechanical Engineer*, Union Bag & Paper Corp., Savannah, Ga. *Mail*: 506 Maupas Ave., Savannah, Ga.

HOWARD E. EDMONDSON, (1944) Address unknown.

CLARENCE C. EDWARDS, JR., (1942), *Civil Engineer*, Dist. Construction Engineer, La. Dept. of Highways. *Mail*: Box 872, Alexandria, La.

JOHN P. EAGAN (A), (1931), Assistant Engineer in Charge of Maintenance & Operation, Market Street Steam Electric Station, New Orleans Public Service Inc. *Mail*: 5436 S. Claiborne Ave., New Orleans 15.

S. W. ELBERSON, (L.M.), (1911), *Civil Engineer*, Vice-President & Gen. Manager Louisiana Public Utilities Co., Inc., and Gulf Public Service Co. Inc., 201 St. Joseph St. *Mail*: P. O. Box 165, Lafayette, La.

L. C. ELDRIDGE, (1943), Engineer and Superintendent, Baton Rouge Water Works Co., 131 Lafayette St. *Mail:* P. O. Box 2391, Baton Rouge.

M. H. ELISSALDE, (1942), *Electrical Engineer,* Drafting & Design, Gulf States Utilities Company. *Mail:* 2708 Adams Ave., Baton Rouge 7.

LT. SIDNEY ELLIS, JR., (1940), *Chemical Engineer,* U. S. Naval Reserve. *Mail:* 5633 Ada Place, New Orleans 19.

O. H. ELVERUM, (1936), *Civil Engineer,* U. S. Naval Reserve. *Mail:* Morgan City, La.

WALDO A. ERICKSON, (1945), *Mechanical and Electrical Engineer,* Senior Engineer, Shell Oil Co., Inc., Norco, La.

FERNANDO ESTOPINAL, JR., (1944), *Civil Engineer. Mail:* 8130 Zimple St., New Orleans 18.

J. OWEN EVANS, 1946), *Consulting Engineer,* Private Practice, Room 101, 822 Perdido St., New Orleans 12.

LT. MARSHALL B. EWING, (1944), *Electrical Engineer,* USNR. *Mail:* Hosston, La. U. S. Naval Reserve. Address unknown.

— F —

LT. (j.g.) LLOYD P. FADRIQUE, (J), (1941), *Chemical Engineer,* Supply Officer, U. S. Naval Reserve. Address Unknown.

HAROLD FRANCIS FAVRET, (1937), *Civil Engineer,* Engineer-Estimator, Lionel F. Favret, General Contractor, 1128 Lizardi St. *Mail:* 937 Gravier St., New Orleans, 12.

LT. JAMES E. FAVRET, (1942), *Civil Engineer,* U. S. Naval Reserve, foreign duty. *Mail:* 226 Brockenbraugh Court, New Orleans 20.

GEORGE CALVERT FELTON, (J), (1946), *Metallurgical Engineer,* Refinery Metallurgist, Standard Oil Co. of N. J., La. Div., Baton Rouge. *Mail:* 810 Park Blvd., Baton Rouge.

CHARLES H. FENSTERMAKER, (L. M.), (1914), *Civil Engineer,* Consulting and General Engineer, Hillyer, Deutsch, Edwards, Inc., P. O. Box 293, Oakdale, La.

ARTHUR J. FERGUSON, (1938), *Mechanical Engineer,* Safety Director, Standard Oil Co. of N. J., La. Division. *Mail:* 506 Centenary St., Baton Rouge.

JOHN P. FERNANDEZ, (1943), *Mechanical and Electrical Engineer,* Assistant Professor of Experimental Engineering, Tulane University. *Mail:* 9011 Apple St., New Orleans, 18.

FRANK P. FISCHER, (1940), *Electrical Engineer,* Combustion Engineer, Frank P. Fischer Engineering Co., 1920 Audubon St. *Mail:* 420 Dryades St., New Orleans 13.

CHARLES LEAHY FISCHER, (J), (1940), *Civil Engineer. Mail:* 1014 Aline St., New Orleans 15.

EUGENE L. FITHIAN, (A), (1940), Manager, New Orleans Office, Eugene Dietzgen Co., 5527 S. Galvez St. *Mail:* 318 Camp St., New Orleans 12.

CAPT. HUBERT A. FLANAKIN, (1940), *Civil Engineer,* U. S. Army, 80 Westminster Drive, N. E., Atlanta, Ga.

HARRY W. FLETCHER, (A), (1937), Proprietor, Fletcher Equipment & Supplies, 33 Farnham Place, Metairie. *Mail:* 609 Tchoupitoulas St., New Orleans 1.

E. H. FLEWELLEN, JR. (J), (1944), *Chemical Engineer,* Assistant Supt. of Power Plant, Freeport Sulphur Co. *Mail:* Box 27, Port Sulphur, La.

LIONEL E. FLOTTE, (1939), *Civil Engineer,* District Manager, United Cork Companies, 205 Rosewood Drive, Metairie. *Mail:* 5705 Pitt St., New Orleans 15.

ALGERNON F. FLOURNOY, (1941), *Patent Engineer and Patent Attorney,* 1038 College St. *Mail:* 41 Continental American Bank Bldg., Shreveport, La.

MAJOR ROBERT B. FOSTER, JR., (1940), *Civil Engineer,* U. S. Army, *Mail:* 2029 Palmer Ave., New Orleans 15.

JAMES M. FOURMY, (1940), *Civil Engineer,* Consulting Engineer, Hammond, La.

FREDERICK H. FOX, (1922), *Civil Engineer,* Associate Professor of Civil Engineering, Tulane University. 1437 Calhoun St. *Mail:* Tulane University, New Orleans 15.

IRWIN FRANKEL, (J), (1942), *Chemical Engineer. Mail:* 1816 Soniat St., New Orleans 15.

ALBERT J. FRANSEN, (1934), *Mechanical and Electrical Engineer,* Production Engineer, Boland Machine & Mfg. Co., 1000 Tchoupitoulas St. *Mail:* 201 Ringgold St., New Orleans 19.

LOUIS T. FRANTZ, (1936), *Electrical Engineer,* Sewerage and Water Board, 8735 Apricot St., New Orleans, 18.

HAROLD M. FRASER, (1943), Vice-President, International Lubricant Corp. *Mail*: 1604 Audubon St., New Orleans 18. *Mail*: P. O. Box 390, New Orleans, La.

MARION ELLIS FRATER, (1943), *Architect*, Engineer, W. Horace Williams Co., 833 Howard Ave. *Mail*: 2504 Audubon St., New Orleans, 18.

LT. CMDR. JOHN H. FREDERICKSON, JR., (1940), *Civil Engineer*, USNR, Asst. Public Works Officer, Bldg. 90, NATTC, Norman, Okla.

ERNEST M. FREEMAN, (1939), *Civil Engineer*, Consulting Engineer, E. M. Freeman & Associates, City Bank Bldg. 3427 Youree Drive. *Mail*: City Bank Bldg., Shreveport 23, La.

A. F. FRITCHIE, (1945), *Mechanical Engineer*, Asst. Gen'l. Supt. in charge Mechanical, Standard Oil Co. of La. *Mail*: 2331 Kleinert Ave., Baton Rouge 11, La.

ALVIN M. FROMHERZ, (L. M.), (1915), *Civil Engineer*, Consulting Engineer, 226 Carondelet St. *Mail*: 1430 Henry Clay Ave., New Orleans 15.

FRANK C. FROMHERZ, (J), (1943), *Civil Engineer*, Junior Asst. Engineer, U. S. Public Health Service. *Mail*: 1430 Henry Clay Ave., New Orleans 15.

THOMAS ALVIN FROMHERZ, (J), (1945), *Civil Engineer*, Cadet-Mishipman, U. S. Merchant Marine Corps. *Mail*: 1430 Henry Clay Ave., New Orleans 15.

— G —

LT. COL. BENJAMIN E. GALLOWAY, JR., (1941), *Civil Engineer*, U. S. Army, foreign duty. *Mail*: c/o Mrs. B. E. Galloway, Oak Grove, La.

CARY B. GAMBLE, (1941), *Consulting Engineer*, Partner, Cary B. Gamble, 443 Canal Bldg., New Orleans 12.

FRANK G. GAULT, (1939), *Sales Engineer*, P. O. Box 553, Lake Charles, La.

1st LT. JOHN STONE GENTILICH, (1933), *Civil Engineer*, U. S. Engineers, N. O. District. *Mail*: 4675 Venus St., New Orleans, 17.

F. J. GERMANO, (1938), *Civil Engineer*, Associate Professor of Engineering Mechanics, Louisiana State University. 162 E. State St., Baton Rouge 13. *Mail*: Atkinson Hall, L.S.U., Baton Rouge, La.

JOHN W. GERMOND, (1945), *Civil Engineer*, Chief Engineer, Crawford Co., Baton Rouge. 432 East Drive. *Mail*: Box 989, Baton Rouge, La.

CAPT. EDWARD H. GESSNER, (1933), *Civil Engineer*, U. S. Naval Reserve, foreign duty. *Mail*: 119 Audubon Blvd., New Orleans 15.

LT. JAMES K. GIBSON, (1941), *Electrical Engineer*, U. S. Naval Reserve, 22 Battery St., San Francisco, Cal.

RILEY L. GILBERT, (1943), *Mechanical Engineer*, Chief Engineer, Gulf Engineering Co., 916 S. Peters St., New Orleans 12. *Mail*: 134 Rose Ave., N. O. 20.

ERNEST McKAY GILLEN, (1944), *Highway Engineer*, Resident Engineer La. Dept. of Highways. 444 Prospect St. *Mail*: Box 1084, Shreveport.

J. HARRY GILLUM, (1934), *Electrical Engineer*, Assistant to General Refining Supt., Standard Oil Co. *Mail*: 2130 Madison Ave., Baton Rouge 7.

HOWARD W. GLEASON, (1938), *Civil Engineer*, Glover Construction Co., 1430 Whitney Bldg. *Mail*: 320 Brockenbraugh Court, New Orleans, 20.

JOHN A. GLOVER, (1938), *Civil Engineer*, General Contractor of Building Construction. Geo. J. Glover Co., Inc. 1305 Soniat Street. *Mail*: 1430 Whitney Bldg., New Orleans 12.

DAVID W. GODAT, (1924), *Civil Engineer*, Partner, Godat & Heft, Consulting Engineers, 314 Terminal Station Bldg. *Mail*: 540 St. Peter St., New Orleans, 12.

JULES GODCHAUX, (L. M.), (Jan. 1, 1899), Vice-President and Engineer of Operation, Godchaux Sugars, Inc., 1007 Masonic Temple, New Orleans, 12.

PAUL LEON GODCHAUX, (1941), *Chemical Engineer*, Carondelet Bldg., New Orleans 12.

WALTER GODCHAUX, JR., (1938), *Chemical Engineer*, Assistant to Vice-President, Godchaux Sugars, Inc., P. O. Box 226, New Orleans. *Mail*: 1838 Calhoun St., New Orleans 15.

LT. (j.g.) W. SCOTT GOLDMAN, (J), (1942), *Civil Engineer*, U. S. Naval Reserve, foreign duty.

JOSEPH McCORMACK GONDRAN, (1923), *Civil Engineer*, Construction Engineer American Sugar Refining Co. *Mail*: 8228 Panola St., New Orleans 18.

LOUIS K. GOOD, (1944), *Civil Engineer*, Director & Manager, R. P. Farnsworth & Co., Inc., 1515 S. Saleedo Street. *Mail*: 2817 Jefferson Ave., New Orleans 15.

EDWIN HENRY GOODLOE, (1942), *Civil Engineer*, District Engineer, La. Dept. of Highways, Lake Charles. *Mail*: 1011 South Division St., Lake Charles, La.

ROBERT E. GOSA, (1929), *Civil Engineer and Contractor*, Member of firm, W. Horace Williams Co. 6020 Prytania St. *Mail*: 833 Howard Ave., New Orleans 13.

ENS. ALVIN G. GOTTSCHALL (J), (1943), *Mechanical Engineer*, U. S. Naval Reserve, foreign duty.

BERNARD GRAFF, SR., (1939), *Mechanical and Electrical Engineer*, Chief Engineer, Mundet Cork Corporation, 325 No. Front St. *Mail*: 1321 Dante St., New Orleans, 18.

RICHARD N. GRAHAM, (1944), *Civil Engineer*, U. S. Maritime Commission. *Mail*: 233 Walnut St., New Orleans 18.

ARTHUR A. GRANT, (1937), *Mechanical Engineer*, Consulting Engineer, Private Practice, 1215 Exposition Blvd. *Mail*: 1745 Canal Bldg., New Orleans, 12.

CHARLES H. GREEN, (1937), *Civil Engineer*, Partner Wm. F. Surgi Equipment Co. 4601 Lafaye St. *Mail*: 1017 Magazine St., New Orleans 13.

BERNARD A. GREHAN, (J), (1942), *Civil Engineer*, 1670 Soniat St., New Orleans 15.

BERNARD H. GREHAN, (L. M.), (1915), *Civil Engineer*, Vice-President Geo. J. Glover Co., Inc., 1430 Whitney Bldg. *Mail*: 1670 Soniat St., New Orleans 15.

F. B. GREVEMBERG, (1935), *Civil Engineer*, Supt. of State Bldgs., State of La., Dept. of Finance. Cottage No. 3, Capitol Grounds. *Mail*: Box 4001, Capitol Station, Baton Rouge, La.

WILL S. GUEDRY, (1940), *Civil Engineer*, District Engineer, Dept. of Highways. *Mail*: 401 W. Charles St., Hammond, La.

PETER J. GUELFI, (1940), *Industrial Sales Engineer*, Gulf States Utilities Co., Baton Rouge.

MARIO R. GUELL, (1938), *Electrical Chief Draftsman and Designing Engineer*, Gaylord Container Co. *Mail*: 601 West 3rd St., Bogalusa, La.

WALDECK F. GUILBEAU, (1943), *Chemical Engineer*, Southern Research Laboratory, 2100 Robert E. Lee Blvd. *Mail*: 6667 Memphis St., New Orleans, 19.

J. MASON GUILLORY, (1933), *Mechanical and Electrical Engineer*, Manager, Industrial and Commercial Engineering Division, New Orleans Public Service, Inc., 4128 Monroe St. *Mail*: 317 Baronne St., New Orleans, 9.

A. H. GUILLOT, (1917), *Civil Engineer*, Principal Roadway Engineer, New Orleans Public Service Inc. 1423 Adams St. *Mail*: 317 Baronne St., New Orleans 9.

DONATO ENRIGUE GUIZA, (1939), *Civil Engineer*, Engineer Supt., Boh Bros. Construction Co., 2400 Cypress St. *Mail*: 3723 Cadiz St., New Orleans 15.

WILLIAM BREWSTER GURNEY, (1943), *Mechanical Engineer*, Gulf States Utilities Co. *Mail*: 2631 Hundred Oaks Ave., Baton Rouge.

MARTIN M. GURTLER II, (1938), *Civil Engineer*, Construction Engineer Alabama Dry Dock & Shipbuilding Co., Mobile, Ala. *Mail*: 624 City Park Ave., New Orleans 19.

JOHN JOSEPH GUTWEILER, (1945), *Civil Engineer*, Resident Engineer, La. Dept. of Highways, Baton Rouge. 906 Main St., Pineville, La. *Mail*: Box 3208, Baton Rouge 5.

— H —

S. G. FRANK HAAS, (1940), *Technical Engineer*, Sewerage & Water Board. *Mail*: 59 Neron Place, New Orleans 18.

JOHN A. HAASE IIII, (1933), *Civil Engineer*, Naval Architect U. S. Maritime Commission, 348 Baronne St. *Mail*: 115 S. Hennessy St., New Orleans 19.

ROBERT N. HABANS, (1939), *Civil Engineer*, Chief Engineer, Orleans Materials & Equipment Co., Inc., 1556 Tchoupitoulas St. *Mail*: 5228 Pitt St., New Orleans 15.

ALLEN S. HACKETT, (1921), *Civil Engineer*, Consulting Engineer, Private Practice, 454 Walnut St., New Orleans 18.

CALLENDER FAYSSOUX HADDEN, (1928), *Mechanical & Electrical Engineer*, Executive-Vice-President and Treasurer, Standard Supply & Hardware Co., P. O. Drawer 620, New Orleans 7.

EDGAR J. HAGSTETTE, JR., (1935), *Chemical Engineer*, 227 S. Pierce St.

HARVEY A. HALL, (1945), *Civil Engineer*, 2030 Myrtle Ave., Baton Rouge, La.

WILLIAM HANSEN HALL, (1941), *Electrical Engineer, Physicist*, Instructor in Physics, University of Oklahoma. 212 Fourth St., DeRidder, La. *Mail*: University of Oklahoma, Norman, Okla.

DANIEL HALLARON, JR., (1939), Mech. & Elect. Engineer, Electrical Distribution Engr., New Orleans Public Service Inc. 4491 Franklin Ave. *Mail*: 317 Baronne St., New Orleans 9.

FARRAR PETRIE HAMILTON, (L. M.), (1915), 408 Walnut St., N. O. 18.

GEORGE R. HAMMETT, (1920), *Mechanical Engineer*, Manager, A. M. Lockett & Co., Ltd., 340 Vincent Ave., Metairie. *Mail*: 308 Whitney Bldg., New Orleans 7.

LT. CMDR. BEN J. HANEY, USNR, (1939), *Mechanical and Electrical Engineer*, Supervisor of Shipbuilding, Jeffersonville Boat & Machine Co., Jeffersonville, Ind.

FRED A. HANNAMAN, JR., (1944), *Mechanical Engineer*, Mechanical Coordinator Chem. Prod. Div., Standard Oil Co. of N. J., Louisiana Division. 1721 Cedardale Ave., Baton Rouge 15. *Mail*: Box 551, Baton Rouge, La.

LT. (j.g.) HOWARD J. HANSEN, (1939), *Civil Engineer*, U. S. Naval Reserve. *Mail*: 1202 Willow St., Point Loma, San Diego, Cal.

IRVEN E. HANSON, *Construction Engineer*, Supt. Engineering & Maintenance, Freeport Sulphur Co., Port Sulphur, La.

WILLIAM HARDY, (1937), *Contractor*, Partner, Hardy-Stevens Company, 917 Carondelet Bldg. 2404 Pine St. *Mail*: 917 Carondelet Bldg., New Orleans 12.

LOUIS W. HARRELL, (1942), *Mechanical Engineer*, Field Testing Engineer, La. Dept. of Highways. *Mail*: 1939 University Ave., Baton Rouge, La.

ALLAN J. HARRIS, (1924), *Sales and Application Engineer*, Owner Allan J. Harris Company, 400 Balter Bldg. *Mail*: 7615 Jeannette St., New Orleans 18.

LT. JAMES E. HARVEY, JR., (J), (1940), *Mechanical Engineer*, U. S. Naval Reserve. *Mail*: 3104 State St. Drive, New Orleans 15.

JAMES E. HASSINGER, JR., (J), (1945), *Civil Engineer*, Engineer, William R. Burk, Associated Architects & Engineers, 504 Pan American Bldg. *Mail*: 2021 S. Carrollton Ave., New Orleans 18.

JOHN D. HAVERKAMP, (1946), *Electrical Engineer*, Industrial Engineer, New Orleans Public Service, Inc. 3910 La. Ave. Pkwy. *Mail*: 317 Baronne Street, New Orleans 9.

N. L. HAWKINS, (1943), *Civil Engineer*, President, Orleans Materials & Equipment Co., 1556 Tchoupitoulas St. 265 Audubon Blvd. *Mail*: P. O. Box 87, New Orleans 6.

W. WALLACE HAY, (1927), Senior Navigation Engineer, Head River Terminals Section, Tennessee Valley Authority. Home: Radio Road, Route 12, Fountain City, Tenn. *Mail*: c/o T.V.A., Arnstein Bldg., Knoxville, Tenn.

ARTHUR C. HAYS, (1940), *Sales Engineer*, Private Practice. Home: 1114 Burgundy St. *Mail*: 1221 Carondelet Bldg., New Orleans 12.

ENS. JOSEPH I. HEBERT, JR., (1942), *Civil Engineer*, U. S. Naval Reserve, address unknown.

MARVIN I. HEBERT, (1944), *Civil Engineering Draftsman & Designer*, Squad Leader, Dept. of Highways (Road Design Section). *Mail*: 2219 Pocahontas St., Baton Rouge, La.

SIDNEY L. HEBRARD, (1945), *Highway Engineer*, La. Dept. of Highways, Baton Rouge. 1260 University Ave., Baton Rouge.

ENS. RICHARD A. HEEHS, (J), (1944), *Mechanical Engineer*, U. S. Naval Reserve. *Mail*: 73 Poplar Ave., Memphis 3, Tenn.

GEORGE A. HEFT, (1939), *Civil Engineer*, Consulting Engineer, Godat & Heft, 314 Terminal Station Bldg. *Mail*: 2420 Audubon St., New Orleans 18.

MALCOM B. HELM, (1941), *Civil Engineer*, Petroleum Engineer, The Texas Company, Producing Dept. P. O. Box 252. *Mail*: 1812 Marengo St., New Orleans 15.

NUMA J. HELWICK, (1936), *Mechanical Engineer*, Partner, American Heating & Plumbing Co., 829 Baronne St. *Mail*: 809 Greenwood St., N. O. 19.

HARRY B. HENDERLITE, (1929), *Civil Engineer*, Chief Engineer, Louisiana Department of Highways. 716 N. 8th St. *Mail*: Dept. of Highways, Baton Rouge 4.

JAMES P. HENDERSON, (1938), *District Erector*, A. M. Lockett & Co., 311 Whitney Bldg. *Mail*: 1627 S. Carrollton Ave., New Orleans 18.

FRANK MELVILLE HEROY, (1946), *Civil and Cartographic Engineer*, U. E. Engineer Office, Foot of Prytania St. *Mail*: 6124 Prytania St., New Orleans 15.

RUDOLPH HERPICH, (1925), *Mechanical Engineer*, Planner and Estimator, U. S. Navy, 315 N. Carrollton Ave. *Mail*: 3904 Delgado Drive, New Orleans 19.

RUDOLF HERTZBERG, (1943), *Civil Engineer*, Chief Training Section, U. S. Engineer Office, Foot of Prytania St. *Mail*: 8019 Hickory St., New Orleans 18.

WILLIAM T. HESS, (1933), *Mechanical and Electrical Engineer*, Vice-President and Chief Engineer, Louisiana Power & Light Company. *Mail*: 142 Delarondo St., New Orleans 14.

OSCAR HIGGINBOTHAM, (1934), *Chemical Engineer,* Compania Ingenios Azucareros Matanzas, S. A., Central Espana, Perico, Cuba.

ARTHUR M. HILL, (1934), *Mechanical Engineer,* Professor of Heat Engineering Tulane University. *Mail*: 823 Pine St., New Orleans 18.

G. WILLIAM HILL, (1936), *Mechanical and Electrical Engineer,* Sales Engineering, Westinghouse Electric & Mfg. Co., Masonic Temple Bldg. *Mail*: 2800 Audubon St., New Orleans 18.

J. CLIFTON HILL, (1942), *Chemical Engineer,* Chemist, Louisiana Station, Gulf States Utilities Co. *Mail*: 2153 Broussard St., Baton Rouge.

EDWARD D. HOGG, (J), (1940), *Civil Engineer,* Assistant Engineer, N. O. Public Belt Railroad, P. O. Box 1240. *Mail*: 8000 Nelson Street, New Orleans 18.

W. T. HOGG, (L. M.), (1913), *Civil Engineer,* Principal Assistant Engineer, Board of Commissioners, Port of New Orleans. *Mail*: 8000 Nelson St., N. O. 18.

ERWIN HOGGE, (1945), *Mechanical and Electrical Engineer,* Supt. of Production, La Central Electric Co., Inc. Home: Box 283, Pineville, La. *Mail*: Box 111, Alexandria, La.

JOSEPH A. HOLLAND, (1945), *Civil Engineer,* Assistant Engineer, Billingsley Engineering Co., 409 Interstate Bank Bldg. *Mail*: 1817 Valance St., New Orleans 15.

MAJOR WALTER HOLLOWAY, (1923), *Mechanical and Electrical Engineer,* QMC, Post Quartermaster, U. S. Army, Gulfport Field, Gulfport, Miss. *Mail*: Box 578, Tuskegee, Ala.

WILLIAM D. HOLLOWAY, (1945), *Lubrication Engineer,* Supt. Industrial & Technical Oil Sales, Gulf Refining Co., P. O. Box 400, New Orleans. *Mail*: 1440 Calhoun St., New Orleans 15.

RALPH S. HOLT, (1938), *Testing Engineer,* Co-owner, R. S. Holt Testing Laboratory, 637 Tchoupitoulas St., New Orleans 12.

PAUL F. HOOTS, (1927), Assistant to President, New Orleans Public Service Inc. 139 Fairway Drive. *Mail*: 317 Baronne St., New Orleans 9.

FRANKLYN G. HORNSBY, (1945), *Electrical Engineer,* Supt. Meters & Service, Gulf States Utilities Co., 340 Florida St., Baton Rouge. *Mail*: 2010 Walnut St., Baton Rouge 7.

ALBERT E. HOTARD, (J), (1945), *Civil Engineer,* Senior Instrumentman, Louisville & Nashville Railroad, 908 West Broadway, Louisville, Ky. *Mail*: 221 Pelican Ave., New Orleans 14.

J. GERALD HOTARD, (1945), *Electrical Engineer,* Gulf States Utilities Co., Baton Rouge. *Mail*: 2312 Edgewood Drive, Baton Rouge 9.

LT. S. E. HOTTINGER, JR., (1932), *Electrical Engineer,* U. S. Naval Reserve. *Mail*: 38 Allard Blvd., New Orleans 19.

LEO W. HOUGH, (1942), *Civil Engineer and Geologist,* Soils Engineer, La. Dept. of Highways, Testing and Research Section, 2-C-3 Pentagon Courts, Baton Rouge. *Mail*: Testing & Research Section, La. Dept. of Highways, Baton Rouge, La.

CHARLES P. HOYT, (1945), *Mechanical Engineer,* Maintenance & Construction Division Head, Standard Oil Co. of N. J., La. Div., Box 551, Baton Rouge. *Mail*: P. O. Box 864, Baton Rouge, La.

JAMES T. HUEY, (1939) *Highway Engineer,* Senior Bridge Designer, La. Dept. of Highways. Home: 942 Convention St. *Mail*: P. O. Box 1446, Baton Rouge 2, La.

STANTON ENNES HUEY, (1937), *Civil Engineer,* Consulting Engineer, Huey & Cage, Ouachita Nat'l. Bank Bldg., Monroe, La.

EDWARD F. HUGHES, (1933), *Civil Engineer,* Sewerage and Water Board, 526 Carondelet St. 2302 Valmont St. *Mail*:526 Carondelet St., New Orleans 12.

WILLIAM J. HUGHES, (1943), *Civil Engineer,* Location Engineer, Louisiana Department of Highways. *Mail*: 2265 Ferndale Ave., Baton Rouge 15.

DICK A. HUNT, (1941), *Civil Engineer,* Office Engineer, Oman Construction Co., 2113 Aklin St., Nashville, Tenn.

—I—

CLARENCE A. IBACH, (1944), *Power Plant Engineer,* Assistant Test Engineer, Gulf States Utilities, 340 Florida St. *Mail*: P. O. Box 111, Baton Rouge, La.

ENS. WARREN E. IBELE, (J), (1944), *Mechanical Engineer,* U. S. Naval Reserve. *Mail*: 4320 St. Peter St., New Orleans 19.

LYALL GIBSON IRELAND, (1929), *Electrical Engineer,* Vice-President & Chief Engineer, New Orleans Public Service Inc., 1460 Henry Clay Ave. *Mail*: 317 Baronne St., New Orleans 9.

C. A. IVES, JR. (1922), *Civil Engineer,* Zone Engineer, Standard Oil Co. of N. J., Baton Rouge. *Mail*: 940 Park Blvd., Baton Rouge.

— J —

COMMODORE ERNEST LEE JAHNCKE, (L. M.), (Jan. 1, 1900), Special Representative, Bureau of Ships, U. S. Navy, 731 Iberville. *Mail*: 1412 Union Bldg., New Orleans 12.

PAUL F. JAHNCKE, (L. M.), (Jan. 1, 1908), *Civil Engineer*, President, Jahncke Service, Inc.; Flint Sand & Gravel Co., 7 Audubon Place. *Mail*: 814 Howard Ave., New Orleans 4.

MAJOR ERNEST J. JAMES, (1942), *Civil Engineer*, U. S. Army. *Mail*: 1006 Thornton St., Alexandria, La.

JAMES S. JANSSEN, (1933), *Civil Engineer*, Gas Engineer, New Orleans Public Service Inc. 225 Bellaire Drive. *Mail*: 317 Baronne St., New Orleans 9.

JOSEPH EDMUND JARMAN, (1942), *Civil Engineer*, District Engineer La. Department of Highways, Monroe, La. *Mail*: 1507 Spencer Ave., Monroe, La.

LT. (j.g.) NEILL P. JEFFREY, JR. (J), (1943), *Civil Engineer*, U. S. Naval Reserve. *Mail*: Jeanerette, La.

FRANK E. JOHNSON, JR., (1937), *Electrical Engineer*, Assistant to Supt. of Electrical Distribution, New Orleans Public Service Inc. 4450 Baccich St. *Mail*: 317 Baronne St., New Orleans 9.

HAMILTON JOHNSON, (1937), *Mechanical and Structural Engineer*, Designing and Consulting Engineer, Independent Practice. 2626 Dalrymple Drive, Baton Rouge. *Mail*: Box 404, Baton Rouge, La.

ENS. ROY ERNEST JOHNSON, (J), (1943), *Civil Engineer*, USNR. *Mail*: 4807 St. Claude Ave., New Orleans 17.

WARREN JOHNSON, (L. M.), (1903), *Mechanical Engineer*, President and General Manager, Todd-Johnson Dry Docks, Inc. *Mail*: 6226 Marquette Place, New Orleans 15.

WILLIAM H. JOHNSTON, (J), (1945), *Mechanical Engineer*, Salesman, F. N. Johnston, Inc. 1637 S. Jeff. Davis Pkwy. *Mail*: 2207 American Bank Bldg., New Orleans 12

C. LEONARD JONES, (1923), *Civil Engineer*, Chief Structural Designer, Board of Commissioners, Port of New Orleans, 2 Canal St. *Mail*: 2747 Audubon St., New Orleans 18.

SARGENT F. JONES, (1940), *Civil Engineer*, 5422 Prytania St., New Orleans 15.

CHARLES E. JOUBERT, (L. M.), (Jan. 1, 1909), *Civil Engineer*, Publicker Commercial Alcohol Co., Westwego, La. *Mail*: 3021 S. Carrollton Ave., N. O. 18.

— K —

KARL P. KAMMER, (1931), *Mechanical Engineer*, General Superintendent, Electrical Department, New Orleans Public Service Inc. 5010 Bienville St. *Mail*: 317 Baronne St., New Orleans 9.

NOEL P. KAMMER, (1936), *Architectural Engineer*, Engineer, R. J. Dorn Co., 5300 Tchoupitoulas St. *Mail*: 3527 Carondelet Street, New Orleans 15.

W. J. KEATING, (A), (1946), *Electrical Engineer*, Superintendent, E. Levy & Co., 530 Murray St., Home: 335 Sixteenth St. *Mails* P. O. Box 1845, Alexandria, La.

THOMAS S. KEATY, (1946), *Chemical Engineer*, Training Director, Standard Oil Co. of N. J. *Mail*: 6191 Esplanade Ave., Baton Rouge La.

ARTHUR R. KEILER, (1940), Chief Inspector, Hartford Steam Boiler Inspection and Insurance Co. 217 Dodge Ave. *Mail*: 519 Hibernia Bank Bldg. N. O. 12.

CLAUDE J. KELLY, (1936), *Civil Engineer*, Vice-President, N. O. Cement Products Co., Inc. 3301 Julia St. *Mail*: 4139 General Taylor St., N. O. 15.

JAMES PARKERSON KEMPER, (H. M.), (L. M.), (May 25, 1909), Civil Engineer, address unknown.

CHARLES MACDONALD KERR, (L. M.), (1913), *Civil Engineer*, 5831 S. Robertson St., New Orleans 15.

GERALD C. KERR, (1937), *Acoustical Engineer*, Taylor-Seidenbach Co. 625 Pine St. *Mail:* 1401 Tchoupitoulas St., New Orleans 13.

BERNARD L. KIERNAN, JR. (J), (1944), *Mechanical Engineer*, Manager, Kay Engineering Service. 1622 Mirabeau Ave. *Mail*: 202 Interstate Bldg., New Orleans 12.

BERNARD L. KIERNAN, SR., (1940), *Mechanical Engineer*, Chief Engineer, Jackson Brewing Co., 620 Decatur St. *Mail*: 1622 Mirabeau Ave., N. O. 19.

O. G. KIRBY, (1940), *Civil Engineer*, Engineer & Construction Supt., W. R. Aldrich & Co., P. O. Box 2027. *Mail*: 1959 Myrtledale Ave., Baton Rouge, La.

LEONARD R. KIRST, (1929), *Civil Engineer,* Louisiana State Department of Public Works, Capitol Building. *Mail*: 317 East Drive, Baton Rouge 12.

JOHN KLORER, (L. M.), (Jan. 23, 1898), *Civil Engineer,* Supervising Engineer, Defense Plant Corporation of the R. F. C., Higgins Aircraft, Box 32, New Orleans. *Mail*: 8300 Panola St., New Orleans 18.

LT. COL. J. T. KNIGHT, JR., (1940), *Civil Engineer,* Address unknown.

LT. (j.g.) NATHANIEL B. KNIGHT, JR. (J), *Electrical Engineer,* (1944), *U. S. N. R. Mail*: 329 Whitney Building, New Orleans 12.

CHARLES P. KNOST, (1944), *Electrical Engineer,* District Representative, Moloney Electric Company, 7903 Belfast. *Mail*: 428 Balter Bldg., New Orleans 12.

WILHELM E. KOCH, (1916), (L. M.), *Construction Engineer,* 2627 Coliseum St., New Orleans 13.

RICHARD B. KOHNKE, (L. M.), (1911), *Civil Engineer,* Office Engineer, City of New Orleans, City Hall. *Mail*: 932 Pichcloup Place, New Orleans 19.

LOUIS I. KORN, (1933), *Mechanical Engineer. Mail*: 1022 Joseph St., N. O. 15.

GUS C. KRAUS, (Assoc.), (1929), *Mechanical Engineer,* Assistant Superintendent, Rolling Stock & Shops, New Orleans Public Service Inc., 317 Baronne St. *Mail*: 2838 Iberville St., New Orleans 19.

ROBERT J. KUHN, (1925), *Electrical Engineer,* Consulting Engineer. 2724 Octavia St. *Mail*: 901 Pere Marquette Bldg., New Orleans 12.

— L —

LT. (j.g.) EDWIN A. LAFAYE, (J), *Mechanical Engineer,* U. S. Naval Seserve. *Mail*: Naval Air Station, Corpus Christi, Texas.

LT. IRWIN M. LAIS, (J), (1940), *Mechanical Engineer,* U. S. Army Air Corps. Address unknown.

GEORGE B. LAMBERT, JR., (1939), *Engineer,* M. T. Reed Construction Co., Operation Div., U. S. Navy ABD., Gulfport, Miss. *Mail*: Mississippi City, Miss.

EARLE A. LANDRY, (1942), *Highway Engineer,* Port Allen, La.

HENRY LOUIS LANDRY, (J), (1942), *Electrical Engineer,* Power Sales Engineer, Gulf States Utilities Co. *Mail*: 2222 Cedardale Ave., Baton Rouge, La.

HERRICK J. LANE, (1929), *Civil Engineer,* Member of firm, W. Horace Williams Co. 1465 State St. *Mail*: 833 Howard Ave., New Orleans 13.

EDWARD S. LANPHIER, (1918), Lighthouse Engineer, Retired, 1204 State Street, New Orleans 15.

N. E. LANT, (1937), *Bridge Engineer,* La. Dept. of Highways. 4780 Newcomb Drive. *Mail*: c/o La. Dept. of Highways, Baton Rouge, La.

WILLIAM M. LARKIN, (1944), *Electrical Engineer, Power Engineer,* Gulf States Utilities Co., 340 Florida St. *Mail*: 740 Vernon St., Baton Rouge, La.

LEO JOS. LASSALLE, (1936), *Mechanical Engineer.* Dean, College of Engineering, Louisiana State University and A. & M. College, 616 Park Blvd. *Mail*: L. S. U. University Station, Baton Rouge 3.

W. STONE LEAKE, (1934), *Electrical Engineer, Sales Engineer,* General Electric Co. 303 Betz Place. *Mail*: 1004 Richards Bldg., New Orleans 12.

JOSEPH H. LEBLANC, JR., (J), (1955), *Mechanical Engineer,* Foreman, Welding &Mfg. Co., 609 Calliope St. *Mail*: 2309 St. Charles Ave., New Orleans 13.

ENS. OWEN V. LEBLANC, (J), (1944), U. S. Naval Reserve. *Mail*: 2927 Bell St., New Orleans, La.

ROBERT E. LEBLANC III, (J), (1944), *Electrical Engineer. Mail*: 715 Exposition Blvd., New Orleans 15.

WENDEL J. LECHTENBERG, (J), (1944), *Architect, Jr. Electrical Engineer,* Mathieson Alkali Works, Lake Charles. *Mail*: 820 1/2 Clements St., Lake Charles, La.

STANLEY M. LECOURT, (1933), *Civil Engineer,* Research Engineer, Mississippi Shipping Co., Inc., 501 Hibernia Bldg. *Mail*: 3033 Robert St., New Orleans 15.

JOSEPH M. LEDOUX, (1945), *Civil Engineer,* District Manager, National Electric Products Corp. *Mail*: 5700 Garfield St., New Orleans 15.

CLARENCE O. LEE, (1944), *Mining Engineer,* Technical Assistant to Gen'l. Mgr., Freeport Sulphur Co. 48 Versailles Blvd. *Mail*: 1804 American Bank Bldg., New Orleans 5.

RANDALL F. LEGEAI, (1923), *Mechanical and Electrical Engineer,* Sales Engineer, New Orleans Public Service Inc. 3830 Nashville Ave. *Mail*: 317 Baronne St., New Orleans 9.

BRYAN J. LEHMANN, (1915), *Mechanical Engineer*, Head Stillman, Shell Oil Co., Inc. *Mail*: c/o Shell Oil Co., Inc., Norco, La.

H. L. LEHMANN, (1937), *Testing and Research Engineer*, Louisiana Department of Highways, 2152 Myrtledale Ave. *Mail*: Louisiana Department of Highways, Baton Rouge, La.

LEE SIMS LENOIR, (1943), *Civil Engineer*, District Engineer, La. Department of Highways, 3425 Fairfield Ave. *Mail*: Box 38, Shreveport, La.

PAUL J. LETZ, (1938), *Surveyor*, Private Practice, Room 10, Duson Bldg. *Mail*: 203 E. 8th St., Crowley, La.

HAROLD A. LEVEY, (1936), *Chemical Engineering Consultant*, President American Products Mfg. Co. 8127-33 Oleander St. *Mail*: 311 Audubon Blvd., New Orleans 15.

ENS. ALLISON M. LEVY, (J), (1944), *Mechanical Engineer*, U. S. Naval Reserve. *Mail*: 1930 Robert St., New Orleans 15.

EUGENE LEVY, (A), (1946), *Electrical Contractor*, Owner, E. Levy & Co., Electrical Contractors, Box 1845, Alexandria, La.

COMDR. NEVILLE LEVY, (1929), *Mechanical and Electrical Engineer*, Assistant District Procurement Officer, 8th Naval District. 6306 Prytania St. *Mail*: 410 Camp St., New Orleans 12.

RALPH E. LIND, (1930), *Civil Engineer*, 6624 Louis 14th St., New Orleans 19.

ROBERT LOBSTEIN, (1943), *Mechanical Engineer*, *Mail*: 3330 Lake Shore Drive, Chicago, Ill.

ROBERT P. LOCKETT, (A), (1931), *Mechanical Engineer*, Vice-President, A. M. Lockett & Co. 2130 Palmer Ave. *Mail*: 308 Whitney Bldg., New Orleans 12.

WILLIAM A. LOCHTE, (1945), *Mechanical Engineer*, Smith-Hinchman & Grylls, 51 Pine St., New York City. *Mail*: 401 8th Ave., Brooklyn, N. Y.

GERVAIS LOMBARD, (C. M., L. M., H. M.), (Jan. 1, 1898), *Civil Engineer*, 574 Walnut St., New Orleans 18.

JULES A. LORIO, (1921), *Mechanical Engineer*, Superintendent Dibert, Bancroft & Ross Company, Ltd., 3400 Tulane Ave. *Mail*: 7420 Benjamin St., New Orleans 19.

C. HAROLD LOUREE, (1943), *Civil Engineer*, District Manager The Ingalls Companies, 126 Carondelet St. Home: 29 Joyce Ave. *Mail*: Box 673 New Orleans 7.

L. A. LOUSTALOT, (L. M.), (1913), *Civil Engineer*, Hammond, La.

BYRON PHELPS LYONS, (1944), *Civil Engineer*. Dist. Engr., La. Dept. Public Works, 614 Drehr Ave., Baton Rouge.

— M —

DANIEL P. MABEL, (1945), *Electrical Engineer*, District Manager, Anaconda Wire & Cable Co. 305 W. Maple St., Zone 20. *Mail*: 1005 Carondelet Bldg., New Orleans 12.

FRANK W. MACDONALD, (1933), *Civil Engineer*, Associate Professor of Civil Engineering, Tulane University. 4918 S. Johnson St. *Mail*: c/o Tulane University, New Orleans.

WALLACE RAY MACK, (J), (1942), Instrumentman, Louisiana Department of Highways. *Mail*: P. O. Box 308, Leesville, La.

KENNETH W. MACKENZIE, (1939), *Testing Engineer*, Owner, Construction Materials Laboratory, 906 Sevier Ave., Knoxville, Tenn.

JOHN F. MALLETTE, (1943), Civil Highways & Bridge Construction Engineer, Licensed Concrete Contractor, 3323 N. 23rd Street, St. Petersburg 6, Fla.

HENRY J. MALOCHEE, (L. M.), (March 5, 1898), *Mechanical Engineer, Division Engineer*, Defense Plant Corp. Home: 4420 Danneel St., New Orleans. *Mail*: Box 1788, Baton Rouge 2.

JOHN D. MALONE, JR., (1937), *Electrical Engineer*, Assistant Operating Engineer, New Orleans Public Service Inc. 234 Glendale Blvd., Metairie. *Mail*: 317 Baronne St., New Orleans 9.

ISHAM W. MANN, JR., (1938), *Mechanical Engineer*, Field Service Engineer, A. M. Byers Co. *Mail*: 4742 Pecan St., New Orleans 17.

S. KENAN MANSON, JR., (J), (1942), *Civil Engineer*, R. P. Farnsworth & Co., 3018 Leeland St., Houston, Texas. Mail: 7933 Oak Street, New Orleans 18.

WALTER A. MARCOTTE, (A), (1942), *Industrial Engineer*, Shell Oil Co. 600 Jefferson Davis Parkway. *Mail*: 430 Hillary St., New Orleans 18.

ALBERT E. MARKS, (1925), *Civil Engineer,* 5633 Rosemary Place, New Orleans 19.

N. L. MARKS, JR., (1937), *Civil Engineer,* City Engineer, Room 21, City Hall. *Mail:* 1830 S. Dupre St., New Orleans 15.

HAROLD O. MARQUART, (1943), *Civil Engineer,* Office Engineer, Voorhies & Smith, Consulting Engineers, 3000 A Dalrymple Drive. *Mail:* 1835 Birch St., Baton Rouge 7, La.

EDMUND B. MARTIN, (1937), *Electrical Engineer,* Federal Land Bank, 4118 Saratoga St., New Orleans 15.

ROBERT L. MARTIN, (A), (1946), *Chemist,* Sanitary Engineer, City of Alexandria. *Mail:* 1518 Chester St., Alexandria, La.

HIRAM RUSSELL MASON, (1945), *Electrical Engineer,* Professor and Head of Department of Electrical Engineering, Southwestern Louisiana Institute, Lafayette, La.

SEBASTIAN V. MASSIMINI, (1931), *Mechanical Engineer,* President Gulf Engineering Co. Inc., 1403 Broalway. *Mail:* 916 S. Peters St., New Orleans 13.

ALLEN JUMEL MATHERNE, JR., (1943), *Electrical Engineer,* Test Engineer, Gulf States Utilities Co., 340 Florida St. *Mail:* 454 Florida St., Baton Rouge 8.

RUSSEL A. MATHERNE, (J), (1945), *Mechanical Engineer,* Inspector, Louisiana Divisnon, Standard Oil Co. *Mail:* 425 S. 21st St., Baton Rouge, La.

ARNOLD CARL MATTHIES, (1945), *Chemical Engineer,* Process Engineer, Standard Oil Co. of N. J., Louisiana Division, North Baton Rouge, La. *Mail:* 2285 Cedardale Ave., Baton Rouge 15.

EDWIN LORENZO MATTISON, (1942), *Chemist,* Chief Chemist, Tetra-Ethyl Lead Plant DuPont Co. *Mail:* 1181 Steele Blvd., Baton Rouge, La.

GEORGE ELMER MAY, (1940), *Heating and Ventilating Engineer,* N. O. Public Service Inc., 317 Baronne St. *Mail:* 2031 Short St., New Orleans, 18.

JOHN K. MAYER, (1933), *Mechanical and Electrical Engineer,* Associate Professor and Head of Experimental Engineering, Tulane University. 2419 Audubon St. *Mail:* College of Engineering, Tulane University, New Orleans 15.

1st. LT. JOHN F. MAYS, (1937),*Civil Engineer,* U. S. Army, foreign duty. *Mail:* 1407 First St., New Orleans 13.

LUTHER D. McCORQUODALE, (J), (1942), *Civil Engineer,* Resident Engineer La. Dept. of Highways. 721 Boulevard St. *Mail:* 1007 S. Division St., Lake Charles, La.

JAMES P. McCULLOUGH, (1938), *Chemical Engineer,* Assistant Head, Contracts and R/W Department, United Gas Pipe Line Co. Home: 724 McCormick St. *Mail:* United Gas Bldg., Shreveport, La.

A. WYLIE McDOUGALL, (A), (1943), District Manager, H. H. Robertson Co., 725 Toulouse St., New Orleans 16.

DEWITT T. McIVER, (1944), *Mining Engineer,* Assistant Vice-President and General Manager, Freeport Sulphur Co., 1804 American Bank Bldg., New Orleans 12.

LT. (j.g.) PAUL A. McKIM, (J), (1944), *Chemical Engineer,* U. S. Naval Reserve. Home: 2861 Pocahontas St., Baton Rouge, La. *Mail:* Naval Magazine, Port Chicago, Calif.

GORDON J. McLEAN, (1923), *Mechanical and Electrical Engineer,* Design Engineer, Dupont de Nemours Co., Nemours Bldg. *Mail:* 221 N. Bancroft Pkwy., Wilmington, Del.

HENRY L. McLEAN, (1930), *Mechanical Engineer,* Consulting Engineer, 419 Carondelet Bldg. *Mail:* 2604 St. Roch Ave., New Orleans 17.

LEAL C. H. McLEAN, (1933), *Mechanical and Electrical Engineer,* Manager Fabricating Sales Dept., Jones & Laughlin Steel Corp. 1325 Cadiz St. *Mail:* P. O. Box 66, New Orleans 6.

EDWARD A. McLELLAN, (1938), *Mechanical Engineer,* Manager, F. N. Johnston, Inc., 1453 Arabella St. *Mail:* 2207 American Bank Bldg., New Orleans 12.

LT. EDWARD J. McNAMARA, (1937), *Civil Engineer,* U. S. Naval Reserve, foreign duty. Home: 3132 Derby Place, New Orleans.

J. A. McNIVEN, (1922), *Civil Engineer, Chief Engineer,* Board of Commissioners, Port of New Orleans. 224 E. Livingston Place, Metairie. *Mail:* No. 2. Canal St., New Orleans 6.

GEORGE P. MEADE, (1936), *Chemical Engineer,* Manager Gramercy Refinery, Colonial Sugars Co., Gramercy, La.

ALFRED MARION MELANCON, (J), (1942), Engineering Draftsman, Gulf States Utilities Co. *Mail:* 762 North 27th St., Baton Rouge.

C. GLENNON MELVILLE, (1943), *Civil Engineer,* W. Horace Williams Co. Home. 6026 Memphis St. *Mail:* 833 Howard Ave., New Orleans 13.

GEORGE H. MENEFEE, (J). (1938), *Mechanical Engineer*, Safety Engineer, The Travelers Insurance Co. Home: 624 Lowerline St. *Mail*: 611 Richards Bldg, New Orleans 12, La.

RICHARD F. MESSINA, (1945), *Civil Engineer*, Sales Engineer, Wm. F. Surgi Equipment Co., 2136 Selma St. *Mail*: 1017 Magazine St., New Orleans 13.

LT. J. M. MIAZZA, (J), (1942), *Mechanical Engineer*, U. S. Army. *Mail*: 1611 Pine St., New Orleans 18.

GEORGE E. MILLARD, (1945), *Test Engineer*, Manager, Diesel Engine Department, Fairbanks Morse Co. *Mail*: 5528 Pitt St., New Orleans 15.

ERNEST L. MIRE, (1938), *Civil Engineer*, Chief Engineer, N. O. Public Belt Railroad, 5420 Fontainebleau Drive. *Mail*: P. O. Box 1240, New Orleans 10.

H. LANE MITCHELL, (1944), *Civil Engineer*, Commissioner of Public Works, City of Shreveport. Home: 350 Albany Ave. *Mail*: City Hall, Shreveport, La.

HENRI J. MOLAISON, (1934), *Chemical Engineer*, Associate Engineer, Engineering and Development Division, U. S. Southern Regional Research Laboratory, U. S. Dept. of Agriculture, 2100 Robert E. Lee Blvd. Also Part-time Instructor in Electrical Engineering, College of Engineering, Tulane University. *Mail*: 109 Sherwood Forest Drive, New Orleans 19.

JOHN EDWARD MONROE, JR., (1944), *Chemical Engineer*, Chief Chemical Engineer, Freeport Sulphur Co. *Mail*: P. O. Box 657, Port Sulphur, La.

JOHN W. MONTGOMERY, (1923), *Sales Engineer*, Structural Engineer, Jones & Laughlin Steel Corp. Home: 4109 Tchoupitoulas St. *Mail*: P. O. Box 66, New Orleans 6.

DAVID MOODIE, (1933), *Mechanical Engineer*, Engineer, N. O. Public Service Inc., Market Street S. E. Generating Station. 2839 Audubon St. *Mail*: Market and So. Peters St., New Orleans 13.

JOHN E. MOREHISER, JR., (1938), *Mechanical Engineer*, Assistant Professor, Mechanical Engineering, College of Engineering, Tulane University. *Mail*: 5740 Pontchartrain Blvd., New Orleans 18.

RICHARD A. MORNHINVEG, (1937), *Mechanical Engineer*. *Mail*: 998 Ingleside Drive, Baton Rouge, La.

WILLIS DEDRIC MORRIS, (1945), *Electrical Engineer*, Associate Professor of Electrical Engineering, Louisiana State University. *Mail*: 555 Stanford Ave., Baton Rouge 14.

WALTER B. MOSES, (L. M.), (1913), *Mechanical and Electrical Engineer*, Consulting Engineer, Partner Leo S. Weil & Walter B. Moses. 3504 Napoleon Ave. *Mail*: 801 Audubon Bldg., New Orleans 16.

LT. (j.g.) JOHN W. MULLEN, JR., (1939), *Civil Engineer*, U. S. Naval Reserve, foreign duty.

JACOB F. MULLER, JR., (1932), *Mechanical Engineer*, Partner, Plant Manager and Superintendent, Muller Furniture Mfg., Co., 200 N. Derbigny St. *Mail*: 3 Fairview Court, New Orleans 20.

RICHARD F. MULLER, (1939), *Mechanical and Electrical Engineer*, Sales Engineer, Allis Chalmers Manufacturing Co. 2905 Palmer Ave. *Mail*: 724 Canal Bldg., New Orleans 12.

ADAM G. MUNDINGER, (1943), *Civil Engineer and Surveyor*, Owner, A. G. Mundinger Co., 4559 Highland Road, Baton Rouge, La.

ROBERT S. MUNSELL, (1944), *Mining Engineer*, Assistant Superintendent of Production, Freeport Sulphur Co., Port Sulphur, La.

JOSEPH R. MURPHY, (1943). Power Plant Engineer, Assistant Test Engineer Gulf States Utilities Co. *Mail*: 400 Laurel St., Baton Rouge, La.

LT. STENNING C. MURPHY, (J), (1941), *Chemical Engineer*, U. S. Naval Reserve, Naval Ammunition Depot, New Orleans. *Mail*: 511 Lowerline St., New Orleans 18.

NED SCRUGGS MUSE, (1946), *Electrical Engineer*, Louisiana Field Representative, The Graybar Electric Co. *Mail*: 2429 Elliot St., Alexandria 16, La.

WESTON W. MUSE, JR., (1945), *Highway Engineer*, Locating Engineer, Department of Highways. *Mail*: 528 Lakeland Drive, Baton Rouge 8.

CHARLES A. MYERS, (1937), *Civil Engineer*, Pan American Engineering Co., 912 Fifth St., Alexandria, La.

— N —

EDWARD M. NABERSCHNIG, JR., (1923), *Chemical Engineer*, Assistant to Works Supt., Southern Cotton Oil Co., 9 Mile Post, Westwego, La.

CLAYTON L. NAIRNE, (1929), *Mechanical and Electrical Engineer*, Assistant to Executive Vice-President, New Orleans Public Service Inc., 6031 Pitt St. *Mail*: 317 Baronne St., New Orleans 9.

ROBERT L. NALL, (1936), *Mechanical Engineer,* Plant Engineer Flintkote Co., 4500 N. Galvez St. Home: 1139 State St., New Orleans 15. *Mail:* Box 1122, New Orleans 4.

ARTHUR J. NAQUIN, (1928), *Mechanical and Electrical Engineer,* Safety Counselor New Orleans Public Service Inc. 2515 Pine St. *Mail:* 317 Baronne St., New Orleans 9.

ALLEN J. NEGROTTO, (1920), *Civil Engineer,* State Director, Public Work Reserve, 1047 Canal Bldg. *Mail:* 129 Beverly Drive, Metairie, New Orleans 20.

BERNARD STANLEY NELSON, (L. M.), (1911), *Mechanical Engineer,* Chief Engineer A. M. Lockett & Co., Ltd. 7319 Panola St. *Mail:* 308 Whitney Bldg., New Orleans 12.

LAWRENCE K. NELSON, (1940), *Mechanical and Electrical Engineer,* Associate, James M. Todd, Consulting Engineer. 2502 Palmer Ave. *Mail:* 207 N. Peters St., New Orleans 16.

WALDEMAR S. NELSON, *Mechanical-Electrical Engineer, Engineer,* V. J. Bedell Company, 504 Pan American Bldg. *Mail:* 322 Hillary St., New Orleans 18.

DONALD EUGENE NESTLER, (J), (1945), *Mechanical Engineer,* Student Test Engineer, General Electric River Works, 920 Western Ave. *Mail:* Thomson Club, 24 Baker St., Lynn, Mass.

ALBERT B. NEVILS, (J), (1942), *Junior Traffic Engineer,* Traffic and Planning Section, La. Department of Highways. *Mail:* Route 3, Box 293-C, Lake Charles, La.

LEROY L. NEWMAN, (1923), *Electrical Engineer,* Superintendent of Electric Distribution, New Orleans Public Service Inc. 1227 Exposition Blvd. *Mail:* 317 Baronne St., New Orleans 9.

HARRY P. NEWTON, (1939), *Chemical Engineer,* Asst. Director, Southern Research Laboratory, 2100 Robert E. Lee Blvd. *Mail:* 7025 Freret St., New Orleans 18.

JAMES H. NICKELSON, (1944), *Highway Engineer,* Box 1579, Lake Charles, La.

CHRISTIAN NIELSEN, (1939), *Mechanical Engineer,* Plant Engineer, Wedgeplug Valve Co., 1300 S. Broad Ave. *Mail:* 3620 Cherry St., New Orleans 18.

LEO A. NIXON, (1942), *Construction Inspector,* The Texas & Pacific Railway Co. *Mail:* P. O. Box 849, Marshall, Tex.

SIDNEY D. NOLAN, *Engineer,* Cities Service Refining Corp., Lake Charles. *Mail:* 23 Center Ave., Maplewood, La.

—O—

WILLIAM F. OAKES, (1918), *General Contractor,* 344 Camp St., New Orleans 12.

JOSEPH T. O'BRIEN, (1940), Electrical Engineer, Head of Utilities Dept., Chemical Produces Division, Standard Oil Co. of N. J. *Mail:* 1309 Ingleside Drive, Baton Rouge 12.

PAUL S. O'BRIEN, (1943), *Metallurgical Engineer,* Representative Socony Paint Products Co. *Mail:* 630 Laurel St., Apt. 4, Baton Rouge 8.

LEO M. ODOM, (1942), *Civil Engineer,* Chief Engineer, State of La. Dept. of Public Works. 2219 Myrtledale Ave. *Mail:* 11th floor, Capitol Bldg. Baton Rouge, La.

CHARLES W. OKEY, (L. M.), (1911), *Civil Engineer,* Head Engineer, Tennessee Valley Authority. Home: Crestwood Drive, Route 6, *Mail:* T. V. A. 616 Union Bldg., Knoxville, Tenn.

GEORGE E. OLDHAM, (1944), 913 Richland Ave., Baton Rouge, La.

OLE K. OLSEN, (L. M.), (1907), *Civil Engineer,* Senior Partner Ole K. Olsen Company. 508 Millaudon St. *Mail:* 823 Perdido St., New Orleans 12.

JOHN H. O'NEILL, (L. M.), (1916), *Public Health Engineer,* Director, Division of Public Health Engineering, La. State Board of Health, Civil Courts Bldg. *Mail:* 637 Lowerline St., New Orleans 18.

ADLOE ORR, JR., (1938), *Civil Engineer,* 316 Baronne Street. *Mail:* 6505 Wuerpel New Orleans 19.

LT. FRANCIS J. ORY, (J), (1941), *Civil Engineer,* U. S. Naval Reserve. Public Works Officer. *Mail:* 312 Millaudon St., New Orleans 18.

WILLIAM P. OSTER, (1928), *Mechanical and Electrical Engineer,* Vice-President and Sales Manager, Equitable Equipment Co., Inc. 4651 Baccich St. *Mail:* 410 Camp St., New Orleans 12.

PAUL F. OSWALD, (1945), *Mechanical Engineer,* Consulting Engineer, President Oswald Engineering Service Inc. 3031 Coliseum St. *Mail:* 504 Queen & Crescent Bldg., New Orleans 12.

— P —

PAUL PASCAL PARETI, JR., (1933), *Mechanical and Electrical Engineer*, 201 S. Alexander St., New Orleans 19.

JOHN JOSEPH PASTOREK (J), (1943), *Chemical Engineer*, U. S. Naval Reserve, Foreign duty.

ALBERT B. PATERSON, (1923), *Mechanical and Electrical Engineer*, President New Orleans Public Service Inc. 15 Audubon Place. *Mail*: 317 Baronne St., New Orleans 9.

HAROLD J. PATTERSON, (1940), *Civil Engineer*, Housing Authority of New Orleans, 326 Carondelet St. *Mail*: 1637 Robert St., New Orleans 15.

RUSSELL GLOCER PATTERSON, (1945), *Consulting Engineer*, 710-A Whitney Bldg., New Orleans 12.

T. ELLIS PEAK, (1941), *Mechanical Engineer*, Head of Engineering Dept., Standard Oil Co. of La. *Mail*: 2028 Lakeshore Drive, Baton Rouge, La.

BOYKIN W. PEGUES, (L. M.), (1907), *Civil Engineer*, Head of Dept. of Civil Engineering, Louisiana State University, University Station, Baton Rouge.

CLAIBORNE PERRILLIAT, (1944), *Civil Engineer*, Secretary-Treasurer Perrilliat Rickey Construction Co., 1530 S. Rendon St. *Mail*: 1928 Octavia St., New Orleans 15.

STAYTON L. PERRY (A), (1946), Superintendent of Water Works, City of Alexandria. *Mail*: 1811 Polk St., Alexandria, La.

HARLUF C. PETERSEN, (1945), *Mining Engineer*, Supt. Land & Exploration Dept., Freeport Sulphur Co., 1804 American Bank Bldg. 721 Exposition Blvd. *Mail*: P. O. Box 1520, New Orleans 5.

CHARLES J. PHILLIPS, JR., (1941), *Designing Engineer*, Engineering Estimator, Standard Oil Co. of N. J. La. Div. *Mail*: 3321 Wenonah St. Baton Rouge 5.

BRISTER B. PIERCE, (1929), *Electrical Engineer*, Chief Engineer Gaylord Container Corp., Mill Division, Bogalusa, La.

FREDERICK F. PILLET, (1922), *Civil Engineer*, Head of Civil Engineering Dept., Louisiana State University. 730 N. 10th St. *Mail*: L. S. U., Baton Rouge 3.

RICHARD A. PISKE, JR. (J), (1945), *Mechanical Engineer*, Student Engineer, Carrier Corp., Syracuse, N. Y. *Mail*: 7309 Spruce St., New Orleans 18.

JOSEPH POMINSKI, (1941), *Chemical Engineer*, Southern Regional Research Laboratory, Engineering & Development Div., 2100 Robert E. Lee Blvd. *Mail*: 337 Hillary St., New Orleans 18.

ARTHUR CLINTON PORTER, (1940), *Mechanical Engineer*, Process Engineer, Consolidated-Vultee Aircraft Corp., Fort Worth, Texas. *Mail*: 2712 Azelea St., Fort Worth 7.

EARL PORTER, JR., (1945), *Civil Engineer*, Partner, Hebrard & Porter, Box 10, Baton Rouge. *Mail*: 1955 Chestnut St., Baton Rouge 7.

JOHN L. PORTER, (L. M.), (1924), *Civil Engineer*, Assistant Director, Division of Public Health Engineering, La. State Board of Health, Room 207 Civil Court Bldg. *Mail*: 8407 Panola St. New Orleans 18.

JOHN E. POTTHARST, (1937), *Mechanical Engineer*, President Mechanical Equipment Co. and Peoples Utilities, Inc. 20 Versailles Blvd. *Mail*: 861 Carondelet St., New Orleans 13.

JOHN E. POTTHARST, JR., (1943), *Mechanical Engineer*, Assistant to Engineering Officer, U. S. Navy. *Mail*: 20 Versailles Blvd., New Orleans 15.

IRVING R. PRAY, (1939), *Chemical Engineer*, Bridge Design Section, Dept. of Highways, Baton Rouge, La.

KENNTH T. PRICE, (1944), *Mining Engineer*, General Superintendent, Freeport Sulphur Co., Port Sulphur, La.

WARD C. PURDUM, (J), (1944), *Mechanical Engineer*, U. S. Naval Reserve, foreign duty. *Mail*: 520 S. Scott St., New Orleans 19.

IVAN H. PURINTON, (1944), *Mechanical Engineer*, New Orleans Public Service Inc.; Instructor Part-time in Experimental Engineering, Tulane University. 1323 Octavia St. *Mail*: 317 Baronne St., New Orleans 9.

DeWITT L. PYBURN, (1941), *Civil Engineer*, Director, Dept. of Public Works, State of Louisiana, 364 Center Drive. *Mail*: Capitol Bldg., Baton Rouge, La.

— Q —

JOHN E. QUARLES, (1945), Asst. Chief Engineer, Crawford Company. *Mail*: 1728 Cloverdale St., Baton Rouge, La.

PAT H. QUINLAN, (1925), *Drainage Engineer*, Sewerage and Water Board, 526 Carondelet St. *Mail*: 1141 Philip St., New Orleans.

— R —

LT. IRWIN A. RABENOVITZ, (J), (1942), *Chemical Engineer,* U. S. Army. *Mail:* 3625 Napoleon Ave., New Orleans 15.

GROVER CLEVELAND RACKERBY, (1926), *Civil Engineer,* U. S. Engineers, N. O. District, Foot of Prytania St. *Mail:* 4021 Octavia St., New Orleans 15.

WALTER S. RAINVILLE, JR., (1934), Transportation Engineer, Director of Research, American Transit Association, 292 Madison Ave., New York 17. Home: 7741 S. Claiborne Ave., New Orleans 18. *Mail:* Apt. 16W, 32 Washington Square, New York 11.

PAUL E. RANDOL, (1945), *Electrical Engineer,* Operating Superintendent, Central Louisiana Electric Co., 229 W. Main St., Bunkie, La. *Mail:* 405 Rose St., Bunkie, La.

EDWARD S. RANDOLPH, (1937), *Consulting Engineer,* Panama Canal, Special Engineering Director, Diablo Heights. 51555 Blackburn Place, Diablo Heights. *Mail:* P. O. Box 441, Balboa Heights, Canal Zone.

CHARLES FREDERICK RANTZ, (1924), *Refrigeration Engineer,* 436 Elmira Ave., New Orleans 14.

A. B. RATCLIFF, JR., (1944), *Civil Engineer,* Highway Engineer, Dept. of Highways. *Mail:* 824 Costello Lane, Baton Rouge 8.

LYMAN C. REED, (1943), *Electrical Engineer,* President, Reed Unit Fans Inc., 439 Lowerline St. *Mail:* 1001 St. Charles Ave., New Orleans 8.

MARION B. REED, (1945), *Electrical Engineer,* Inspection Engineer, Standard Oil Co. of N. J., La. Div. *Mail:* 3220 Eaton Street, Baton Rouge 5.

ROBERT N. REED, (J), (1941), *Electrical Engineer,* Standard Oil Co. of N. J., Louisiana Division. *Mail:* 3684 Winnebago St., Baton Rouge 5.

MICHAEL H. REILLY, (1940), *Construction Engineer,* Field Superintendent, Pan American Airways, A. D. P. *Mail:* 4402½ Canal St., New Orleans 19.

LT. THOMAS J. RENNIE, (J), (1940), *Civil Engineer,* U. S. Marine Corps Reserve, foreign duty.

FRANK L. REYNOLDS, (L. M.), (1916), *Construction Engineer,* Vice-President, Irons & Reynolds, Inc., 420 Lexington Ave., New York City. *Mail:* 115 Ocean Ave., Brooklyn.

HAMPTON REYNOLDS, (1937), *Civil Engineer,* 1525 Short St., New Orleans 18.

WILLIAM H. RHODES, (1927), *Civil Engineer,* Asphalt Div. Representative, Shell Oil Co., 600 S. Jefferson Davis Parkway. *Mail:* 1519 Exposition Blvd., New Orleans 15.

EDWARD B. RICE, (1945), *Civil Engineer* (Hydraulic), District Engineer, U. S. Geological Survey, 355 Sunset Blvd., Baton Rouge. *Mail:* Box 8877 Univ. Sta., Baton Rouge 3, La.

ROBERT BRUCE RICHARDSON, (1937), *Civil Engineer,* Construction & Maintenance Engineer, Louisiana Department of Highways. 975 Ingleside Drive. *Mail:* La. Dept. of Highways, Baton Rouge, La.

W. PAT RICHARDSON, (1945), *Mechanical and Electrical Engineer,* Johns-Manville Sales Corp. *Mail:* 223 Brockenbraugh Court, New Orleans 20, La.

GEORGE J. RICHAUD, (1937), *Civil Engineer,* Supt. of Roadways, New Orleans Public Service Inc., 710 Third St., N. O. 20. *Mail:* 317 Baronne St.

CLAIRE WILLIAM RICKER, (1929), *Electrical Engineer,* Professor and Head, School of Electrical Engineering, Tulane University. 717 St. Peter St. *Mail:* College of Engineering, Tulane University, New Orleans 15.

ANSON F. RIDEOUT, (1937), *Civil Engineer,* District Engineer & Manager for states of Louisiana and Texas, J. B. McCrary Co., Inc. 410 Bon Ami Street. *Mail:* Thompson Bldg., DeRidder, La.

FRANK RIESS, (1941), *Mechanical Engineer,* Estimator and Field Supervisor, Geo. J. Glover Co., Whitney Bldg. *Mail:* 924 Audubon St., New Orleans 18.

JOHN RIESS, (L. M.), (1906), *Civil Engineer and Contractor,* 17 Audubon Blvd. *Mail:* Carondelet Bldg., New Orleans 12.

CAPT. JOHN A. RILEY (J), (1941), *Mechanical Engineer,* U. S. Army. Address unknown.

FRANK M. RITCHIE, (1943), *Surveyor,* Chief Engineer and Supt. of Lands, The Louisiana Land & Exploration Co. 928 Crescent Blvd. *Mail:* Box 231, Houma, La.

CHARLES L. RITTENBERG, (1937), *Civil Engineer,* Insurance Engineer, Meyers, Whitty & Hodge, 1024 Canal Bldg. *Mail:* 429 Lowerline St., New Orleans 18.

WILLIAM S. ROATEN, (1940), *Mechanical Engineer,* Erecting Supt., Worthington Pump & Machinery Corp., Buffalo, N. Y. *Mail:* Box 512 Waterproof, La.

JAMES M. ROBERT, (L. M.), (1908), *Mechanical Engineer.* Dean, College of Engineering, Tulane University. 2141 State St. *Mail*: College of Engineering Tulane University, New Orleans 15.

A. R. RODRIGUEZ, (1938), *Civil Engineer and Naval Architect,* Private Practice. 1628 N. Dupre St. *Mail*: 903 Maritime Bldg., New Orleans 12.

EDWIN J. H. RODRIGUEZ, (1918), *Chemical Engineer,* Johns-Manville Sales Corp., 101 Marietta St., Atlanta, Ga.

EVERETT G. ROESSLE, (1926), *Civil Engineer,* Geo. P. Rice, Consulting Engineer, 324 Audubon Bldg. *Mail*: 1019 Leontine St., New Orleans 15.

CHARLES M. ROGERS, (1944), *Mechanical Engineer,* Consulting Engineer for Sales Dept., N. O. Public Service Inc. 2838 St. Charles Ave. *Mail*: 317 Baronne St., New Orleans 9.

ENS. LOUIS J. ROSENBOHM, (J), (1944), *Civil Engineer,* U. S. Naval Reserve. Home: 347 Joseph St., New Orleans. *Mail*: 34th C. B., U.S.N.B., Port Hueneme, Cal.

JOSEPH ELLIS ROSS, (1944), *Highway Engineer,* Resident Engineer, La. Dept. of Highways, Box 752, Monroe, La.

NORMAN H. ROSS, (A), (1938), *Sales Engineer,* Secretary, Ole K. Olsen, Inc., 4516 S. Johnson St. *Mail*: 823 Perdido St., New Orleans 12.

LT. CMDR. ALFRED J. ROTH, JR., (1938), *Civil Engineer,* USNR, Public Works Officer, Naval Air Station, New Orleans. *Mail*: 5944 Argonne St., New Orleans, La.

RALPH K. ROTHROCK, (1938), *Mechanical Engineer,* Private Practice, 5316 Dryades St., New Orleans 18.

— S —

WILLIAM C. SAGE, (1942), *Mechanical and Civil Engineer,* President and General Manager, Cia. Manufacturara de Tubos de Acero, S. A. *Mail*: Calle Paris 337, Monterrey, Mexico.

HENRY DAY SALASSI, (1944), *Engineering Draftsman,* Squad Leader, La. Dept. of Highways, *Mail*: 1070 Glenmore Ave., Baton Rouge.

COMMANDER HARRY S. SALZER, (1927), *Civil Engineer,* District Marine Engineer Officer, U. S. Coast Guard. 6028 Catina St. *Mail*: 327 Custom House, New Orleans 16.

CAPT. HYMAN SAMUELSON, (J), (1940), *Civil Engineer,* U. S. Army. *Mail*: 4332 S. Prieur St., New Orleans 15.

R. M. SANDERFORD, JR., (J), (1942), *Electrical Engineer,* 2302 Ethel Ave., Waco, Texas.

JAMES J. SAURAGE, (1942), *Testing Engineer,* Laboratory Testing Engineer, La. Dept. of Highways. *Mail*: 2242 Stanton Ave., Baton Rouge.

LEON E. SAVAGE, (1943), *Civil and Mechanical Engineer,* Chief Engineer, Celotex Corporation. 3936 Louisiana Ave. Parkway, New Orleans. *Mail*: c/o Celotex Corp., Marrero, La.

HORACE A. SAWYER, (1945), *Civil Engineer,* Vice-President and Manager, Lone Star Cement Corp. 901 Burdette St. *Mail*: 1120 Hibernia Bank Bldg., New Orleans 12.

WALTER HOWARD SCALES, (1929), *Architectural Engineer,* Southern Manager, National Lumber Manufacturers' Association. 2319 Lowerline St. *Mail*: 550 Canal Bldg., New Orleans 12.

J. GILBERT SCHEIB, (1935), *Construction Engineer,* Executive Director, Housing Authority of New Orleans, 705 Carondelet Bldg., *Mail*: 2412 General Pershing St., New Orleans 15.

CARL SCHNEIDER, (1940), *Consulting Engineer,* City of New Orleans, Division of Public Works, Room 305, City Hall. *Mail*: 7711 Plum St., N. O. 18.

EDWARD L. SCHNEIDER, (J), (1944), *Chemical Engineer,* Freeporot Sulphur Co., Port Sulphur, La. *Mail*: 221 S. Genois St., New Orleans 19.

CPL. ROBERT EDWARD SCHNEIDER, JR., (J), (1943), *Mechanical Engineer, Mail*: 221 S. Genois St., New Orleans 19.

LT. (j.g.) ROBERT WILLIAM SCHUPP, (J), (1943), *Mechanical Engineer,* U. S. Naval Reserve. *Mail*: 1445 Exposition Blvd., New Orleans 15.

MORRIS C. SCHWARTZ, (1941), *Chemical Engineer,* Assistant Director, Eng. Experiment Station, L. S. U. 2745 Lake Shore Drive, Baton Rouge. *Mail*: Chemical Engineering Bldg., L. S. U., Baton Rouge 3.

ARTHUR M. SCOTT, (1938), *Structural Engineer,* Ole K. Olsen, Inc., 823 Perdido St. *Mail*: 2824 Dante St., New Orleans 18.

ROBERT MALLARD SEAGO, (1938), *Mechanical Engineer*, Efficiency Engineer, Market St. Generating Station, New Orleans Public Service Inc. 3411 Octavia St. *Mail*: Market and So. Peters St., New Orleans 13.

PAUL T. SEASHORE, (1934), *Civil Engineer*, Vice-President and Manager, Louisiana Land & Exploration Co., Houma, La.

SOLIS SEIFERTH, (1927), *Architect*, Partner, F. Julius Dreyfous & Solis Seiferth. *Mail*: 1838 Jefferson Ave., New Orleans 15.

J. MURRAY SEMMES, (1943), *Civil Engineer*, Safety Engineer, Louisiana Department of Highways. *Mail*: 759 Concordia St., Baton Rouge, La.

ROBERT I. SENN, (1942), *Civil Engineer*, Missouri Pacific Railroad Co. *Mail*: 1061 Greer St., Memphis, Tenn.

WARREN C. SHANKLE, (A), (1942), 2550 Fairfields Ave., Baton Rouge, La.

GEORGE PARISH SHARP, (J), (1942), Chief of Party, Louisiana Department of Highways, Monroe, La.

GEORGE E. SHAW, (1944), *Mechanical Engineer*, Manager Petroleum Department, Oliver United Filters Inc. Apt. 12F, 445 W. 23rd St. *Mail*: c/o Oliver United Filters Inc., 33 W. 42nd St., New York 18, N. Y.

RICHARD M. SHAW, (1937), *Civil Engineer*, Foreign Survey Party Chief, Higgins Industries, Industrial Canal. *Mail*: 1622 Cadiz St., New Orleans 15.

GEORGE F. SHELLY, (1944), *Electrical Engineer*, Supervising Engineer, New Orleans Area, Defense Plant Corporation. *Mail*: 18 Tokalon Place, New Orleans 18.

RAYMOND SHERRARD, JR., (J), (1942), *Electrical Engineer*, Quality Maintenance Engineer, General Electric Co., 1 River Road, Schenectady, N. Y. *Mail*: 13 State St., Schenectady.

SANTOS V. SHIELDS, (J), (1942), *Civil Engineer*, Freeport Sulphur Co. *Mail*: Tarpon Inn, Freeport, Texas.

HERBERT M. SHILSTONE, (1931), *Chemical Engineer*, 1662 Valmont Street. *Mail*: 510 Gravier St., New Orleans 12.

HERBERT M. SHILSTONE, JR., (1933), *Civil Engineer*, President, Shilstone Testing Laboratory, Inc., 301 M & M Bldg., Houston, Texas. Home: 1404 Waugh Drive. *Mail*: 301 M & M Bldg., Houston.

DALTON B. SHOURDS, (1943), *Civil Engineer*, Partner Shourds-Mogabgab-Bean, Engineers and Management, 642 Audubon Bldg., New Orleans. *Mail*: P. O. Box 676, Gulfport, Miss.

MAJOR HARRY H. SHUTTS, (1934), *Civil Engineer*, U. S. Army, foreign duty. Partner, F. Shutts' Sons, 324 Pujo St., Lake Charles. *Mail*: 915 Cleveland St., Lake Charles, La.

S. C. SMITH, (1940), *Civil Engineer*, District Engineer, Dept. of Public Works, State Capitol Bldg., Baton Rouge. *Mail*: Box 696, Tallulah, La.

T. BAKER SMITH, (1919), *Civil Engineer*, Consulting Engineer, P. O. Box 266, Houma, La.

J. COOPER SPENGLER, (1942), *Chemist*, Gas Department, Gulf States Utilities Co. 2903 Hollywood Drive. *Mail*: Gulf States Utilities Co., Baton Rouge, La.

A. D. STANCLIFF, JR., (J), (1943), *Civil Engineer*, Construction Engineer, R. P. Farnsworth & Co., Inc., 1515 Salcedo St. *Mail*: 4735 Carondelet St., New Orleans 15.

LT. WILLIAM F. STANDKE (J), (1940), *Civil Engineer*, U. S. Naval Reserve, foreign duty. Home: 1525 Eagle St., New Orleans 18.

S. SHELTON STANTON, (1946), *Mechanical Engineer*, Glueck & Stanton, 522 Florida St., Baton Rouge. Home: 525 E. State St. *Mail*: Box 8181, University Station, Baton Rouge, La.

DAVID STAYER, (1926), *Electrical Engineer*, Engineer, U. S. Army, Room 552, Federal Bldg., Louisville, Ky. *Mail*: 2709 Virginia Ave., Louisville 11, Ky.

CHARLES E. STEIDTMANN, JR., (J), (1944), *Electrical Engineer*, U. S. Army. *Mail*: 1421 Hillary St., New Orleans.

REINHARD A. STEINMAYER, (1924), *Geologist*, Professor of Geology, Tulane University. *Mail*: 7933 Oak St., New Orleans 18.

ORLANDO W. STEPHENSON, JR., (1946), *Mechanical Engineer*, Assistant Professor of Mechanical Engineering, Tulane University. *Mail*: 8318 Stroelitz St., New Orleans 18.

FRED W. STEVENS, (L. M.), (1904), District Manager, Allis- Chalmers Manufacturing Co. 3380 State St. Drive. *Mail*: 724 Canal Bldg., New Orleans 12.

CAPT. FRANK M. STEVENSON, (1941), *Civil Engineer*, U. S. Army, New Orleans Port of Embarkation. *Mail*: 84 Maryland Drive, New Orleans 18.

GEORGE F. STEVENSON, (1942), La. Dept. of Highways, Baton Rouge, La.

CHESTER A. STEWART, (1945), *Mechanical and Electrical Engineer*, Pipe Line Foreman & Dist. Supt., United Gas Pipe Line Co. *Mail*: 2420 Metairie Road, New Orleans 20.

DAVID WHYTE STEWART, (1919), *Mechanical Engineer*, Chief Engineer, Market Street Power Station, New Orleans Public Service Inc. 1623 Pine St. *Mail*: Market & S. Peters St., New Orleans 13.

FELTUS B. STIRLING, (1944), *Electrical Engineer*, Engineer, Gulf States Utilities Co., *Mail*: 2005 Ferndale Ave., Baton Rouge 15.

SAMUEL J. STOKES, (J), (1944), *Civil Engineer*, Junior Engineer, Humble Oil & Refining Co., 2316 American Bank Bldg. *Mail*: 4460 Music Street, New Orleans 17.

NORMAN F. STRACHAN, (1944), *Civil Engineer*, 6029 Prytania St., N. O. 15.

LT. HAROLD H. STREAM, JR. (J), (1942), *Chemical Engineer*, U. S. Naval Reserve. *Mail*: 1518 Henry Clay Ave., New Orleans 15.

CURTIS D. STUBBS, (A), (1946), *Mechanical Engineer*, Chief Engineer, Southern Electric Appliance Corp., 800 St. Charles St. *Mail*: 2719 Elder St., New Orleans 17, La.

HERBERT C. SWAN, (1933), *Mechanical and Electrical Engineer*, Head Aircraft Engine Dept., Isaac Delgado Trades School, 615 City Park Ave. *Mail*: 366 Pine St., New Orleans 18.

LEONARD R. SWINNEY, (1943), *Civil Engineer*, Not practicing. 2021 Terrace Ave., Baton Rouge 11, La.

— T —

FRANCIS M. TAYLOR, (1938), *Chemical Engineer*, Head School of Chemical Engineering, Tulane University, 1312 Fern St. *Mail*: College of Engineering Tulane University, New Orleans 15.

LT. JOHN Y. TAYLOR (J), (1943), *Mechanical Engineer*, U. S. Marine Corps. Reserve, foreign duty. *Mail*: 20 Newcomb Blvd., New Orleans 18.

WILLIAM W. TENNANT, (1937), *Civil Engineer*, Manager La. Div. Inland Waterways. Standard Oil Co. of N. J. Home: 520 Convention St. *Mail*: P. O. Box 551, Baton Rouge, La.

L. W. TERRY, (1940), *Civil Engineer*, Owner and Operator, Terry Lumber Co., DeRidder, La. Junior Field Engineer, M. W. Kellog Co. *Home*: 802 Port St. *Mail*: P. O. Box 349, DeRidder, La.

S. A. THEARD, (1920), *Civil Engineer*, Engineer and Sales Manager, Oyster Shell Products Corp., Pure Lime Corp., Morgan City, La. *Mail*: 8114 Freret St., New Orleans 18.

IRA L. THOMAS, JR., (1940), *Civil Engineer*, Traffic and Planning Engineer, La. Dept. of Highways. 1254 Inglesido Drive. *Mail*: P. O. Box 1284, Baton Rouge, La.

ABIJAH W. THOMPSON, (1945), *Civil Engineer*, Consulting Engineer, Private Practice. 7731 Spruce Street. *Mail*: 202 Balter Building, New Orleans 12.

W. L. THOMPSON, (1939), *Civil Engineer*, Construction Engineer Louisiana Department of Highways, P. O. Box 572, Hammond, La.

STEWART TICKNOR, (1922), *Civil Engineer*, 601 Gen. Lee St., Pascagoula, Miss.

ENS. HAROLD A. TIMKEN, JR. (J), (1944), *Electrical Engineer*, U. S. Naval Reserve. *Mail*' 5922 Laurel St., New Orleans 15.

LT. COL. JOHN PAUL TOBIN, (1940), *Mechanical Engineer*, U. S. Army, foreign duty. *Mail*: 614 Royal St., New Orleans 15.

JAMES M. TODD, (1923), *Mechanical and Electrical Engineer*, Consulting Engineer, James M. Todd. Home: 17 Richmond Place. *Mail*: 217 N. Peters St., New Orleans 16.

HARRY MILLS TROTT, (1945), *Civil Engineer*, Supt. of Construction, The Solvay Process Co., P. O. Box 271, Syracuse, N. Y. *Mail*: Solvay Club House, Syracuse 9, N. Y.

SIDNEY E. TROUARD, (1928), *Electrical Engineer*, Electrolysis Engineer, New Orleans Public Service Inc. 2328 General Taylor St. *Mail*: 317 Baronne St., N. O. 9.

WILDAY TUDURY, (1941), *Mechanical Engineer*, Chief Engineer Dixie Machine Welding & Metal Works, 1031 Annuncination St. *Mail*: 155 Homestead Ave., N. O. 20.

WILLIAM NEWTON TULLER, (1937), *Chemical Engineer*, Supervisor of Laboratory, Freeport Sulphur Co. *Mail*: P. O. Box 691, Port Sulphur, La.

GEORGE H. TUNNER, (1940), *Safety Engineer and Boiler Inspector,* Supervising Engineer, The Travelers Companies. 318 Maple Ridge Drive. *Mail:* 611 Richards Bldg., New Orleans 12.

W. O. TURNER, (1931), President and General Manager, Louisiana Power and Light Co. 142 Delarondo St., Algiers 14, La.

JOHN R. TUSSON, (J), (1942), *Chemical Engineer,* 1301 Columbia Ave., Sheffield, Ala.

— V —

ROBERT H. VAUGHAN, (1942), *Highway Engineer III,* District Construction Engineer, La. Dept. of Highways. 1508 East Kings Highway. *Mail:* P. O. Box 38, Shreveport, La.

LT. WALTER J. VERLANDER, (J), (1942), *Mechanical Engineer,* U. S. Naval Reserve. *Mail:* 1140 Louisiana Ave., New Orleans 15.

JULES A. VILLEMONT, (A), (1945), *Engineering Draftsman,* The Flintkote Co. *Mail:* 2759 Banks St., New Orleans 19.

LUCIEN T. VIVIEN, JR., (1930), *Mechanical and Electrical Engineer,* Assistant Superintendent of Engineering and Construction, Gulf Refining Co., 941 Maison Blanche Bldg. *Mail:* 3129 Derby Place, New Orleans 19.

WILLIAM VON PHUL, (L. M.), (July 1, 1908), *Civil Engineer.* Home: Green Acre Lane, Westport, Conn. *Mail:* 1530 Calhoun St., New Orleans 15.

ALVIN A. VOSS, (1927), *Civil Engineer,* U. S. Naval Air Station, Pensacola, Fla. *Mail:* 619 N. 9th Ave., Pensacola, Fla.

— W —

GEORGE D. WADDILL, (L. M.), (1911), *Civil Engineer,* Senior Engineer, U. S. Mississippi River Commission, Vicksburg, Miss. *Mail:* 7433 Maple St., New Orleans 18.

CAPT. BATTAILLE HARRISON WADE, (1942), *Civil Engineer,* U. S. Army. *Mail:* Box 307, Jennings, La.

RICHARD E. WAGNER, (1933), *Civil Engineer.* Home: 4201 Elba St., New Orleans 15.

ARTHUR L. WALKER, (1943), *Civil Engineer,* Vice-President, Sternberg Dredging Company-St. Louis-New Orleans. Home: 211 W. Maple Drive, New Orleans 20. *Mail:* Pere Marquette Bldg., New Orleans 12.

J. D. WALKER, (L. M.), (Jan. 8, 1908), *Civil Engineer,* Engineer, Lang Co., 2500 Poydras St., New Orleans 19.

JESSE L. WALKER, (1944), *Chemical Engineer,* 206 N. 8th St., Columbus, Miss.

WAYNE PAUL WALLACE, (1936), *Civil Engineer,* Assistant Professor of Civil Engineering, Louisiana State University. 155 Vicoro Drive. *Mail:* Atkinson Hall, L. S. U., Baton Rouge 3.

WILLIAM WALLACE, (Assoc.), (1930), *General Contractor,* Owner, 131 N. Jefferson Davis Parkway, New Orleans 19.

STEPHEN J. WALLBILLICH, (1926), *Civil Engineer,* Civil Engineer, U. S. Engineer Office, Foot of Prytania St., New Orleans. *Mail:* 4214 State St., New Orleans 15.

KYLE WARD, JR., (1941), *Chemical Engineer,* Head, Cotton Fibre Research Division, Southern Regional Research Laboratory,, 937 Wilson Drive, N. O. 19. *Mail:* 2100 Robert E. Lee Blvd.

HARRY W. WATERFALL, (1937), *Mechanical Engineer,* Professor and Head of Dept. of Mechanical Engineering, Louisiana State University. 416 State St. *Mail:* College of Engineering, L. S. U., University Station, Baton Rouge 3.

MAX P. WATSON, (1944), *Mechanical and Electrical Engineer,* District Engineer, United Gas Pipe Line Co. and Union Producing Co., 707 Canal Bldg. 15 Davis Blvd. *Mail:* P. O. Box 1628, New Orleans 11.

THOMAS A. WATSON, (1942), *Civil Engineer,* Industrial Sales Engineer, Gulf States Utilities Co., 340 Florida St. 541 N. Seventh St. *Mail:* P. O. Box 2431, Baton Rouge 2.

HARRY WAUGH, (1941), *Civil Engineer,* Road Design Engineer, Louisiana Department of Highways. 650 Boyd Ave. *Mail:* Dept. of Highways, Baton Rouge 4.

CHARLES H. WEATHERLY, (J), (1945), *Mechanical Engineer.* Test Engineer, General Electric Company, River Works, Lynn, Mass. Home: 24 Baker St., Lynn, Mass. *Mail:* 3618 Coliseum St., New Orleans, La.

LEO S. WEIL, (1920), *Consulting Engineer,* Partner. Leo S. Weil and Walter B. Moses. 478 Brodway. *Mail:* 801 Audubon Bldg., New Orleans 16.

CHESTER O. WEILBAECHER, (1940), *Electrical Engineer*, Designer of D. C. Machines, Allis-Chalmers Company, Electrical Dept., Milwaukee, Wis. *Mail*: 924 E Wells St., Milwaukee 2, Wis.

LEON C. WEISS, (1918), *Civil Engineer*, Weiss, Dreyfous & Seiferth, Architects. 7425 Dominican St., New Orleans 18.

WILLIAM WHIPPLE, (1936), *Mechanical Engineer*, Professor of Steam Engineering, Louisiana State University. 4666 Vanderbilt Drive. *Mail*: P. O. Box 8524, University Station, Baton Rouge 3.

WILL A. WHITAKER, (1945), *Mechanical Engineer*, Asst. Head, Engineering Dept. Standard Oil Co. of N. J., La. Div. *Mail*: 1167 Main St., Baton Rouge, 3, La.

ANDREW P. WHITMAN, JR., (J), (1945), *Civil Engineer*, 5243 Constance St., New Orleans 15.

CARL B. WHYTE, (1946), *Engineer*, Chief Engineer, Cities Service Refining Corp., Lake Charles. *Mail*: 1624 West Common St., Lake Charles, La.

RICHARD KNOWLES WILKERSON, (1943), *Chief Engineer*, Gulf States Utilities Co. *Mail*: 3129 Hollywood St. ,Baton Rouge, La.

LAWRENCE V. WILLEY, (1939), *Construction Engineer*, District Construction Engineer, La. Dept. of Highways. *Mail*: 430 Centenary Drive, Baton Rouge, 14, La.

ROBERT W. WILLIAMS, (1940), *Chemical Engineer*, Process Engineer, Standard Oil Co. of N. J., Louisiana Division. *Mail*: 2123 Cedardale Ave., Baton Rouge 7.

W. HORACE WILLIAMS, (L. M.), (1908), *Civil Engineer*, Member of Firm and General Manager, W. Horace Williams Co. Home: 5414 St. Charles Ave. *Mail*: 833 Howard Ave., New Orleans 13.

W. HORACE WILLIAMS, JR. (J), (1943), *Civil Engineer*, Engineer and Estimator, W. Horace Williams Company, 833 Howard Ave. *Mail*: 2611 Octavia St., New Orleans 15.

CHARLES S. WILLIAMSON, (L. M.), (1916), *Chemical Engineer*, Consulting Engineer, 1739 Marengo St., New Orleans 15, La.

MAJOR GEORGE F. WILLIAMSON, (1939), *Civil Engineer*, U. S. Marine Corps, foreign duty. *Home*: 7830 Burthe St., New Orleans.

VICTOR L. WILLOZ, (L. M.), (Jan. 1, 1900), *Civil Engineer*, Distribution Engineer, New Orleans Public Service Inc. 4439 S. Miro St. *Mail*: 317 Baronne St., New Orleans 9.

FRIEND ASBURY WILSON, JR., (1943), *Mechanical Engineer*, Assistant to Superintendent, Gulf States Utilities Co. *Mail*: 2542 Jackson Ave., Baton Rouge, La.

JAMES NORMAN WILSON, SR., (L. M.), (1911), *Mechanical Engineer*, Sewerage & Water Board of New Orleans, 526 Carondelet St. *Mail*: 2425 Audubon St., New Orleans 18.

LT. COMDR. A. R. WINGATE, JR., (1925), *Civil Engineer*, U. S. Naval Reserve, foreign duty. *Home*: 1525 Exposition Blvd., New Orleans 15.

WILLIAM A. WINTZ, JR., (1942), *Civil Engineer*, Asst. Prof. in Civil Engineering, Louisiana State University. *Mail*: 3029 Highland Road, Baton Rouge 13.

GUY WILLARD WITMER, (1943), Asst. Chief Engineer, Savannah Electric & Power Co. Home: 1302 E. Anderson St. *Mail*: c/o Savannah Electric & Power Co., Savannah, Ga.

A. ALFRED WOODS, (L. M.), (1914), *Civil Engineer*, Chief Engineer Maintenance of Ways & Structures, Southern Railway System, Western Lines. Home: 2492 Observatory Road. *Mail*: 307 East Fourth St., Cincinnati 2, Ohio.

D. F. WOODS, (1922), *Civil Engineer*, Lutcher, La.

JOHN KING WOOLF, (1943), *Civil Engineer*, Member of firm, W. Horace Williams Co. 298 Walnut St. *Mail*: 833 Howard Ave., New Orleans 13.

HUGH WORLEY, JR., (1945), *Civil Engineer*, Engineer & General Supt., Barber Bros. Co. *Mail*: Box 629, Baton Rouge, La.

CHARLES J. WYLER, (1919), *Mechanical Engineer*, Assistant Chief Engineer, A. M. Lockett & Co., Ltd., 308 Whitney Bldg. *Mail*: 530 Jackson Ave., New Orleans 13.

—Y—

LOVETT YOUNG, (1943), *Chief Chemist*, Gulf States Utilities Co. *Mail*: 2404 Hale St., Baton Rouge, La.

— Z —

MARIO G. ZERVIGON, (1943), *Electrical Engineer*, Associate Professor of Electrical Engineering, Tulane University, 8 Palm Terrace. *Mail:* College of Engineering, Tulane University, New Orleans 15.

COMDR. ANTHONY MICHAEL ZIBILICH, (1941), *Chief Engineer*, U. S. C. G., Assistant Maintenance Office, Senior Coast Guard Officer, 8th Naval District, 327 Customhouse Bldg. *Mail:* 119 Ringgold St., New Orleans, La.

ROBERT W. ZIFLE, (1937), Engineer, Supt. of Equipment, New Orleans Public Service, Inc., 2838 Iberville St., New Orleans. *Mail:* 715 Pelican Ave., New Orleans 14, La.

T. H. ZUMWALT, (1944), *Civil Engineer*, Asst. Supervisor of Engineering, Freeport Sulphur Company, Port Sulphur, La.

Student Members

JACK HINRICHS, 7617 Sycamore Street, New Orleans 18.

JOHN A. LAURENT, JR., 1941 Congress St., New Orleans 17.

CHESTER G. LOB, Tulane Campus, New Orleans 15.

CARL J. PARK, 2506 Jasmine Street, New Orleans 17.

NORVIN LEROY PELLERIN, 2706 Palmer Ave., New Orleans 15.

FELICIEN PERRIN, 5213 Prytania St., New Orleans 15.

R. W. SEIDLER, 9130 Apple Street, New Orleans 18.

CHRISTIAN M. VOELKEL, JR., 2762 Wisteria St., New Orleans 17.

T. J. WILLIAMS, JR., 415 Bouny St., New Orleans 14.

Summary

Honorary Members		2
Charter Members		2
Life Members		46
Members:		
Local	245	
State	183	
Non-Resident	61	
Address Unknown	5	494
Associate Members		2
Affiliate Members:		
Local	14	
State	6	20
Junior Members:		
Local	40	
State	18	
Non-Resident	35	
Address Unknown	3	96
Student Members		9
Total		671

Past Presidents

*Sidney F. Lewis	1898
*Thos. L. Raymond	1899
Henry J. Malochee	1900
*Frank M. Kerr	1901
*Alf. F. Theard	1902
*Alf. Raymond	1903
*J. F. Coleman	1904
W. B. Wright	1905
*W. H. Hoffman	1906
*G. W. Lawes	1907
*C. W. Wood	1908
*J. T. Eastwood	1909
*W. B. Gregory	1910
*J. C. Haugh	1911
D. S. Anderson	1912
*A. M. Shaw	1913
W. H. Williams	1914
*L. C. Datz	1915
*Samuel M. Young	1916
A. T. Dusenbury	1917
John Klorer	1918
Ole K. Olsen	1919
John Riess	1920
R. S. Manley	1921
Donald Derickson	1922
*J. S. Bareli	1923
James M. Robert	1924
Marcel Garsaud	1925
Farrar P. Hamilton	1926
Edward S. Lanphier	1927
John L Porter	1928
Frederick H Fox	1929
James M. Todd	1930
*Frank G. Frost	1931
Frederick N. Billingsley	1932
John H. O'Neill	1933
A. L. Dunlap	1934
Edward S. Bres	1935
Allen S. Hackett	1936
C. S. Williamson	1937
Bernard H. Grehan	1938
David W. Godat	1939
William H. Rhodes	1940
David W. Stewart	1941
C. Glenn Cappel	1942
Karl P. Kammer	1943
Charles M. Kerr	1944
Reinhard A. Steinmayer	1945

* Deceased.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Mniutes of Meeting of the Board of Direction, November 12, 1945

The meeting was called to order by President Steinmayer, with Messrs. Gosa, Kerr, Lassalle, McNiven, Mayer and Fernandez present. Mr. M .C. Abrahm also was present by invitation. Minutes of the preceding meeting were read and accepted.

It was announced that Mr. Noel Kammer had accepted the chairmanship of the Finance Committee for the remainder of the year.

Two letters from Dr. Robert Lobstein, a non-resident member of the society, were read, in which exception was taken to the text of the article "How Can We Keep Freedom" which was included in the Proceedings of February 1945. The Secretary was instructed to inform Dr. Lobstein that the views expressed in the article were those of a guest speaker and are not necessarily those of the Society.

President Steinmayer read a letter from Mr. Henri Molaison, Chairman of the Library Committee, recommending improvements in the committee's functions, and stated that the communication would be turned over to the new administration for its guidance.

The President announced that he had received a request from Mr. W. H. Haney for permission to address the Society on the objectives of "The Instrument Society of America" with a view to forming a local section of that organization. It was moved by Mr. Kerr, seconded by Mr. Mayer, and carried, that Mr. Haney be allowed to address the Society.

It was moved and passed unanimously that Mr. Albert Fransen be reinstated to membership in the Society.

The Secretary announced that the following named applicants had been approved by the Membership Committee, and it was voted to place their names on the next ballot:

For Member: Thomas E. Alexander, Jr., Thomas H. Bean, Jr., George D. Cobaugh, J. Owen Evans, John D. Haverkamp, George E. Core, Thomas S. Keaty, Ned Scruggs Muse, and Samuel S. Stanton.

For Affiliate Member: Curtis D. Stubbs, W. J. Keating, Stayton L. Perry, Eugene Levy, and Robert L. Martin.

Minutes of the Special Meeting of October 8 were read and accepted. The President gave a summary report on the progress of the plans for the 11th Annual Meeting. All matters pertaining to the meeting appeared to be under control and had advanced to the stage where it was reasonable to expect a successful meeting. It was decided that the winner of the student paper be awarded a certificate of merit during the meeting.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Joint Meeting of the Louisiana Engineering Society with the Delta Chapter, American Society of Heating and Ventilating Engineers, November 12, 1945.

The meeting was called to order by President Steinmayer, with approximately 90 members and guests present. The President read the

announcement pertaining to the nominating committee and pointed out the privileges of members with regard to presenting candidates for nomination.

Mr. B. S. Nelson read a memorial letter honoring the late A. M. Lockett, and moved that said memorial be published in the Proceedings. The motion carried.

Dr. Leo J. Lassalle read a memorial letter in honor of the late Professor Taintor Parkinson, after which it was moved and passed that same be published in the proceedings.

It was also moved and passed that copies be sent to the respective families of the deceased members, after which a moment of silence was observed in tribute to them.

Mr. W. H. Haney gave a brief talk on "The Instrument Society of America" and stated that a local section now was being organized.

President Steinmayer appealed to the membership to voice their opinions on the Proceedings.

Mr. M. C. Abrahm outlined the progress being made on plans for the annual meeting.

The meeting then was turned over to Mr. W. H. Grant, Chairman of the Delta Chapter, American Society of Heating and Ventilating Engineers, who conducted the business of that organization, after which Mr. L. V. Cressy introduced the speaker of the evening, Mr. R. M. Spencer, who gave a very interesting address on "Automatic Temperature Control". Following the lecture, the audience expressed its appreciation with a rising vote of thanks to the speaker.

The chair then was returned to President Steinmayer, who again thanked the speaker and accepted a motion for adjournment.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Meeting of the Board of Direction, December 5, 1945

The meeting was called to order by President Steinmayer, with Messrs. Gosa, Kerr, Mayer, McNiven, Nairne and Fernandez present. Minutes of the previous meeting were read and accepted.

It was moved and passed that each student participant in the Student Conference to be held during the Annual Meeting be presented with a certificate of Merit.

The secretary read his reply to Dr. Lobstein's letter regarding the article "How Can We Keep Freedom" which appeared in the February issue of the Proceedings.

A communication from Mr. C. W. Stokes, Secretary of the Southwest Association of Engineers, and the Secretary's reply to same, were read.

The Secretary announced that acknowledgment of floral offerings had been received from the families of the late A. M. Lockett and H. M. Gallagher. The President appointed Messrs. Charles M. Kerr Chairman, F. N. Billingsley and J. A. McNiven to write a memorial letter in honor of the deceased H. M. Gallagher.

The Secretary was instructed to place the names of the following applicants, approved for membership by the Membership Committee, on the December ballot:

For Member: Frank Melville Heroy, Orlando W. Stephenson, Jr., Marion B. Reed, and Carl B. Whyte.

For Junior Member: George Calvert Felton.

For Transfer from Junior to Full Member: Franklin D. Cardwell, S. Steve Carnegie, C. L. Fischer, Arthur C. Porter, John E. Pottharst, Jr. and C. O. Weilbaecher.

Mr. Mayer reported upon the progress of the membership index card file.

Advertising rates of the Proceedings were discussed, and the Board suggested that the Publications committee, through Mr. J. H. Collins, Sr., Chairman, be requested to make recommendations for new rates comparable to those of similar publications.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Joint Meeting of the Louisiana Engineering Society With Illuminating Engineering Society, New Orleans Chapter, December 10, 1945

The meeting was called to order by President Steinmayer, with approximately 85 members and guests present. Reading of the minutes of the previous meeting were dispensed with. The President read sections 1, 2 and 3 of Article III of the Constitution pertaining to the nomination of officers. Mr. Kerr, Chairman of the Nominating Committee, submitted the following ballot:

For President .....Leo J. Lassalle
For 1st Vice-President .....Clayton L. Nairne
For 2nd Vice-President .....W. Stone Leake
For Secretary-Treasurer .....John P. Fernandez
For Director, 2 years .....Lionel J. Cucullu
For Director, 2 years .....H. L. Lehmann

Mr. Kerr moved that the recommendations of the committee be accepted, seconded by Mr. Zervigon. The motion carried. The President then asked for nominations from the floor, and none were offered. Mr. John Riess then moved that, since no other nomination had been made, the names of candidates recommended by the Nominating Committee be placed on the ballot. The motion was seconded by Mr. Cappel and carried.

The meeting then was turned over to Mr. Raymond Frischhertz, Chairman of the Illuminating Engineering Society, who called on Mr. J. M. Guillory to introduce the speaker of the evening. Mr. Guillory presented Mr. E. B. Richey, Illuminating Engineer of the Birmingham Electric Company, who gave a very interesting lecture on "Artificial Light in the Classroom". Following his address, Mr. Richey was given a rising vote of thanks by the audience.

The Chair was returned to President Steinmayer, who introduced returning veterans present, and the meeting adjurned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Special Meeting of the Board of Direction, January 10, 1946

The meeting was called to order by President Steinmayer, with Messrs. Gosa, Mayer, Nairne and Fernandez present. Mr. M. C. Abrahm also was present by invitation.

The Secretary read two motions passed by the Legislative Committee at a recent meeting, copies of which were attached to these minutes.

Mr. Nairne moved that motion No. 1 be referred to the new Board of Direction, and no action was taken on same.

Mr. Gosa moved, with reference to motion No. 2, that the Society take action as a whole, but the solicitation of individual signatures be permitted at the annual meeting registration desk. The motion carried.

It was moved and passed that the President and Secretary be authorized to sign all checks against the Society's account at the Whitney National Bank, and that the President or the Secretary have the right of access to the contents of the Society's safety deposit box in the vault of the Whitney National Bank. Both motions were duly seconded and adopted unanimously.

The Secretary read letters of resignation from the following members: J. R. Edmonds, M. H. Grosz, W. F. Scofield, W. H. Grant, Jr., William M. Payne, and C. M. Scott.

The resignations were accepted with regret, effective January 1, 1946.

There being no further business, the meeting adjurned.

Secretary-Treasurer
JOHN P. FERNANDEZ

ANNUAL REPORTS OF THE SECRETARY-TREASURER

Financial Report of the Secretary-Treasurer for 1945

Receipts, 1945

Dues	$3,720.62	
Advertising	589.52	
Sale of Certificates	6.30	
*Dividends and Interest	116.98	
Sale of Proceedings	11.10	
Miscellaneous Income	.10	
Total Operating Income		$4,444.62
Income from Frozen Assets		662.62
Total		$5,107.24

Expenses, 1945

Cost of Proceedings	$1,524.15	
Stationery, Printing and Postage	431.66	
†Annual Meeting 1945 Deficit	350.00	
Golf Tournament Deficit	99.47	
Bank Charges	12.28	
Floral Offerings	28.84	
Library Expenses	52.00	
Miscellaneous Expenses	309.06	
Monthly Meetings	228.06	
Salary of Secretary-Treasurer	900.00	
Taxes	30.00	
Rebate to Baton Rouge Section	266.50	
Total Expenses		4,232.02
		$ 875.22

* Includes $58.14 credited to accounts.

† Does not include $128.00 paid in 1944.

Assets—December 31, 1945

Cash, Whitney National Bank Checking Account		$2,870.90
Columbia Bldg. & Loan Association	$ 359.52	
Commonwealth Bldg. & Loan Association	305.36	
Greater N. O. Homestead Association	1,484.98	
Security Bldg. & Loan Association	500.00	
Sixth District Bldg. & Loan Association	500.00	
Union Homestead Association	500.00	
Series F, U. S. Bond 1942	760.00	
Series F, U. S. Bond 1943	754.00	
Series F, U. S. Bond 1945	740.00	
		5,903.86
Total Available Assets		$8,774.76
Total Available Assets at beginning of year		7,899.54
Increase during the Year		$ 875.22

MEMBERSHIP REPORT FOR 1945

Members Elected	
Members	59
Affiliate Members	6
Junior Members	2
Student Members	9
Total	76
Changes in Grade of Membership	
Affiliate Member to Member	1
Junior Member to Member	6
Student Member to Junior Member	5
Members Lost	
Dropped for Delinquent Dues	22
Resigned	6
Deceased	10
Total	38
Net Gain in Membership	38
Total Membership on December 31, 1945	671

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXII APRIL, 1946 NO. 2

CONTENTS

EDITORIAL NOTES AND COMMENTS

The Louisiana Council of Engineers. Recently Mrs. Glen Cappel asked that various chairmen of national engineering societies meet with him to discuss a plan whereby the activities of these various groups may be coordinated.

The response was excellent. At the meeting, ways and means were discussed whereby the several societies would be advised as to projected meetings, legislative plans and civic activities.

It was voted that Mr. J. P. Fernandez be selected as secretary of the group. The other members will be the various chairmen or presidents of national organizations and the president of the Louisiana Engineering Society. It was agreed that the latter officer should act as chairman of the group. Those invited to the meeting by Mr. Cappel, and the groups composing the Louisiana Council of Engineers are as follows:

J. H. Ganucheau, Chairman, New Orleans Section, American Institute of Chemical Engineers.

W. Stone Leake, Chairman, American Institute of Electrical Engineers, New Orleans Section.

Arthur Naquin, President, American Public Works Association, New Orleans Chapter.

C. G. Cappel, President, ASCE., Louisiana Section.

W. H. Grant, Jr., President, American Society of Heating and Ventilating Engineers, Delta Chapter.

Raymond Frischhertz, Chairman, Illuminating Engineering Society, New Orleans Chapter.

B. E. Bremer, President, New Orleans Geological Society.

Charles M. Kerr, President, Society of American Military Engineers, Louisian Post.

Stanley E. Stumpf, President, Delta Society of Safety Engineers, Sales Corporation.

Leo J. Lassalle, President, Louisiana Engineering Society.

Sol Rosenthal, President, American Institute of Architects, Louisiana Section.

Arthur M. Hill, Chairman, American Society of Mechanical Engineers, New Orleans Section.

NOTE: If some group has been omitted from this list please advice either Mr. Cappel at 813 Howard Avenue, New Orleans, or Mr. J. P. Fernandez, College of Engineering, Tulane University, New Orleans 15, La.

The Engineer and the Wagner Act. The position of the technologist under the Wagner Act should be—but unfortunately is not—one of vital concern to all engineers today. How many of us know what that position is? An attempt to explain it, with both advantages and disadvantages, has been made in a new book, The Technologists' Stake in the Wagner Act, by M. E. McIver, H. A. Wagner and M. P. McGirr, published by the American Association of Engineers. The book is dedicated

"to an unrealized aim and an urgent need—Unity in the Engineering Profession."—Power Plant Engineering.

(The American Association of Engineers is located at 8 Michigan Avenue, Chicago 3, Ill. The price of the book is $2.)

Standing Committees. In this issue are listed the standing committees for 1946. Look them over; the list indicates the scope of activities of your society. As members have suggestions to offer they should refer them to the proper committee.

Personals: Mr. A. A. Woods writes our Secretary that he has been retired after fifty years of service with the Southern Railway System.

An engineer and member of the society writes to us concerning the need of technical books in an occupied country. Books on highway, concrete and steel construction, municipal water plants would be most helpful. He states that many of the natives can read English, but cannot speak it. If any L.E.S. members have books along this line to contribute, please mail to:

Public Works Section,
c/o Military Governor,
Ch'ung Ch'ong Namdo,
Taejon, Korea
APO #7
San Francisco, Cal.

New Members. Following is a list of newly elected members and reinstatements. The total is thirty-one, impressive evidence of our society's growth.

For Member

AARON ABRAMSON, New Orleans: Age 39. Endorsed: M. C. Abrahm, A. W. Durning, L. J. Lassalle. L. S. U., B. S. Ch. Eng. 1926. 1926-27, La. Oil Refg. Corp. 1927-34, Chalmette Petroleum Corp., Chief Chemist. 1934-36, Lincoln Oil Co. 1936-Present, partner and Chief Engr., Petrolane Gas Co.

ROSCOE H. BOWERS, New Orleans: Age 38. Endorsed: Allen W. Betz, J. J. Bulliung, D. W. Stewart. Worcester Polytechnic Institute, B. S., E. E., 1932. 1932-37, Kieckhefer Container Corp., Delair, N. J. 1937-41, Elect. Eng. charge of design, construction and operation of 250-ton pulp and paper mill, Plymouth, N. C. 1941-42, Public Service Elec. & Gas Co., Newark, N. J. 1942-present, Res. Engr., Mutual Boiler Ins. Co. Member, A. I. E. E., A. S. M. E. Registered engineer, Mass. #7411.

LEO E. BRODERS, New Orleans: Age 31. Endorsed: A. W. Betz, C. A. Burton, A. W. Chapman. Tulane U., B. E. in Ch. Eng., 1938. 1938-39, Sales Engr., N. O. Public Service. 1939-present, Sales and Prod. Mgr., Davis Mfg. Co. Member Alpha Chi Sigma.

GEORGE A. DEWOLF, Alexandria; Age 42. Endorsed: Soule Butler, Tom C. David, Leo M. Odom. 1928-32, La. Hwy. Comm., Baton Rouge, Rodman and Instrumentman. 1932-33, U. S. Eng. Dept., New Orleans, Surveyman. 1933-34, Shell Petro-

leum Corp., Mech. Eng. Asst. 1934-37, La. Hwy. Comm., Instrumentman. 1938-39, P. W. A., Junior Eng. Inspector. 1939-44, Camp Livingston, La., Chief Field Engr. 1944-45, State Dept. Public Works, Baton Rouge, Res. Engr.

ERNEST L. EUSTIS, JR., New Orleans; Age 34. Endorsed: C. M. Kerr, E. McLellan, C. Perrilliat. Tulane U., B. E., Civil, 1932. 1932-33, U. S. Waterways Exp. Station, Vicksburg, Miss. 1933-34, N. O. Eng. Dist., Dredging Inspector. 1934-35, Supt., Wilbanks & Pierce. 1935-37, U. S. Waterways Exp. Station, Jr. Engr. 1937-40, Carribean Petroleum Co., Venezuela, S. A. 1940-42, Perrilliat-Rickey Const. Co., Engr. and Estimator. 1942-45, U. S. Navy "Seabees", Lt. Cmdr. 1945 to date, Perrilliat-Rickey Const. Co., Eng.-Estimator.

HENRY W. GABBE, New Orleans: Age 37. Endorsed: S. E. Hottinger, E. G. Roessle, A. D. Stancliff, Jr. Del-Bergo School of Civil and Mining Engineering, 3½ yrs. Left in 1928 and have practiced civil eng. in construction of foundations, bridges, water treatment and sewer disposal plants, building construction. Worked with consultant engineer for past ten years.

LEO L. HOLZENTHAL, New Orleans. Age 35. Endorsed: L. I. Korn, H. J. Molaison, C. S. Williamson, Jr. Tulane U., B. E. Chem. Eng. 1933. 1935-43, U. S. E. D. N. O. Dist. Jr. Engr., Soil Mechanics Section. 1943, Isaac Delgado Trades School, Jr. Instructor. 1944-46, Sou. Research Lab., Asst. Engr. and Supervisor Mechanical Shops. Member S. A. M. E.

FRANK S. HOUGHTON, Baton Rouge. Age 48. Endorsed: J. T. O'Brien, T. E. Peak, R. N. Reed. Univ. of Ala., B. S. Mech. Eng., 1922; M. E. 1934. 1922-26, Mech. Engr. Standard Oil Co. of La. 1927, Sales Engr. Gulf States Steel Co., Birmingham. 1928-34, Mech. Engr., American C. I. Pipe Co., Ala. Power Co., Phillips Petroleum Co. Standard Oil Co. of La., Mech. Engr. 1934 to date.

HAROLD C. LEE, New Orleans. Age 39. Endorsed: M. C. Abrahm, R. M. Seago, D. W. Stewart. Montana State College, B. S. Mech. Eng. Ingersoll Rand Co., Sales Engineer, 8 years. Allan J. Harris Co., Sales Engineer, 2 years.

MILTON L. LEVY, New Orleans. Age 42. Endorsed: J. M. Todd, W. S. Leake, G. F. Shelley. Tulane U., B. E., M. & E., 1927. Conducted own electrical contracting business in N. O. until 1937. Kaelin Elect. Co., Estimator and Supt., 1937-40. Higgins Industries, Inc., 1940-date, Chief Electrical Engineer and Elect. Supt. Member A. I. E. E., Associate Member I. E. S.

AUSTIN J. MARY, Baton Rouge. Age 33. Endorsed: M. H. Elissalde, J. G. Hotard, F. B. Stirling. L. S. U., B. S. in E. E., 1934; M. S., 1935. Gulf States Utilities, Elect. Engr., Gas Engr., 1935-42. U. S. Army, Radar Instructor. 1942-44.

A. HEWS McCANN, JR., New Orleans. Age 30. Endorsed: J. H. Bernhard, John Klorer, John Riess. Studied Mech. Eng. Texas A & M, Architecture Tulane, 1934-37. 1937, Seymour Van Os, Architect, Shreveport, La. 1938, J. B. Beaird Corp., Shreveport. 1938-40, F. H. A. 1940-41, partner of G. M. Brumbelow, contractor. 1941-43, U. S. E. D., Vicksburg and New Orleans. 1943, Consolidated Vultee Aircraft Corp., Stress Analyst. 1943-45, U. S. Army Engineer Corps.

THOMAS F. McCRARY, New Orleans. Age 28. Endorsed: G. H. Tunner, G. H. Menefee, A. E. Champeau. Univ. of Okla., B. S. in E. E. 1937, E. H. Moore Oil Co., Okla., 1938, City Engineer, Lawton, Okla. 1939-40, Public Service, Lawton, Okla. Navy Dept., Bureau of Aero., New Orleans, 1940-44. Consolidated Vultee, 1944-45. Travelers Ins. Co., 1945-46. Licensed Boiler Inspector, State of La.

CLIFTON R. NEWLIN, New Orleans. Age 30. Endorsed: H. M. Blain, J. S. Janssen, C. L. Nairne. 1937-41, N. O. Public Service Inc., Student Engr., Unit Cost Engr., Betterment Engr. 1941-45, Army Air Force. 1945-present, N. O. P. S. Inc., Gas Dept., Betterment Engr.

GEORGE B. OLDHAM, New Orleans. Age 44. Endorsed: D. W. Godat, G. A. Heft, A. M. Alexander. New York Univ., M. E. E. 1923. 1934-43, Sup'r Ind. Power Consultant, com'l-ind. power design. 1943, Pan American Airways, Brazil, generation, trans. and dist. design. 1944-45, Foreman, Clinton Eng. Works, complete charge of elect. equipment at Atomic Bomb Project. 1945 to date, R E A Const. & General Elec., Principal Elect. Engr.

HUBERT P. OLIVER, Baton Rouge. Age 53. Endorsed: L. C. Eldridge, L. W. Hough, R. B. Richardson. 2 yrs., M. M. C. (Church school), Meridian, Miss. 1916-33, La. Hwy. Dept., various positions. 1933-36, C W A and other Govt. agencies, Dist. Engr. for 3 parishes. 1936-present, Forcum-James Co., gen'l engineering work.

WILLIAM E. OWEN, Baton Rouge. Age 39. Endorsed: F. J. Germano, L. J. Lassalle, W. P. Wallace. L. S. U., B. S. in E. E., 1942. Navy Dept., Washington, Radio Engr., 1942-43. Nat'l Bureau of Standards, Radio Engr., 1943-45. Member I R E.

HOWARD PERRILLIAT, New Orleans. Age 41. Endorsed: C. M. Kerr, C. L. Nairne, Ole K. Olsen. U. S. Military Academy, West Point, 1927. Post Engineer Officer, Ft. Brown, Texas, 1927-32. Perrilliat-Rickey Const. Co., Inc., Vice-Pres. 1932-42: President, 1942-present.

AMBROSE K. RAMSEY, JR., Baton Rouge. Age 28. Endorsed: L. J. Lassalle, W. D. Morris, W. P. Wallace. L. S. U., B. S. in E. E., 1937; M. S., 1939 Ohio State University, Elect. Engineering, summers 1939-41. Instructor in E. E., L. S. U., 1939-44. Elect. Engr., Naval Ordance Lab., 1944-45; Asst. Professor, L. S. U., 1945-present. Member Tau Beta Pi and A. I. E. E.

GEORGE W. RAPPLEYEA, New Orleans. Age 51. Endorsed: D. W. Godat, C. M. Kerr, G. F. Shelley. Ohio Northern U., Coll. of Eng., 1912; John R. Neal College of Law, Master of Law, 1925; National University, Ph. D. Public Health Eng. 1925. Lt. U. S. Engr. Corps., 1917-18; Asst. Engr. Veile-Blackwell & Buck, N. Y., Hydroelectric Developments, 1912-14; President of utility companies, 1915-18; S. Carolina State Hwy. Dept. 1920-21; Mgr. Cumberland Coal & Iron Co. 1922-26; Chief Estimator, Horton-Salmon Co., 1927-28; Higgins Industries Inc., 1929 to date, presently as Vice-President.

KEARNY ROBERT, New Orleans. Age 31. Endorsed: R. A. Steinmayer, C. M. Kerr, J. K. Mayer. Tulane U., B. E., M. & E., 1934. 1935, U. S. Waterways Experiment Station, Vicksburg. 1935-36, U. S. E. D., New Orleans, Computer. 1936-45, Magnolia Petroleum Co., Dallas, Geophysical Exploration—Torsion Balance, 1936-38; Gravity Meter, 1938-44. 1944 to date, Southern Oil Exploration Co., Partner.

ALBERT T. ROWAN, New Orleans. Age 43. Endorsed: F. P. Fischer, J. D. Haverkamp, N. P. Kammer. L. S. U., Extension Course Math. Columbia U., Ext. Course Structural Steel and Reinforced Concrete Design. 1920-33, Shop Foreman, Lyon Lbr. Co. & G. N. R. R. 1933-36, U. S. Geological Survey, Chief of Party; U. S. C. & G. Survey, Transitman; W. P. A., Area Engineer. 1936-39, Master Mechanic, Natalbany Lbr. Co. & N. O. N. & N. R. R. 1939 to date, Supt. R. J. Dorn Co.

ROY T. SESSUMS, Ruston, La. Age 37. Endorsed: L. J. Lassalle, Leo Odom, B. W. Pegues. La. Polytechnic Inst., B. S. Civil Eng. 1935; L. S. U., M. S. 1936. Univ. of Minn., Graduate Study in Civil Eng, 1936-37 1937-42, La. Polytechnic Inst., Asst. Prof. Civil Eng., Dean, School of Eng. 1942, U. S. Army Air Corps. Presently assigned to Strategic Bombing Survey, Lt. Col. Member A. S. C. E. Licensed C. E., La. 1937.

FREDERICK E. SMITH, Baton Rouge. Age 36. Endorsed: L. C. Eldridge, S. S. Carnegie, A. G. Mundinger. C. E. Course, L. S. U., 1926-28. C. E. course I. C. S. completed 1943. 1928-33, L. J. Voorhies Const. Engr. 1933-35, Surveyman, U. S. E. D. 1935-44, L. J. Voorhies, Office Engr. 1944, Army Service Forces, Civil Engr. P-2. 1945-present, Partner of firm Voorhies & Smith, Consulting Engrs., Baton Rouge. Licensed Civil Engr, La. #237.

CHARLES Q. WIGGINS, JR., New Orleans. Age 30. Endorsed: D. W. Godat, G. A. Heft, A. M. Alexander. Vanderbilt U., B. E., M. & E., 1940. Test Engr., Westinghouse, Pittsburgh, 1940. Supervisor & Asst. Elect. Supt., West Fabricating Plant, Aluminum Co. of America, 1941-45. Asst. Elect. Engr., Godat & Heft, 1945-present. Associate Member A. I. E. E.

For Affiliate Member

IRA E. HALL, Alexandria, La. Age 42. Endorsed: R. W. Bringhurst, Soule Butler, Chas. Myers. Oklahoma A. & M., Mechanical, 1924-26 (incomplete) Roadbuilding Machinery Specialist, 1935-40; Paving Superintendent, 1941-43; Paving Contractor and Superintendent, 1943-45.

For Reinstatement to Membership

WILLIAM K. BECNEL, New Orleans. Age 32. Endorsed: V. J. Bedell, E. L. Mire, P. F. Oswald. Tulane U., B. E. Civil, 1934. 1934-41, N. O. Public Belt R. R., various positions. 1941, J. G. White Eng. Corp., Asst. Field Engr. 1941-42, U. S. Corps of Engrs., Camp Claiborne, Office Engineer. 1942-43, Tidewater Const. Corp., designer. 1943-45, Higgins and Consolidated Aircraft Companies. Presently employed as designer by Oswald Engineering Service. Member Am. Soc. Tool Engrs.

CARROLL L. WOOD, JR., New Orleans. Age 37. Endorsed: J. P. Fernandez, R. A. Steinmayer, F. A. Macdonald. Tulane University, B. E. 1930; C. E., 1939. Board of State Engineers, 1930-38; State Supervisor & Park Planner, National Park Service, 1938-40; Director State Parks Comm., 1940-42; U.S. Army Corps of Engrs., 1942-45; 1945 to date, Consulting Engr. State Park Commission, Engineer for Perrilliat-Rickey Const. Co.

For Junior Member

ANDREW R. ANTICICH, New Orleans. Age 22. Endorsed: J. E. Hassinger, Jr., H. J. Molaison, Kenneth Decossas. Tulane U., B. E., in Chem. Eng., 1944. Employed for 10 months by E. I. DuPont de Nemours Co., Oklahoma Ordnance Works. Member Tau Beta Pi and Alpha Chi Sigma.

JOHN W. CAVANAUGH, New Orleans. Age 26. Endorsed: A. M. Alexander, D. W. Godat, G. A. Heft. Univ. of New Mexico, 3½ yrs. electrical engineering. U.S. Army Engineers, Albuquerque, N. M., 1 year. Worked as an electronic research engr. at Los Alamos, 1942-44, until an injury sustained testing the atomic bomb. Member Am. Military Engrs. and I. R. E.

ROBERT D. COSGROVE, New Orleans. Age 26. Endorsed: A. W. Betz, A. M. Hill, B. S. Nelson. Tulane U., B. E. Mech., 1939. USNR Naval Aviator, 5 years. Employed by Gulf Engineering Co., Inc. since Sept. 1945.

ENGINEERING BRIEFS

High Frequency Destroys Mould. A process developed by Dr. W. H. Cathcart uses an electronic "oven" through which wrapped loaves of bread are passed. High frequency current kills mould spores in about five seconds. The nutritive value, texture and taste are not affected. It is estimated that this process will save about 150,000,000 pounds of bread each year. The method may also be applied to prevention or destroying of mould on other food stuffs.

Robot Fresh-Drink Mixer. You pause for refreshment, step up to a red and white cabinet, push a coin into a slot, and see a paper cup slide down a chute behind a glass window. Streams of refrigerated syrup and charged water pour out, filling the cup exactly to the brim. Fresh, precisely made Coca-Cola is mixed before your eyes in about six seconds. If a dime or a quarter is used instead of a nickle, the change tinkles down into a metal cup. The robot drink mixer can serve 1000 people as fast as they can step up, before the machine runs empty of cups or syrup.

It all seems very simple. But like most things that look simple, a whale of engineering lies behind it. Several kinds of engineering—electrical, mechanical, hydraulic, and, not least of all, psychological.

Getting the cup from the 1000-cup magazine into position was not simple. It was fairly easy to make the cups slide down smoothly and land right up almost every time, but to do it every time required precise shaping of each part.

Filling the cup with charged water and adding an exact amount of syrup presented other problems. A mechanism for charging water was devised which consistently maintains the extremely high absolute carbonation of six to seven volumes of carbon dioxide to one of water. This was achieved by injecting the water into the gas as an extremely fine fog.

A Sterilamp maintains a sterile atmosphere in the cup station and at the same time discourages the collection of flies and other insects that would be attracted by the syrup.

Elaborate controls make the machine automatic. They

were resigned to eliminate customer annoyance with failures to get a drink, perfectly mixed, properly chilled, clean, and without mishap. Appearance of the machine, simplicity of operation, ease of cleaning, and absolute reliability were all made part of the engineering program.

—Westinghouse Engineering Highlights

Sterlizing Water. An interesting story is told in the connection with the sterlizing of water with the use of silver plates and small electric current. On the Burma Road project there was the problem of supplying disease-free water for some 30,000 workers. A current of 10 milliamps flowing between silver plates is said to be capable of sterlizing 1,000 gallons of water each hour. The first equipment consisted of two silver plates, about 4 inches square, powered with flashlight cells, the only available source of current at the time. Thus diseases due to impure drinking water were prevented by this simple device.

Steam Compressors. In some cases steam is needed in small quantities at a pressure of two or three times that supplied by a low pressure boiler. On a few jobs the steam compressor has been the answer. The unit consists of a compressor similar to an air compressor (or sometimes a converted air compressor) driven by an electric motor. The operating record of these units seems to have been satisfactory.

Luminous Plastic. A plastic has been developed which will glow for several hours after exposure to light. It will find uses in house numbers and street markers, and switch plates to mention a few. The "glows" may be green, green-blue, and blue.

A unique fan has been developed with variable pitch blades. The pitch is responsive to a thermal element. Thus, when used with an automobile radiator, during the warm-up period the blades produce no air motion; as the temperature of radiator rises the pitch automatically changes to draw in air, the rate depending upon temperature reached by the thermal element.

Lithium and Its Compounds. Five pounds of lithium compound is capable of producing about 235 cubic feet of hydrogen, for balloon inflation—lithium soaps mixed with lubricants

tend to give these lubricants a uniform viscosity at high and low temperatures—lithium chloride has long been used in the removing of moisture from air for air conditioning installations, thus saving on the refrigeration load. The present price of the element is 12.50 per pound, but it is hoped that improved production facilities will reduce this price.

Report of the Eleventh Annual Meeting

The Board of Direction,
Louisiana Engineering Society
Gentlemen:

While I do not have the final detailed financial report to submit to you at this time, please consider this my final report and I respectfully request the good offices of our Secretary-Treasurer in submitting the financial report.

I believe, in general, the Eleventh Annual Meeting of the L.E.S. was a success, due principally to the excellent work of the various committee chairmen. Financially, I understand we drew from the treasury of the Society less than any time before, roughly, $260. This was due mainly to the increased banquet charges, and actually the Banquet Committee reported a profit for the first time in the history of the Society. A report from John V. Dugan, Jr., Chairman of that committee, is attached.

There were several innovations, as follows:

1. Banquet tickets were available sometime in advance to all members, by mailing each member a ticket request form. This gives everyone an equal chance, deletes the necessity of parceling out tickets to a group to sell, and helps govern the sale of tickets to guests.
2. Increased guest charges helps limit the number of guests and thereby gives more members an opportunity to attend the banquet, since the seating capacity is limited. It also helps make the Banquet a self-supporting affair.
3. Exhibits. I urge that this be given broader scope for the next meeting. It offers real possibilities. If space could be made available and manufacturers charged for this space, the Society will be benefited and those attending will gain from time spent in inspecting these dis-

plays. It will be a drawing card for out-of-town members and guests.

4. Simultaneous sessions with several papers of short duration presented in each session. If this system is used again, I suggest that regular sessions be held on Friday, and the short paper sessions on Saturday. Out-of-town speakers, who come here at considerable expense, should not be asked to present a paper in a very little time, as it is not fair to them. Local talent could be used, and two simultaneous series should suffice.

5. The Program Committee was charged with the duty of counting attendance at all sessions. This should prove of value to the next Committee, and I am attaching a report on this subject from James Janssen, Chairman of the Program Committee for the Eleventh Annual Meeting. This report is very interesting and informative.

I suggest that some method be employed at the next annual meeting to effect registration of all those who attend. One method would be to request, at the start and finish of each session, that those attending register if they have not already done so; another method would be to pass cards around for each attending to sign.

A Certificate of Merit given to each student presenting a paper should be sufficient reward for their efforts.

I sincerely believe that the Annual Meeting of the L.E.S. could be developed to the point of national recognition. There are real possibilities, and considerable thought should be given to the matter months in advance and no effort spared to obtain nationally known engineers and scientists on the speakers list.

In closing, I wish to express my thanks to the members of the Board for their confidence in me and support of my plans. In particular did Reinhardt Steinmayer, Charlie Kerr, and Johnny Fernandez cooperate with me and the Committee in general to help make the meeting a success.

Respectfully submitted,
(Signed) MICHAEL C. ABRAHM,
General Chairman, 11th Annual Meeting,
Louisiana Engineering Society

PAPERS AND DISCUSSIONS

POWERED METALLURGY AS APPLIED TO OILITE BEARINGS AND MACHINE PARTS

A. J. LANGHAMMER *

Modern Powered Metallurgy as applied to self-lubricating bearings and machine parts is distinctly an American development. Oilite Bronze was the first heavy duty self-lubricating bearing, and was developed by Chrysler. Our engineers were convinced that the inaccessible clutch pilot bearing located in the flange end of the crankshaft and supporting the transmission drive shaft should be a trouble-free unit requiring no subsequent lubrication during the life of the vehicle. Existing bearings did not meet this requirement and Chrysler research and development resulted in the discovery of Oilite.

Today these bearings are made in a wide range of sizes and shapes. They run from small units weighing ten thousand (10,000) to a pound to the world's record for a single bearing of two hundred thirty-three (233) pounds. They may be plain cylindrical type, flange bearings, thrust bearings, spherical or self-aligning bearings or special shapes.

Similarly, machine parts such as gibs, retainers, cams, brackets and gears, either self-lubricating or semi solid are also produced on a production basis in bronze, the composition being roughly ninety percent (90%) copper and ten percent (10%) tin.

The structure of these bearings is that of a metallic sponge with tiny interconnecting pores homogeneously distributed throughout the mass. This peculiar structure provides many advantages that are of particular importance to industry in the great South. For example: Spoilage of textiles and food products through the dripping of oil from bearing installations are entirely eliminated. Moreover, a high factor of safety is provded, both structurally and in the matter of subsequent

* President Chrysler Corporation—Amplex Division. Delivered before the Society at the Annual Meeting, Jan. 11, 1946.

lubrication. Specifically, if a bearing normally requires oiling daily, this operation, if neglected for a period of weeks will result in no harm. It is understood, of course, that on many installations no subsequent lubrication is required for the life of the equipment. Our theory is that because of the capillary character of the oil filled pores the bearing operates under the principles of hydraulics rather than mechanics. Being porous they are necessarily weaker than a solid bronze bearing from a purely physical standpoint. However, in operation they are much stronger. The essential difference is the oil or liquid content, which oftentimes gives us astounding results. It should be noted, too, that in an ordinary bearing, pressure, heat, friction and impacts dissipate and destroy oil films. Further, in solid bearings there are no inherent charactertistics which prevent the escape of oil under the slgihtest provocation. Gravity, plus the weight of the shaft alone, will break down the oil film. We have bearings operating with outstanding success on applications where the known instantaneous load is one hundred thousand (100,000) pounds per square inch. This occurs in the thrust bearing of a variable pitch propeller. On the cross shaft bearings in a steering gear, ordinary bearings on automotive equipment pound out quickly though submerged in oil. Oilite Bearings under destruction tests, on the contrary, outlast the segment gear shaft and the mating worm.

Oilite Bearings and parts are made from powders of high purity and grain size of the order of two hundred fifty (250) mesh. They are composed to shape, heat treated by a sintering operation, and pressed to finished size of high accuracy in another die set. Thus a die set is required for each bearing of different dimensions, except variation in length, which is generally accommodated from the same dies. Whereas we have production tools for thousands of bearings, many of you would lik to have small quantities of bearings of special size for repair, maintenance, or development, and product engineering. Such requirements are met readily through a broad range in sizes of Oilite Bronze Solid and Cored Bar Stock. This product fills an important need in the operating, maintenance and engineering departments. If from this paper I leave with you

but one thought, the same being that of Cored and Bar Stock, I will have been of service to you, your company, and to industry.

For stronger pressures and duties iron base bearings are provided, which we term Super-Oilite and Super-Oilite 16. These units are of special merit for low velocity applications and are satisfactory under unit stresses of forty thousand (40,000) pounds per square inch and upward. For resistant members to solvent action Iron Oilite, too, is available.

Thus you will note that our products are both non-ferrous and ferrous. The same materials are used in the fabrication of machine parts, which include spur gears, cams, gerotor gears, levers, pillow blocks, gibs, armature cores, field pieces, pump rotors, brackets, etc. We wish to point out that these materials are readily machined, though Tungsten-Carbide tipped tools are recommended, and for finish machining of the bearing surface proper, these tool bits must be sharp. Actually, this operation is similar to the clean shaving of a beard. Whereas Oilite Bearings and machine parts are generally finished complete without subsequent machining operations, designs involving the latter are frequently attractive and high economical. Obviously the self-lubricating feature may be invaluable, and this property is utilized frequently to the extent of providing self-lubricating gear teeth or self-lubricating threads, both external and internal.

DEVELOPMENTS OF THE DEPARTMENT OF CHEMICAL ENGINEERING OF THE TENNESSEE VALLEY AUTHORITY RELATING TO PHOSPHORUS AND PHOSPHATES

J. H. Walthall *

INTRODUCTION

Two nitrate plants were built at Muscle Shoals, Alabama, during World War I. At the time these plants were built, there were no nitrogen fixation plants in the United States. Nitrate Plant No. 1 was an experimental plant built to produce ammonia by direct synthesis and was the first such plant constructed outside of Germany. After attempts were made to operate it, t ehplant was abandoned. On the other hand, Nitrate Plant No. 2, which employed the cyanamide process, offered possibilities for use, although it was uncompleted when its construction was discontinued shortly after the Armistice of 1918. Thereafter, until the establishment of TVA in 1933, the War Department maintained both plants in their existing condition.

By 1933, when the properties were placed in the hands of TVA, specific possibilities for using Nitrate Plant No. 2 had become more apparent, not only for fertilizer and munitions production, as originally contemplated, but also for chemical research and engineering. Recognizing these possibilities, Congress, in passing the Tennessee Valley Authority Act, established the national policy regarding the use of the Muscle Shoals properties in broader terms than had been contained in the previous legislation. The new act retained the requirements for fertilizer and munitions production, and, in addition, empowered the Authority to foster the unified and balanced development of the entire Tennessee River watershed and adjoining territory through development of the Tennessee River and its tributaries for flood control, navigation, and power, and through agricultural development, reforestation,

* Chief of Chemical Research and Engineering, Dept. of Chemical Engineering, Tennessee Valley Authority. Delivered at the Annual Meeting of the Louisiana Engineering Society, Jan. 11, 1946.

development and encouragement of industries, and other resource development activities.

The TVA Act recognized the need of and provided for development activities in many fields to aid in the conservation and proper use of the natural resources of the area and to promote the general welfare of its citizens. It conferred upon the Authority the power to establish laboratories, to construct and operate experimental plants, to modernize existing facilities, and to construct new plants in order to improve and cheapen the production of fertilizers. The Authority was authorized to cooperate with federal, state, and local agencies, educational and research institutions, associations, and cooperatives in developing its research projects, as well as to obtain whatever technical advice and aid it might require from other sources, private as well as governmental. These broad powers have given a unique character to the Authority's development activities which distinguishes them from the activities of other government agencies.

The present paper is limited to a presentation of the chemical engineering developmental activities of the Authority relating to phosphorus and phosphates. These activities will be used to illustrate the degree to which various segments of the Authority's development programs are integrated and to illustrate the method by which full utilization of the facilities and experience of other agencies is obtained. Processes for the production of new and improved fertilizers are developed at the research and engineering laboratories at Muscle Shoals. At the same time, agricultural experiment stations determine the suitability of the products, and when a product shows promise of being suitable for agricultural purposes, extensive tests of the fertilizer are made under actual farming conditions over a period of years . Although the Authority contributes to the cost of all phases of the research program, expenditure of the colleges and of the farmers are substantial. As a result of this unified approach, the Authority is enabled to contribute effectively to the agricultural development of the Valley and to the welfare of its people.

There is a wide gap between the research laboratory, where results are obtained under carefully controlled conditions, and the large-scale industrial plant. To bridge this gap considerable sums of money and much time and effort usually must be spent on development work before satisfactory large-scale equipment can be built and operated. The Authority bridges this gap by carrying its researches to the point where the technical and economic feasibility of a process is demonstrated on a pilot-plant scale or on a demonstration-plant scale, by publishing the results, and by stimulating in many ways use of the results by the public and by industries. During the course of the development, the materials produced are available for testing and for distribution among ultimate users, thereby making it possible to bring the materials more closely into line with the needs and the demand.

In the decade following the unsuccessful attempt to produce ammonia by direct synthesis at Nitrate Plant No. 1, the synthetic ammonia process was perfected, and several large ammonia plants were erected in this country. The ammonia synthesis process proved to be more economical as a method of fixing nitrogen than the cyanamide process for which Nitrate Plant No. 2 had been built. Therefore, the peacetime production of cyanamide fertilizer at Nitrate Plant No. 2 was no longer economically desirable.

Furthermore, from a survey made in 1933 it was clear that the principal limiting factor of the sustained ability of the soil to produce nutritious crops was not a lack of nitrogen, but a lack of phosphate. Workable deposits of phosphate were available in middle Tennessee within about 70 miles of the Muscle Shoals plant. Based on these and related facts, it was decided that the Authority could best carry out its Congressional mandate relative to fertilizers by instituting large-scale experiments in the production of new and improved phosphatic fertilizers and by using the fertilizers in a farm-demonstration program to encourage soil conservation and improved farm-management practices. Following are brief descriptions of several of the more important process developments.

FURNACE PROCESSES FOR SMELTING PHOSPHATES

Phosphate rock may be smelted in either an electric furnace or a blast furnace. In carrying out the smelting operation the rock is reacted with the appropriate amounts of carbon and silica in a furnace at high temperature to produce phosphorus vapor, carbon monoxide, and calcium silicate slag. Elemental phosphorus and carbon monoxide leave the furnace as a gas which may be handled in at least two ways. The gaseous mixture may be burned with air to produce phosphorus pentoxide and carbon dioxide, the phosphorus pentoxide hydrated and recovered as phosphoric acid, and the carbon dioxide discharged to the atmosphere. Alternatively, the furnace gas may be passed through a condenser where the phosphorus is condensed and separated from the carbon monoxide, and the latter may then be used as fuel.

Electric-Furnace Process: Nitrate Plant No. 2 offered unusual advantages for large-scale development of the electric-furnace process for smelting phosphate rock. Twelve large electric furnaces had been installed in the plant originally, together with auxiliary equipment, for the production of calcium carbide which is an intermediate product in cyanamide production, and these installations, together with much of the auxiliary equipment, could be converted for use in the smelting of phosphates. Large amounts of low-cost electric power were available from the Tennessee River development, and the phosphate beds in middle Tennessee were within convenient shipping distance of the plant.

In the electric-furnace process the heat carrying out the reaction is supplied by electric power. Prior to 1933 the electric-furnace process had been used by a few companies for pdoduction of phosphoric acid, and the acid was used for making food-grade or ohter high-priced chemicals. However, the information publicly available regarding these plants was very meager. The Authority, therefore, constructed a pilot-plant-size furnace and two commercial-size furnaces of different design to study the process.

The two large furnaces were equipped to produce phosphoric acid directly. Later, to increase the national defense value of the plant and to provide more flexible operation, experimental work was carried out on condensation of elemental phosphorus from the furnace gases and a semi-work-scale unit was tested. This work culminated in the installation of a phosphorus-condensation system for one of the large furnaces. It was desirable to gain experience in the condensing, storing, pumping, and metering of phosphorus, since elemental phosphorus represents the ultimate in concentration for shipment. The condensation of phosphorus from large electric furnaces was a new accomplishment. Both "wet" and "dry" phosphorus-condensing systems were developed and operated successfully. Improvements in electric-furnace smelting and phosphorus-condensing technology and equipment have been such that high-quality phosphorus is now produced directly. All furnaces built by the Authority since the development of suitable condensing systems have been equipped to condense elemental phosphorus

The quantity of phosphorus available to the War Department during World War I was limited and was never sufficient to permit extensive exploitation of the offensive value of the chemical. In contrast, during World War II tremendous quantities of elemental phosphorus were supplied to the War Department, and the Authority was a major supplier, having supplied over 50,000 tons of elemental phosphorus to the Chemical Warfare Service. During the first world war only about 1000 tons of phosphorus was available during the entire war period. That amount is less than a typical week's production at Nitrate Plant No. 2.

Significant advances in the technology of electric-furnace smelting have been made. Difficulties which arose in early operations have been eliminated by improvements and by improved operating technique. A furnace lower in cost than the original furnaces but of increased thermal and electrical efficiency has been developed.

Improvements in installing the furnace lining and a more uniform supply of electric power have resulted in uninterrupted operation of furnaces over periods of several years.

The design of the furnace itself has undergone considerable modification. Whereas the initial furnaces were of 6,000-kilowatt capacity, the latest furnaces that have been constructed operate on about 14,000 kilowatts. The use of steel in the roof of the furnaces has been almost completely eliminated with a consequent simplification of the roof structure and an improvement in power factor. The furnace roofs are constructed entirely of refractory material and are now cast in one piece.

Considerable improvement has been made in the amount of power consumed per ton of P_2O_5 charged to the furnace, and the electrode consumption has been greatly reduced. Initially, naturally occurring lump phosphate rock was used almost exclusively as a phosphatic constituent of the furnace charge. At the present time, agglomerated material is used exclusively for this purpose.

In early operation the slag from the furnaces was tapped into cast-iron chill cars. This method of handling and subsequent disposal proved to be costly, and the resultant product was of little use, so a system was installed for granulating the slag with water and pumping it to storage. This installation, which is a modification of a commercial granulation system adapted to the special conditions at the TVA plant, has proved successful and has permitted utilization of slag for agricultural purposes without further processing. It has been demonstrated that granulated electric-furnace slag having the proper chemical composition is an effective liming material and soil conditioner, and that its small phosphate content is of value as plant food. The demand for this product has been great, and almost all slag produced since installation of the granulation system has been sold to farmers.

When the Authority entered the phosphate-production field, lump phosphate rock from Maury County, Tennessee, was available for its initial operations. It was soon evident, however, that the supplies of lump rock from this source were being rapidly depleted and would soon be unavailable at a reasonable price. After a search of other locations in Tennessee failed to reveal an economically attractive source of lump phosphatic

material, the TVA undertook the mining, concentrating, and agglomeration of fine phosphatic material. In the mining operation phosphate matrix is mined by means of an electric dragline. The matrix is mixed with water, and the suspension is pumped through a pipe line to a washing plant, dispersants are added, and the dispersed slurry goes to a large hydroseparator where the clay is separated from the material that is rich in phosphorus. The phosphatic suspension is then pumped through a pipe line for a distance of about three miles to a classification plant where the phosphatic material is separated into fractions of various sizes ranging from 10 microns to coarse sand.

Attempts to develop an electric phosphate-reduction furnace which would operate on fine phosphatic material have not been successful, because the gases released in the furnace cannot escape freely through a charge consisting of fine material. Consquently, some form of agglomeration must be used to get the phosphate into shape for use in the furnaces. At present, agglomeration is being accomplished both by sintering in a sintering machine of standard type and by nodulizing in a rotary kiln. In the sintering operation phosphatic material is heated to incipient fusion by combustion of lump fuel which is mixed with the phosphate. In the nodulizing operation wet phosphatic material is fed through a rotary kiln that is heated by the combustion of a mixture of by-product carbon monoxide gas from the electric smelting furnaces and powdered coal. During passage through the kiln, the material is heated to incipient fusion and forms balls or nodules which are discharged from the kiln, crushed to a reasonably uniform size, screened, and cooled.

Both the nodulizing and sintering operations are expensive, and other means of agglomerating the material without having to use high temperatures are being studied. Among these are briquetting in conventional briquetting machines and agglomeration by tumbling in a rotating cylinder followed by heating to temperatures lower that that required in the sintering or nodulizing operations. These methods of agglomeration offer

considerable promise of appreciably lowering the cost of this step in the process.

Blast-Furnace Process: The Bureau of Soils of the U. S. Department of Agriculture studied the reduction of phosphate rock in a fuel-fired furnace (about 1917) and carried the experiments to a semi-works scale. About 1930, a blast furnace for the smelting of phosphate rock was built at Pembroke, Florida, by the Coronet Phosphate Company, and was operated for a brief period only.

In 1927, the Bureau of Chemistry and Soils took up again some fundamental studies of the blast-furnace method of smelting phosphate, first using small-scale, and later, semi-works equipment. It was believed that the use of a new type of blast-furnace stove would result in certain economies of operation which might make it feasible to use the blast furnace in producing phosphatic fertilizer. In 1933-34 work was carried on cooperatively by the Bureau and the Authority. At the conclusion of this work the Authority continued the further development of the process.

Comprehensive studies and actual pilot-plant operation in the development of a feasible blast-furnace process suitable for smelting phosphate for eventual use in agriculture have been carried out at Muscle Shoals. Improvements have been made in the process to the extent that, based on pilot-plant studies, the process now appears to be a promising method for smelting phosphate. One of the most important improvements has been the development of a process for oxidizing substantially all the phosphorus vapor in blast-furnace gas without oxidizing a significant proportion of the carbon monoxide. Once oxidized, the prosphorus can be removed relatively easily from the gas, thus leaving the latter available in large quantities for heating the hot-blast stoves. A new-type blast-furnace stove is used to preheat the blast air. The temperature of the blast air supplied to the furnace has been found to be the most important factor affecting thermal efficiency of the furnace, the amount of P_2O_5 reduced per unit weight of carbon increasing with

blast temperature. Means of operating at higher blast temperatures than those previously used have been developed. It was found that operation proceeded without difficulty with low-grade, run-of-mine Tennessee matrix without preparation other than partial drying in a rotary dryer. Tennessee blue rock and Western rock phosphate were also successfully smelted in the pilot-plant blast furnace.

Choice of Processes: The choice between the electric-furnace process and the blast-furnace process is one of economic consideration; that is, comparative costs of electric power and coke at the furnace site. Both processes have advantages over the wet process, which produces dilute phosphoric acid and requires hte use of high-grade washed rock phosphate and sulfuric acid, in that they can utilize low-grade rock phosphate and produce highly concentrated phosphoric acid. The electric-furnace process has an advantage over the blast-furnace process for the production of elemental phosphorus, since the combustion products of the fuel are mixed with the reaction products in blast-furnace gas, and the concentration of phosphorus in this gas is only about 1/10 as much as in electric-furnace gas; although condensation of phosphorus from blast-furnace gas is possible, efficient recovery is more difficult than in the electirc-furnace process. Furnace operation and the economies of the process are less affected by grade of burden in the blast-furnace process than in the electric-furnace process.

PRODUCTION OF PHOSPHORIC ACID

By burning elemental phosphorus and cooling and hydrating the gases, acid containing about 85 per cent H_3PO_4 can be conveniently produced. Two methods of recovering this acid from the gas stream have been studied by the Authority. The use of a packed tower as an entrainment separator upstream from a cooler was tried on a plant scale following pilot-plant tests. Over-all recovery of acid was satisfactory, but excessive repair and maintenance costs caused the method to be abandoned. Recovery of the acid by electrostatic precipitators has proved very satisfactory, and although the initial cost of the precipitators is high, all the acid plants of the Authority now use this

method. Until recently, the phosphorus was burned in a refractory-lined steel combustion chamber which was cooled on the outside with water. Maintenance costs on this type of construction were very high, and a more recent development consists of a combustion chamber constructed entirely of graphite. Water flowing over the outside of the graphite blocks keeps the interior surfaces of the blocks at such a low temperature that oxidation of the graphite does not occur. One large unit of this type has been in operation for a number of months and gives evidence of being very economical. A second unit is now being constructed.

By drying the air used for combustion of the phosphorus and by absorbing the resultant anhydros-phosphorus pentoxide in strong phosphoric acid, an acid called "superphosphoric acid" can be produced, and production of this acid has been studied on a pilot-plant scale. This acid contains 85 per cent P_2O_5 as contrasted with the orthophosphoric acid which contains about 72 per cent P_2O_5. Superphosphoric acid has several advantages over less concentrated phosphoric acid. It is expected that it can be shipped in ordinary steel containers without corrosion. It is expected that reduced corrosion in the plant in which superphosphoric acid is produced will result in lower costs for maintenance of the plant. The burning of phosphorus with dried air eliminates acid formation in the combustion chamber and thereby permits the convenient recovery of the heat of combustion of the phosphorus, and credit for recovery of this heat will still further reduce the cost of the acid. In addition, superphosphoric acid is one of the most concentrated forms of P_2O_5 that can be conveniently shipped. It is expected that the availability of acid of this concentration will lead to the discovery of special uses to which the material can be put. The Authority, therefore, is proceeding with plans to try out the process on a full plant scale.

PRODUCTION OF CONCENTRATED SUPERPHOSPHATE

About a century ago, a German chemist by the name of Liebig, showed that the phosphate in bones could be rendered more available as plant food by treating it with sulfuric acid.

In 1840, John B. Lawes, an Englishman, was granted a patent for the manufacture of fertilizers from bone by treatment with sulfuric acid. Subsequently, phosphate ore was used instead of bone. The product obtained was named superphosphate, and it contained about 16 per cent of available phosphorus pentoxide, the essential plant food. Up to 1933 very little had been done to improve Lawes' process or the product obtained from it. Since deposits of phosphate ores are not well distributed in relation to the localities where fertilizers are used, the cost of transporting materials such as ordinary superphosphate, which is of low plant-food content, was an undesirable burden on the consumer of the product. Thus, there was a great opportunity to meet the need for more concentrated forms of phosphatic fertilizers through the large-scale development of new and improved processes. However, the production of these more concentrated fertilizers required a marked deviation from Lawes' process.

It was known that concentrated superphosphate containing 46 to 48 per cent phosphorus pentoxide could be produced by mixing phosphoric acid with pulverized rock phosphate. Although a small amount of concentrated superphosphate was being produced in 1933, its manfacture from strong acid was an undeveloped art and few farmers were familiar with the material. The opinion prevailed that phosphoric acid could not be used at a higher strength than 65 per cent. Industry was actually using 50 to 55 per cent acid, obtained by evaporation from the more dilute acid produced by the "wet process." When acid of this strength is mixed with the stoichiometric amount of ground raw phosphate, a sticky mass is obtained which must subsequently be dried by long storage or by artificial means. TVA's first development was a process for producing concentrated superphosphate in a relatively dry, granular condition from concentrated phosphoric acid (72 to 78%) which was obtained by diluting the 85 per cent acid produced directly by the electric-furnace method. This process eliminated the costly drying procedure ordinarily required.

Both batch and continuous methods of mixing the phosphate dust and the phosphoric acid have been developed. In the

batch method the acid and rock are carefully proportioned and then mixed in sigma-blade mixers. Because of the excessive wear on the mixers and the high power requirement in the batch process, however, experimental work was directed toward the development of a continuous type mixer having no moving parts. The mixer as finally developed consists simply of a steel cone into which phosphate dust and acid are fed simultaneously. The acid enters the cone tangentially from four nozzles with the result that the reactants are adequately mixed on their passage through the cone to a belt conveyor. One small mixer of this type having a capacity of 30 tons per hour has replaced the two sigma-blade mixers formerly used for this work.

PRODUCTION OF METAPHOSPHATE FERTILIZERS

It was found, in laboratory experiments, that a phosphorus-bearing gas such as issues from the smelting of phosphate in an electric furnace could be burned and the resultant P_2O_5 caused to react directly with phosphate rock to form calcium metaphosphate containing 60 to 65 per cent phosphorus pentoxide. The production of calcium metaphosphate was of special interest because of its possible use as a fertilizer, and the commercial significance of using P_2O_5 in this way was evident. Also, such a method would eliminate the need for producing phosphoric acid. Subsequently it was found that the basic idea involving the direct reaction of hot P_2O_5 with phosphate rock had been covered by patents issued to a citizen of Czechoslovakia. Later on, the TVA purchased these patents. The development of a practical process proved to be a long-drawn-out problem of research and engineering.

In the present process phosphorus is burned and the hot gases are passed through a tower filled with lump phosphate rock. The P_2O_5 in the gases reacts with the phosphate to produce molten calcium metaphosphate which drips to the bottom of the furnace and is tapped out, cooled, and ground. The product requires no curing. In a modified process phosphate fines instead of lump phosphate are used as the raw material. Thousands of tons of calcium metaphosphate have been made by the two processes. Extensive tests have proved the value

of this material as a fertilizer. Because of its high P_2O_5 content many tons of calcium metaphosphate were shipped to England under Lend-Lease during the height of the ship shortage.

By using muriate of potash instead of rock phosphate fines in the modified calcium metaphosphate process, potassium metaphosphate has been produced in pilot-plant equipment. This double-nutrient fertilizer, which contains about 55 per cent P_2O_5 and 35 per cent K_2O, is one of the most highly concentrated fertilizers ever produced. The potassium and phosphorus are in a relatively water-soluble and plant-available form. Products containing metaphosphates of both potassium and calcium in various proportions also have been produced by processing mixtures of potassium chloride and either phosphate sands or limestone with P_2O_5. Potassium salts other than the chloride may be used also. Development work on these processes is continuing.

FUSED TRICALCIUM PHOSPHATE

It has been known for a long time that if rock phosphate is heated to sintering temperature, a part of the fluorine is removed. The Bureau of Chemistry and Soils of the United States Department of Agriculture showed the roles of various factors in the elimination of fluorine from rock phosphate and the relation of fluorine removal to the development of phosphate availability. The process proposed by the Bureau was to be carried out at temperatures below that at which the phosphate fuses. This scheme has merit in that the very difficult problem of corrosion of refractories by fused rock is avoided. The result obtained by the Bureau was duplicated in the TVA laboratories without difficulty, but these results were not reproduced in pilot-plant equipment. Mechanical difficulties were such that it was concluded that it would be simpler to face the corrosion problem and to defluorinate the phosphate in fused condition.

A process, which appears to be technically and economically feasible, for producing a phosphatic fertilizer directly from rock phosphate by fusion was then developed through all stages of laboratory- and pilot-plant-scale experiments. In the

process rock phosphate and silica are charged to a shaft furnace and fused by heat from the burning of gas or oil. The fused tricalcium phosphate collects in the bottom of the furnace, and the product is granulated by tapping it periodically from the furnace into a high-velocity stream of water. Before use, the product, which contains about 28 to 30 per cent P_2O_5, is dried and pulverized; no curing is necessary to make it suitable for fertilizer use. A large-scale plant for the production of fused tricalcium phosphate has been constructed and is now in operation.

UTILIZATION OF BYPRODUCTS

To produce cheap phosphatic fertilizers it is important that economical outlets be developed for byproducts. There are five byproducts obtained in significant quantities from the phosphorus and phosphatic fertilizer operations; namely, electric-furnace slag, ferrophosphorus, carbon monoxide, the potash- and phosphate-bearing dust separated from the gaseous products leaving the phosphate-smelting furnace, and fluorine compounds. The disposition of the slag as an agricultural liming agent and of the carbon monoxide as a fuel in the nodulizing of phosphate sand for the charge to the smelting furnace have been described. The ferrophosphorus and the fluorine compounds also are of sufficient importance to warrant their discussion.

The normal outlet for ferrophosphorus has been through sale to steel manufacturers. When the electric furnaces are operated at the optimum conditions for the production of phosphorus, the silicon content of the byproduct ferrophosphorus is high, and the ferrophosphorus cannot be sold for use in the steel industry without reprocessing. A method for treating ferrophosphorus to decrease its silicon content and to increase its phosphorus content has been developed. However, with new electric furnaces being installed for phosphate smelting, the market cannot absorb the supply of ferrophosphorus. A considerable amount of research has been directed toward new ways of utilizing ferrophosphorus. Some success has been attained on a small scale in the development of a process for the production of a phosphatic animal-feed supplement or fertilizer

from ferrophosphorus and limestone. Preliminary results have indicated that the product can be used satisfactorily as an animal-feed supplement and that it is a good phosphatic fertilizer.

Phosphate rock normally contains about 3½ per cent fluorine. In the manufacture of phosphorus and phosphatic fertilizers, this fluorine is released in varying degrees, and the Authority has carried out and is continuing research directed toward its recovery in the form of useful compounds. There are promising possibilities for the use of fluorine compounds in the preparation of larvicides and insecticides, in the fireproofing and preservation of wood, and in the manufacture of artificial cryolite for use in the manufacture of aluminum.

PRODUCTION OF DIAMMONIUM PHOSPHATE

A continuous process for the production of diammonium phosphate has been developed on a small scale, using engineering equipment, and the process is now under experimental study on a larger scale to obtain data for design and construction of a demonstration plant. In this process anhydrous ammonia and concentrated phosphoric acid are introduced into a saturator. By proper control of the pH and the rate of feed of ammonia and acid, either monoammonium phosphate or diammonium phosphate or mixtures of the two can be produced. The heat of the reaction evaporates most of the water introduced with the acid. The crystalline product is removed continuously by settling and filtration and dried in a rotary dryer.

Diammonium phosphate contains 54 per cent P_2O_5 and 21 per cent nitrogen. It has good physical characteristics for use as fertilizer, and preliminary estimates indicate that the proposed process for its manufacture is economically attractive. Development of a process for production of ammonium phosphate is of interest because this material is a highly concentrated fertilizer that contains two plant nutrients, and because products from both the phosphate and ammonia plants at Muscle Shoals could be used in its production.

CONCLUSION

Although it is felt that considerable technical progress has been made during the twelve years of TVA research and development, many immediate problems still remain to be solved. In this mining and washing of phosphate the most serious problem requiring solution is how to process the tailing that remains from the washing operation so that vast areas will not be needed for its disposal. Further attempts must be made to develop an electric furnace that will operate on fine phosphatic material. In the meantime the development of cheaper methods for the agglomeration of fines must be completed.

In connection with the blast furnace the experimental developments should be confirmed on a plant scale.

Promising leads toward further improvement in the manufacture of concentrated superphosphate should be followed as well as possible improvements to the metaphosphate processes. Really satisfactory methods of recovering and utilizing the fluorine that is liberated in the processing of phosphate rock must be found. Accordingly, the Department of Chemical Engineering of the Authority is looking forward to a busy period now that the war is over and our efforts can be concentrated on the principal job of the department.

MINUTES OF THE MEETING AND BUSINESS OF THE SOCIETY

Minutes of Annual Meeting of the Louisiana Engineering Society January 10, 1946

The meeting was called to order by President Steinmayer, with approximately 110 members and guests present. Reading of minutes of the previous meeting was dispensed with. Dr. Lassalle read three resolutions, copies of which are attached to these minutes, which were accepted.

President Steinmayer introduced the presidents or chairmen of the various engineering organizations who were present. Dr. Douglas Anderson introduced the speaker, Dr. William Monroe White, who delivered the keynote address entitled "The Professional Engineer in Our Post War Reconversion".

The financial and membership reports for the year 1945 were presented by the secretary-treasurer. The annual report reviewing the Society's activities for the year was presented by President Steinmayer. Mr. Naquin moved that this report be accepted with a standing round of applause, seconded by Dr. Anderson and promptly executed.

The following students received certificates of merit for their presentation of technical papers at the annual meeting: E. J. Auffant, J. A. Laurent, Jr., B. R. Mehl, N. L. Pellerin.

A Junior Membership award to Andrew P. Whitman of Tulane University was announced by President Steinmayer. Presentation of Life Membership Certificates was made to the following: David L. Cullom, Wilhelm E. Koch, John H. O'Neill, Frank L. Reynolds, Charles S. Williamson, Jr.

Mr. Charles M. Kerr, Chairman of the Nominating Committee, presented the Teller's Report. Certain members of the Society then were requested to escort the newly elected officers to the front, namely: Leo Jos. Lassalle, President; Clayton L. Nairne, First Vice-President; W. Stone Leake, Second Vice-President; John P. Fernandez, Secretary-Treasurer; Lionel J. Cucullu, Director for Two Years; H. L. Lehmann, Director for Two Years.

Retiring President Steinmayer then handed the gavel to President-Elect Lassalle, who made a short speech of acceptance.

Other announcements regarding the remaining program of the annual meeting were made and, there being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

A RESOLUTION Thanking the Management of the St. Charles Hotel

Whereas for the past twelve years the Louisiana Engineering Society has enjoyed headquarters at the St. Charles Hotel, and whereas the Management of this same Hotel has placed at the disposal of the Society facilities that have materially contributed to the success of this and past Annual Meetings—be it resolved that the Louisiana Engineering Society acknowledges with thanks the wholehearted cooperation received from Captain John J. O'Leary and his staff—and furthermore, that this resolution be made a part of the minutes of this meeting, and a copy forwarded to Captain O'Leary.

LEO J. LASSALLE, *Chairman*
Special Resolutions Committee

A RESOLUTION Thanking the Southern Regional Laboratory of the United States Department of Agriculture, the Board of Commissioners of the Port of New Orleans, and the New Orleans Public Service Inc.

Whereas the Louisiana Engineering Society holds an Annual Meeting for the primary purpose of affording its members and their guests an opportunity to broaden their general knowledge of engineering and allied subjects, and whereas the privilege of visiting plants and research laboratories and viewing port facilities is an important contribution to the accomplishment of this objective—be it resolved that the members of this Society hereby acknowledge with thanks the courtesies extended by the Southern Regional Laboratory of the United States Department of Agriculture, the Board of Commissioners of the Port of New Orleans, and the New Orleans Public Service Inc., and furthermore, that this resolution be made part of the minutes of this meeting with copies forwarded to:

Mr. C. A. Bertel, President, Board of Commissioners, Port of New Orleans.

Dr. Walter M. Scott, Director, Southern Regional Research Laboratory, United States Department of Agriculture.

Mr. A. B. Paterson, President, New Orleans Public Service Inc.

LEO J. LASSALLE, *Chairman*
Special Resolutions Committee

A RESOLUTION Thanking the Speakers on the Program of the 1946 Annual Meeting of the Louisiana Engineering Society

Whereas the Louisiana Engineering Society is singularly fortunate in having on the program of its 1946 Annual Meeting, men of outstanding and recognized ability in their respective fields of endeavor, and whereas these men are giving freely of their time and talents in contributing to the knowledge and enjoyment of those attending the technical exercises and other sessions of this year's meeting—be it resolved that the members of this Society indicate their appreciation of the efforts of these distinguished gentlemen by a rising vote of thanks, and furthermore that this resolution be incorporated into the minutes of this meeting.

LEO J. LASSALLE, *Chairman*
Special Resolutions Committee

Minutes of Meeting of the Board of Direction, January 23, 1946

President Lassalle called the meeting to order with Messrs. Cucullu, Leake, Mayer, McNiven, Nairne, Steinmayer and Fernandez present. Mr. Charles M. Kerr also was present by invitation.

Minutes of the preceding regular meeting and the special meeting of January 10 were read and accepted. A letter from the Orleans Parish Medical Society also was read.

Mr. J. H. Collins' letter regarding advertising rates for the Proceedings was read by the Secretary and President Lassalle appointed a committee consisting of Messrs. Collins, Hill and Fernandez to study the matter.

Mr. Kerr proposed that the Louisiana Engineering Society hold a joint meeting, and possibly a three-way meeting, with the Society of American Military Engineers and possibly with the Civil Engineers in March. The proposal was accepted with a proviso that all three organizations waive business matters on that evening.

A resolution by the Legislative Committee, copy of which is attached to the minutes of the special meeting of January 10, was accepted,

It was decided that regular monthly meetings of the Board be held on the second Monday of each month at 6:30 p. m. in the St. Charles Hotel. The Secretary was authorized to place the names of all applicants approved by the Membership Committee on periodic ballots.

The Secretary was instructed to have the Society's accounts audited for 1945.

The Secretary announced the attendance at the annual meeting and the cost of the banquet, and was instructed to write a letter of thanks to the chairman of the annual meeting for his splendid work and that of his sub-committeemen in making the annual meeting a success.

Initiation dues were waived for the year 1946.

Mr. Arthur M. Hill was reappointed Editor of the Proceedings. John P. Fernandez was appointed to investigate the cost of a projection screen to be purchased by the Society.

Selection of chairmen for the various standing committees was made and, there being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Executive Meeting—Baton Rouge Section, Louisiana Engineering Society
February 5, 1946

Place: Highway Testing Laboratory.

Those present: P. J. Guelfi, President; J. T. O'Brien, Past President; H. L. Lehmann, Past President; James J. Saurage, Secretary-Treasurer.

President Guelfi called the meeting to order and immediately opened discussion on appointments to the several committees.

Following is listed the committee appointments:

Technical Papers Committee
T. E. Peak, Chairman
T. E. Crossan
F. B. Grevenberg
W. P. Wallace

Entertainment and Arrangements Committee
R. A. Morhinveg, Chairman
F. G. Hornsby
L. W. Hough
P. S. O'Brien

Membership Committee
W. M. Larkin, Chairman
R. M. Craig
F. A. Hannaman, Jr.
L. W. Harrell
F. J. Germano
E. B. Price
H. M. Trott

Publicity Committee
W. A. Wintz, Jr., Chairman
J. R. Murphy

The possibility of having more than four meetings a year was then discussed. It was decided that we would try to arrange to have five meetings this year if arrangements could be made for a speaker for the extra meeting.

March 12th was tentatively set as the date for our next regular meeting and Wolf's auditorium as the meeting place.

January 18th at Mike and Tony's was agreed upon as the time and place for the next Executive Meeting to make final plans for the next regular meeting. The Chairmen of the several committees are to be invited to attend our next Executive Meeting since their work and cooperation is necessary in arranging and conducting all regular meetings.

Meeting adjourned .

JAMES J. SAURAGE
Secretary-Treasurer
Baton Rouge Section, L.E.S.

Minutes of the Meeting of the Board of Direction, February 11, 1946

The meeting was called to order by President Lassalle with Messrs. Cucullu, Leake, Lehmann, Mayer, McNiven, Steinmayer and Fernandez present. Minutes of the previous meeting were read and accepted.

The Secretary was authorized to purchase a 5x7-foot projection screen.

Letters from Messrs. A. B. Paterson, President, New Orleans Public Service Inc., and C. M. Scott, Director, Southern Research Laboratory, acknowledging receipt of the January resolution, were read.

Discussion took place concerning the appointment of various chairmen for standing committees.

The Secretary was authorized to have ballots printed and to investigate the cost of stuffing and mailing.

A letter addressed toPresident Lassalle, pertaining to State Civil Service, was read, and it was decided to refer the matter to the Standing Committee on Professional, Civic and Industrial Affairs.

It was moved and passed that a pad be circulated at regular meetings of the Society for a record of attendance.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Joint Meeting of the Louisiana Engineering Society with the American Society of Mechanical Engineers, February 11, 1946

The meeting was called to order by President Lassalle. Minutes of the previous meeting were read and accepted.

Letters from Messrs. A. B. Paterson and C. M. Scott, acknowledging the January resolutions, were read by the Secretary.

The chair then was relinquished to Mr. A. M. Hill, Chairman of the New Orleans Section, American Society of Mechanical Engineers, who introduced the speaker of the evening, Mr. Arrigo Righi, Chief of Latin American Relations, Pan American Airways, who delivered a very instructive lecture entitled "International Air Transportation Policy". Following the lecture a sound film, "Wings to Alaska" was shown.

President Lassalle thanked the speaker and the audience expressed appreciation by a standing round of applause.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Executive Committee Meeting, Baton Rouge Section, Louisiana Engineering Society, February 18, 1946

Place: Mike and Tony's Steak House.

Those present: P. J. Guelfi, President; Wm. Whipple, First Vice-President; T. Ellis Peak, Second Vice-President; James J. Saurage, Secretary-Treasurer; J. T. O'Brien, Past President; H. L. Lehmann, Past President; R. A. Morhinveg, Chairman, Entertainment Committee; W. M. Larkin, Chairman, Membership Committee; W. A. Winz, Jr., Chairman, Publicity Committee.

While waiting to be served, president Guelfi opened the meeting with a discussion of the individual committee members for the benefit of the Chairmen of the Committees who may not have known personally, all the members of their respective committees.

The discussion then turned to the subject of speakers for our regular meetings. Several tentative speakers and subjects were mentioned and Mr. Peak, Chairman of Technical Papers Committee made notes of all.

He was reminded that our meeting dates could, within reason, be set to the convenience of available speakers but that none of our meetings should conflict with those of the Parent Section. Also, we would like to hold more than four meetings this year if speakers could be secured.

March 12th was decided on as the tentative date for our next regular meeting and Wolf's Auditorium was definitely set as the place.

After a delicious steak supper, the business session of the meeting being finished, the meeting turned to an informal discussion of engineering in general and finally to the problem of subsoil stability in Louisiana. Mr. Lehmann cited some interesting highway projects and told in some detail, the construction methods used to secure fill and roadway stability in sections that are under-lain with unstable materials.

This ended what seemed to be a very successful and enjoyable session.

JAMES J. SAURAGE
Secretary-Treasurer
Baton Rouge Section, L.E.S.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXII JUNE, 1946 NO. 3

CONTENTS

EDITORIAL NOTES AND COMMENTS

Our Front Cover. The photograph depicts the fluid catalytic cracking units of the Baton Rouge refinery, Standard Oil Company of New Jersey. These units were used during the war for the production of 100 octane gasoline. They have now been converted to civilian production. The equipment stands about two hundred and fifty feet in height. The picture was furnished by the publicity department at the request of our member, W. A. Whitaker.

In This Issue. Freedom of the Air? Read what Mr. Arrigo Righi says about this misleading slogan in "International Air Transport Policy". It will be an eye opener to you, as to what is going on behind the scenes. Will we be left holding

the bag? Mr. Righi has some suggestions as to what you can do.

A survey of various acid resisting containers and fluid transmission material is given by Mr. Lippman under the title of "New Synthetic Materials Resistant to Severely Corrosive Conditions". Table I is particularly comprehensive in comparing different products.

ENGINEERING BRIEFS

Coal for Gas Turbines. Seventeen projects are under way at various research institutes and colleges in connection with processes for pulverizing coal for use in gas turbines. One method consists of passing the coal, having first subjected it to air or steam pressure, through a venturi section. The reduced pressure "explodes" the coal. In connection with development of gas turbines, the navy is operating a unit on an experimental basis at a temperature of 1350°F.

New Plastic. Du Pont has announced a new plastic, Teflon. It was used for military purposes during the war. The manufacturer claims that no appreciable damage resulted from holding the material for three months at a temperature of 572°F. It is claimed also that it can withstand temperatures as low as—72°F. The material can be formed into tubing, rods, gaskets, valve stem packing, etc.

Famine and Seed. Refrigeration will be used in India to prevent the spoilage of almost 3,000,000 pounds of seed potatoes which are lost each year due to unfavorable climatic conditions. It is hoped that this seed storage will not only help avert famine, but will also considerably lower the price of seed potatoes.

Rice Hulls for Insulation. Of interest to Louisianians is the announcement that rice hulls have been found satisfactory for home insulation. It is claimed that their heat transmission is very low, and that rodents will not attack the material.

New Turbine-Generator. The largest turbine of its type, 100,000 kw or about 133,000 horsepower at 3600 rpm is now under construction. Blades will move with supersonic speed; speed above that of sound, or in this case, 1,300 feet per second. Inlet stream conditions to the turbine are 1250 psi, with a temperature of 1,000°F.

Blueprints. A process developed by a paper company in collaboration with a chemical company, gives blue prints of brighter color. It is claimed that details are sharper making for easier reading.

PAPERS AND DISCUSSIONS

INTERNATIONAL AIR TRANSPORT POLICY

By Arrigo Righi *

With the war finished, commercial international aviation is now spreading its wings to make possible quick and safe flights to all corners of the earth in only a few hours.

Our company, in making the first commercial trans-Atlantic flight with the new postwar Constellation Clipper, established a record of 12 hours and 9 minutes from New York to England.

A few weeks ago, we established another record when our Clipper ship flew from New York to Bermuda in only two hours and 22 minutes.

These are the things we will read about every day as this dynamic industry really starts to grow.

Pan American thinks of New Orleans as one of the cornerstones of the company's system. In all our plans for the future, this great city—air gateway between three continents —looms large. It was the wonderful cooperation of New Orleans that helped us in our pioneering operations into Central and South America. We feel that we have worked well together as a team and, for our part, we hope this team will continue to pull together in the years ahead.

But, before your hopes in aviation or ours can be realized, our Federal government must lay down a sound patriotic national air policy. We need such a policy for our commercial development and, above all, for our national security.

This war has made it crystal clear to all Americans that our primary problem of the future is *national security.* The most outstanding developments of the war are the advances made in science and engineering. We are now living in a world of robot bombs, pilotless planes, radar, and above all, atomic power. *Aviation is completely interwoven in all of these vast new forces.*

We are all doing everything in our power to make the United Nations Organization powerful and effective. Today, however,

* Delivered at a joint meeting of the Louisiana Engineering Society and the American Society of Mechanical Engineers, Feb. 11, 1946. Mr. Righi is Chief of Latin American Relations, Pan American Airways.

power politics still stalk the stage—look at Iran, China, Argentina and many others. Our national voice cannot be effective in helping to solve these vital world problems *unless that voice is backed by power and plenty of it.* Our GI's all over the world are clamoring loudly to come home. *This means that our ground forces are dwindling to the point of disintegration.* Our enemies and our potential enemies know this and are applauding. They know that our Navy is not effective in the interiors of Eastern Europe, China, or *the vital oil-rich Middle East.* Only a powerful air force, backed by a healthy progressive aviation industry, is effective in these regions.

General Marshall in his Biennial Report to the Secretary of War clearly stated the vital significance of commercial aviation to our airpower He said:

" . . . . The development of combat airplanes is closely allied with development of civil aeronautics; the prototypes of many of our present transport planes and those soon to come were originally bombers. Many of the aeronautical principles that helped give this nation the greatest air force in the world grew out of commercial development, and our production know-how at the start of this war was partially the fruit of peacetime commercial enterprise. . . . "

To maintain a *strong commercial aviation industry* in this country, we must develop a mass market. This is possible only if we have a sound, patriotic, and realistic National Air Transport Policy. We must not be misled by those who would destroy our leadership in world air commerce. There is no aspect of postwar business where we will meet more determined, and more powerful, competitors than in the field of international air transportation, because other older and more experienced nations see its significance in world diplomacy.

We blundered in our policies affecting American shipping. As a result we lost our top place among the shipping nations of the world. In spite of the millions of dollars which our government poured into subsidies for our shipping lines, the American flag carried less than 25% of American overseas trade as late as 1939.

We *must* profit by past mistakes, and not blindly repeat them.

Our shipping suffered because we permitted a *multiplicity of lines to operate over the oceans in competition with each other* at the same time as they were facing unlimited foreign competition. *We divided our efforts in piecemeal fashion* amongst these various shipping lines and thus weakened our effort. Our foreign competitors operating under *low wage scales and heavy subsidies easily* outdistanced us. We learned *conclusively* that under *these conditions*, it is impossible for us to divide our efforts among a multipliety of companies in competition with each other and powerful unified foreign competitors and still maintain the American wage standards and conduct a successful operation.

The lesson for us in international aviation *should be clear.* We cannot afford to divide our efforts amongst many small international American airlines and thus permit unified low wage scale, subsidized, foreign competitors to conquer us.

To *"divide and conquer"* has been the technique of the Old World down through the ages. Adolph Hitler employed this technique and almost succeeded in enslaving the world. We *must not,* by our own mistakes and unrealism permit ourselves to be divided and conquered in international air transportation.

Before the war, Pan American Airways pioneered in international air transportation, and was the only permanently authorized American flag international airline operator. We were successful to the extent that today our country occupies first place in the field.

International air transportation has become of such vital worldwide importance that foreign countries have formed unified highly organized powerful national airlines to try to gain for themselves world leadership in air commerce. Because of the threat of these powerful unified competitors, my company feels, and has for several years commencing before World War II recommended, that our nation must organize one powerful unified international airline to give our country the greatest possible opportunity to maintain itself in the top place that it now holds in world air commerce in which airlines and all other transportation companies would have a part, and to which they would give their support.

It is imperative that we unite our efforts in an unselfish,

realistic and patriotic manner in the battles for international air transportation leadership.

Senate Bill No. S.326, commonly known as "The All-American Flag Line Bill", has just been introduced and referred to the Commerce Committee. This bill would organize and unite our efforts in this unselfish, realistic and patriotic manner. It would provide that our transportation companies—air, rail, and shipping—would patriotically cooperate in forming a united effort in international air transportation.

It calls for the formation of a community company to be organized under government supervision but *to be privately owned and operated.*

The stock ownership of this company would be divided; 40% for the public, and 60% for the various participating transportation companies. Of this 60%, 20% would be for the railroads, 20% for shipping lines, and 20% for domestic airlines.

The most important single provision in this bill is the absolute prohibition of ownership of more than 2 % of the stock by any one person, partnership, corporation, etc. This guarantee the fact that no one group or combination of groups can gain control of the company to the detriment of the other participating members.

In advocating the passage of this bill, I am proposing that my company be merged or absorbed in this new unified American international airline which would represent all forms of American transportation.

The Community Company, *operating only in the international field,* would in no way interfere with our domestic airlines or other forms of American transportation, except that it would materially benefit each of them. *I want to repeat this point,* as it is so important. This new company operating only *international air transportation* would *not in any way interfere with our domestic airlines* or other forms of transportation such as rails or shipping.

Furthermore, it would not only *not upset* the complete free play of competition amongst these other carriers, but, as participating members, *they would route all their overseas air trans-*

portation business over their own community company rather than over competing foreign lines.

If we have several American airlines competing in the foreign as well as the domestic field, *just the reverse of this would be true.* Clearly what would happen is that soon *all domestic airlines,* in self defense, would try to operate overseas, and our present international airline would, also in self defense, try to operate in the domestic field. We would have our domestic field confused and thrown out of balance by our international airline entering the picture, and America's efforts in the foreign field would be dangerously weakened, because our energies would be divided into small packages going to many competing American companies and our government's support to them would likewise be diluted and weakened.

With a community company, it would be possible to spread profits in order to conduct operations without subsidy over necessary but unprofitable section of its system. The great seasonal fluctuations of air travel in various parts of the world could be handled without extra equipment by seasonal transfer of equipment and personnel which would reduce costs and improve the service. Moreover, the 36,000 existing United States travel agents, ticket offices, etc., scattered all over the world would discontinue handling sales for foreign airlines and concentrate on promoting travel solely for their own community company.

You have recently been reading in the papers of trans-Atlantic air rate controversies between the British government and ourselves. The British government maneuvered one American airline into a position where for a time it allied itself with the British government against another American company. The only winner in this controversy was the British Government. Until we unify our efforts in international air operations, foreign governments will always be able to play off one American company against another, in which only the foreign interests come out on top.

As long as our international air operation is organized along the existing double-headed monstrous lines, we will suffer damaging disadvantages with all our foreign competitors. This community company plans would correct most of these evils.

It has the endorsement of many transportation companies and patriotic leaders in American industry. It is urged by many outstanding labor leaders, whose interests lie in the fact that a unified international airline is a necessary factor in protecting the American workers' high wage standard and our standard of living

This question is of such vital importance to American business and trade, in which you are vitally interested, and above all, to our national security, in which every American citizen is interested, that the contents of this bill, S.326, should be studied with great care. When you have formed your opinions about the bill, then write or wire your Congressmen and Senators and tell them your views. Ours is a government by the people—one of the few left in the world—and it will only be successful as such when we, the people, become conscious of our responsibilities and obligations to make ourselves heard in Washington.

I have been talking about our National Air Transport Policy only with respect to organization matters. *There is even a bigger issue involved. Dangerously misleading slogans,* that have been carefully planted in this country by foreign influences and misled Americans, are jeopardizing our position in world air commerce and destroying the very foundation of our country's national defense.

In future years, we may look back to 1945 and realize that the deceptive phrase, *"Freedom of the Air", was truely the handwriting on the wall.*

We have read much about Freedom of the Air particularly since the Chicago Aviation Conference which was held in the Fall of 1944. At the request of the British, our government called this conference and invited most nations of the world to attend.

For many months prior to the conference, British leaders in and out of aviation, had publicly stated that Freedom of the Air was vital to the maintenance of the British Empire in this century, just as Freedom of the Seas had been in past centuries.

In the atmosphere of these statements, Mr. Adolph Berle, then the Undersecretary of State, met with Lord Beaverbrook in

London to discuss international aviation policies in preparation for the Chicago conference.

Surprisingly enough, at the conference, it was Mr. Berle who strongly advocated Freedom of the Air, and the British delegates, headed by Viscount Swinton, ostensibly opposed the doctrine publicly.

The conference adjourned on December 7, 1944. Under the direction of Adolph Berle, the conference recommended the adoption of the "Five Freedoms"—or Freedom of the Air.

It was planned that this theory of Freedom of the Air would become binding upon the ratification of at least 26 participating powers.

Again under the direction of Adolph Berle, our State Department, shortly after the conference, stated that, by Executive Order, our government intended to adopt Freedom of the Air.

Constitutional lawyers point out that this is unconstitutional. They assert that such a basic change in our foreign policy can be made, legally, only with the consent of the Senate, as called for in the constitution.

Freedom of the Air is in no way analagous to Freedom of the Seas. Under Freedom of the Seas, foreign ships are not permitted to enter the interior of our country by means of inland waterways.

Under Freedom of the Air, the airplanes of all other countries subscribing to the doctrine would be permitted to fly into, across, and out of our country at will.

To open our doors to the aircraft of all foreign nations, friendly and unfriendly, in this day of atomic energy, pilotless planes, radar, and robot bombs, and permit them to "come in at will", would endanger the very existence of our nation.

In August, 1945, *for the first time in the history of the world, a great power,* the Japanese Empire, *surrendered unconditionally* as the direct result of *attack by air.*

Dr. J. Robert Oppenheimer, one of the leading scientists in developing the atom bomb, and the officially designated spokesman for the War Department on atomic energy, testified before

a Congressional committee that in the next war, *atomic attack upon this country would be able to kill over forty million Americans in the first few hours after the declaration of war.*

With this example of what *has* happened, and a responsible prediction of what *can* happen, how many here this evening feel that any patriotic American can intelligently advocate opening our doors wide to the foreign aircraft of friendly and unfriendly nations for all future years?

Yet, there are those in this country today, in and out of the government, who have been so *completely misled by foreign propaganda* that they are actively advocating that our country subscribe to the Freedom of the Air theory.

These people ignore the fact that, aside from the inherent danger in this doctrine to our country's defense, neither geographically nor economically is it necessary for our country to adopt Freedom of the Air, and it would be dangerous for us to give up our air sovereignty to others.

Geographically, we are so situated that American planes can fly from our eastern shores across the Atlantic to Scandanavia, England, France, Spain, Portugal, and Africa without having to cross other countries. We already have established rights to fly into all the countries of Central and South America. Our position in the Pacific Ocean is the strongest of all. We can fly from our west coast to Siberia, Japan, China, the Dutch East Indies, and Australia, without having to cross any other country. Remember we control Hawaii, Midway, Wake, Guam and the Philippines which are the keys to the whole Pacific Ocean.

Economically, we do not need to adopt the Theory of Freedom of the Air because we generate more foreign commerce than any other country in the world. We generate 80% of all foreign trade that touches our shores. In one year alone before the war, American tourists spent $800,000,000 in foreign travel. These conditions place us in the strongest possible trading position. Other countries, like ourselves, need business to run commercial airlies. Our country is the greatest source of that business. Foreign airlines are determined to fly in and out of this country to share in that business, and some of them should be

permitted to do so—but only under bi-lateral agreements, where our country gets concessions of equal value.

Right now, the British Commonwealth is maneuvering into a position to provide for Canada to subscribe to the Freedom of the Air doctrine but not the United Kingdom—at least not until the British feel that conditions are such that they will *gain more than they will give* by subscribing to this doctrine.

This means that British planes from the United Kingdom can fly across the Atlantic to Canada and thence, cloaked in Canadian registry, enjoy the full fruits of Freedom of the Air, flying in and out of our country to all points at will.

Whereas our planes will not be able to fly in and out of the United Kingdom, *except under special arrangements as dictated by the British government in London*, which has not subscribed to the Freedom of the Air Theory. Further, the British Crown Colony of Newfoundland, key to air transportation across the Atlantic, takes its orders from London, and so will not subscribe to the Freedom of the Air Theory, until London gives the word. Accordingly, our many and important trans-Atlantic service stops in that colony will be limited by what the British Government in London allots to us. Under this arrangement, it is clear that our country stands to lose in every direction, and the British Commonwealth to gain a tremendous advantage.

There is much opposition in our country to the adoption of this *new* Freedom of the Air Theory. Many great labor organizations have gone on record opposing this doctrine. Their position has been transmitted to Congress. These great labor organizations are opposed not only to the adoption of the theory in principle, but particularly its adoption by the dangerous technique of Executive Order without public hearings.

On this question of Freedom of the Air, like the question of the Community Company, all patriotic citizens, should study the issues and then make your voice heard in Washington. The members of the Senate Foreign Relations Committee are studying this question of Freedom of the Air right now. The people of this country are entitled to know what these studies and investigations reveal concerning the merits of this doctrine. These facts should be exposed to the light of day so the people can

form their own unbiased opinions as to what is best for our country.

It is then our profound duty as citizens of a Republic to make our voices heard in such an *agressive manner* that we know for certain our governmental representatives are expressing *our views in these matters,* and *not the smooth-soundnig but very dangerous ideas* that are manufactured behind closed doors in Washington or certain powerful foreign capitols. Our representatives are obligated to carry out the wishes of the people.

In wartime, it is the average American citizen who goes forward to fight the battles that win the peace, and in our country with our form of government, in peacetime it must be the average American citizen who expresses himself on the issues of the day, and then makes certain that his representatives in Washington carry out the wishes of the people. This, we hope, will contribute to maintain the peace. If we, the people, fail to exercise this priceless prerogative of a voice in our government, *our whole country and our form of government* will not survive the terrific impact of the social and political upheavals that are taking place in this age of the atom.

NEW SYNTHETIC MATERIALS RESISTANT TO SEVERELY CORROSIVE CONDITIONS

ALFRED LIPPMAN, JR. *

The chemical engineer has been likened to an incubator; he is given the laboratory egg that he is supposed to hatch to a vigorous, productive chicken that lays preferably golden eggs. Processes encountering highly corrosive conditions, with which this paper is concerned, will not be productive of golden eggs if construction materials are selected unwisely, so that excessive repairs, replacements and interruptions in operation occur from corrosion.

Only a little over twenty years ago, concentrated muriatic acid used to be shipped in wooden tanks on flat cars. Not only would the cellulose of the wood turn gradually into sugar but also the wooden tanks were structurally unable to withstand the severe shocks of railroading, so that many an unsuspecting trainman must have received an ablution of muriatic acid.

Each of the materials listed in Table I (1) is unaffected chemically by concentrated muriatic acid, (2) is produced in shapes made entirely of that material, within the dimensional limitations set forth in the table (homogenous construction) and (3) has been definitely proved in actual industrial applications.

Data provided in the tables should indicate those materials of homogenous construction that are most suitable and economical for specific operating conditions over a broad range. Comments on some of the newer developments of the materials in Table I:

Group A—Silicates.

Nos. 1-a and 1-b—Chemical Stoneware. Regular-bodied chemical stoneware (1-a), aluminum silicate, has been marketed for some years but many engineers have shied away from its use wherever temperatures substantially above room temperature were encountered because of susceptibility to fracture by thermal shock, inherent in a dense product with low tensible

* Delivered before the Annual Meeting of the Louisiana Engineering Society, Jan. 11, 1946. Mr. Lippman is Plant Manager, Bay Chemical Co. Inc., Weeks, La.

TABLES I.

PROPERTIES OF MATERIALS SUITABLE FOR SERVICE WITH STRONG MINERAL ACID (HC1).

No.	Description	Sp. Gr.	Ultimate Tensile Strength MPSI	Compressive Strength MPSI	Young's Modulus PSI (x 10⁶)	Coeff. Lineal Expansion of (X 10⁷)	Porosity %	Thermal conductivity —BTU/hr. Sq. Ft.— ft.—°F.	Thermal Shock °F per min. Med. Shapes	Max. Continuous Temp.—°F.	Max. Dia. or Vol. Sdt Integral Shapes	Melting or Vitrifivaiton Point—°F	Max. Internal Pressure —PSI. Std. Pipe	oCsts $/ft. 3" p with Fittings	Odd Costs	Approx. Propoortionality of pipe cost to Dimmeter
Group A—Silicates:																
1-a	Standard Chemical Stoneware	2.2	1.5	75	7.5	20	1.5-3.5	0.7	2-5	180	60"	2350	5.60	1.60		V d
1-b	Newer Chemical Stoneware	2.2	2.4-4.6	90	6-21	10-27	0.3-1.5	1.0-2.9	5-30	300-500	1000 g.	2350	25-100	1.90	T-$350	V d
2	Chemical Porcelain	2.4	7.0	100	10.4	23	.0	0.70	90-120	1000	30"-80 g.	2300	50-100	2.50		d
3	Borosilicate glass (pyrex 774)	2.2	10.0	200	9.8	18.4	0.0	0.68	150	900	24"	2000	80-100	2.35		1.3 d
4	Fused silica	2.1	0.8	22	10.0	3.4	0.0	0.83	250-800	2000	30"	3200	2-5	3.80		0.8 d
Group B—Metals																
5	Tentalum	16.6	42-178	40	27.0	35.7	0.0	32.5	900 (air)	840 (air)	inf.	5162	750-1000		$80-150/lb	——
5-a	Steel (for comparison only, badly corroded)	7.9	60	60	30.0	67.0	0.0	26.0	900	800	inf.	2400	150	.66		d to 1.5 d
Group C—Plastics																
6	Hard rubber	1.2	6.0 Ave.	9	varies	350	0.00	0.09	40-70	120-160	P-8",13g.	250	40-50	1.73		1.2 d
7	Saran	1.7	6.0	8	0.13	880	0.0	0.53	200	170	P-4"	318	90-260	3.10	T-$250	d to 1.5 d
8	Haveg 41 and 60	1.6	2.5	11	1.0	180	0.1	0.20	230	265	120"-7000 g.	400	30-65	2.81		d
Group D—Carbon or Graphite bases																
9-a	Carbon	1.6	1.5	88	.94	18	25	5	600	660	38"	6700 V. atmos.		2.90	5-10c/lb.B	.7d²
9-b	Graphite	1.6	.9	3	.88	12	24	90	600	840	29"	6700 V. atmos.		3.47	15-18c/lb.B	.7d²
10-a	Karbate (10 series)	1.8	2.0	11	2.0	30	2.2	3	250	340	38"	450	75	4.54	45-55c/lb. brick	.7d²
10-b	Karbate (20 serise)	1.9	2.4	11	2.3	23	0.6	75	300	340	29"	450	50-75	4.54	50-58c/lb. brick	.7d²

NOTE: B = bricks, g. = gallons, P = pipe, T = tank (350 gallons), V = vaporizes. All pipes under "costs" ar eflanged except No. 4.

TYPICAL MANUFACTURERS OF MATERIALS IN TABLE I.

1a & 1b.—U. S. Stoneware Co., General Refractories Co., M. A. Knight, General Ceramics & Steatite Co.
2—Lapp Insulator Co., Illinois Electric Porcelain Co.
3—Corning Glass Works.
4—The Amersil Co., The Thermal Syndicate.
6—American Hard Rubber Co., The Luzerne Rubber Co.
5—Fansteel Metallurgical Corporation.
7—Dow Chemical Co.
8—Haveg Corporation.
9—National Carbon Company

strength, low thermal conductivity (making for large temperature differentials through the body), high modulus of elasticity (inelastic), and high rate of thermal expansion. Ceramists, however, not only have improved technique of manufacture but also have found that the incorporation or "alloying" of certain metallic elements (usually oxides or silicates) with the base aluminum silicate clay would produce large modifications of properties, an effect quite analogous to the alloying of metals. Illustratively, the incorporation of cordierite (a MgAl silicate) tremendously reduces thermal expansion.

Improvement in the art is apparent from even cursory comparison of 1 B of Table I (special stoneware now obtainable) with 1A (regular grade). U.S. Stoneware's widely advertised ceratherms now are operating satisfactorily up to 500°F. and withstand substantial thermal shock and mechanical abuse. General Ceramic's tough B-41 body has 3 times the thermal conductivity of regular grade stoneware and withstands 400°F. M. A. Knight manufactures special heat-resistant (chamotte) and conductive bodies. Stoneware pumps are available.

Modern stoneware is thus tailormade when necessary, with properties modifiable to suit suprisingly severe conditions. However, it should be remembered that, in ceramics, fortifying one property may weaken another, so exceptional caution must be exercised to present *all* pertinent operating conditions to the manufacturer.

2—**Porcelain** is a potassium aluminum silicate, similar to modern chemical stoneware in method of manufacture and in several physical properties; resistance to thermal shock and to higher temperature is excellent. Improvement has been made in coupling pipe by means of iron flanges cemented onto the porcelain and usable up to 300°F. The pipe may be assembled without gaskets as faces are ground sufficiently true to seal moderate pressure. Chemical porcelain is made in virtually only one grade, so its behavior is quite accurately predictable.

3—**Borosilicate glass** has been so improved that heat-exchanger tubing of uniform thin wall thickness is produced that permits of overall heat-exchange coefficients with liquids of 50-115, while the thicker-wall pipe handles 80-100 lb. pres-

sure. Transparency is a useful property. The glass may be welded to itself, to other glasses or to silica. Pyrex glass pumps are available.

4—**Fused silica.** Outstanding characteristic of fused silica is (1) its exceptional resistance to thermal shock principally because of its low coefficient of expansion and (2) the high temperature (2000°F.) under which it may operate continuously. Latest development in this field is Corning's transparent Vykor ware, made by leaching out nearly everything except silica from a glass shape, then vitrifying the residual silica (96%). Formerly, transparent silica-ware was obtainable only by fusing quartz. The new Vykor is obtainable in flasks up to 7 liter capacity and in tubing up to 6'' O.D. as well as sight glasses up to 15'' x 15'' for observation of processes at temperature as high as 1650°F. Ultraviolet and other light rays are transmitted well through transparent silica-ware.

5—**Tantalum.** This metal resembles steel closely in properties, as may be determined by comparison of (5) with (5a); it may be welded and shaped similarly, a valuable advantage. Strength is sufficient to permit of exceptionally thin walls or sheeting in the order of .001-.02'' with insignificient resistance accordingly offered to heat transfer by the metal so film resistances are usually controlling. The cost of the element is sufficient so that design in general must utilize as much of the metal as possible for actual heat trasfer; satifactory methods have been developed for using tantalum in combination with other acid-proof materials of construction to achieve utmost efficiency from the tantalum. Consideration of tantalum is indicated for service particularly with very high rates of heat with boiling or condensing films, and for such services wherein the strength and qualities of a truly corrosion-proof metal is required. It is generally too costly to be considered as piping for flow of fluids or for heat-exchange applications with higher film resistances. Of all construction materials resistant to severe transfer, which utilize the low metal resistance to the full, as corrosion, only tantalum and Karbate of the 20 series (10b) are capable of providing overall high heat transfer coefficients comparable to those obtainable with steel.

6—**Hard rubber** is an inexpensive plastic that serves satisfactorily for piping, fittings and smaller shapes, as well as for pumps, at temperatures from 120 to 160° F., depending on composition. In muriatic service, the synthetic hard rubber seems to have some advantages over natural hard rubber formerly used. Thermal shock indicated in table is for pipe, so greater caution must be exercised for valves, pumps and intrivate or larger shapes. Very low thermal conductivity and low softening point are the principal limiting properties. Low cost is an important factor in consideration of this material for services for which it may be suitable.

7—**Saran or vinylidene chloride** provides excellent characteristics for a pipe as it is very easily worked, machined or bent and may be welded together in the field by use of a hot-plate. The low Young's modulus substantially compensates for high thermal expansion so that the pipe does not tend to warp under changes in thermal or mechanical stress, which, together with superior chemical inertness, assures long life at temperatures below 170° F. For chemical service it has not yet been produced in shapes larger than 4'' pipe.

8—**Haveg 41 and 60.** Haveg 41 is the versatile phenol-formaldehyde and asbestos plastic molding composition that has served so many industries through the years. Relatively large integral shapes up to 7000 gallons are producible by a simple molding process. This inexpensive molding process, low cost of the material itself and resistance to thermal shock account for the widespread utilization of Haveg for service below 265° F.; even complicated shapes may be easily molded. Larger shapes of Haveg are shipped with external supports supplied by manufacturer. This material may be repaired or altered by cementing in the field or by remolding at factory. It may be molded around metal inserts; the Wilfley pump is of Haveg. Shapes larger than 7000 gallons may be made by bolting individual panels together. Uniformly distributed, firm supports are essential to prevent excessive tensile strain.

Haveg 60 has just been announced as a furane-base resin with properties similar to Haveg 41, but able to withstand alkali as well as acid service.

Group D—Carbon and Graphite

9—**Carbon.** Carbon is manufactured from a mixture of petroleum coke, coal tar pitch and anthracite coal by calcining in a reducing atmosphere at 2500° F. Temperature gradient and other furnace conditions must be carefully controlled. It is a long, tedious process, hence the cost. The product is porous with low termal conductivity but it has excellent resistance to severe thermal shock due to porosity, and it is self-lubricating. It may be used up to 660° F. in air or to 3300° F. in reducing atmosphere. Because of porosity, carbon cannot be used substantially above or below atmospheric pressure if contamination by air of contents of carbon pipe or vessel is undesirable. Carbon may be produced with controlled porosity (known as porous grade), useful for filter plates or tubes, diffuser elements and electrolytic cell diaphragms. Carbon, of course, is a good conductor of electricity.

10a—**Karbate, 10 series.** Impregnation of the regular carbon product with an acid-proof plastic provides virtually impervious "Karbate" of the 10 series, which can stand severe thermal shock and operate at up to 340° F., a lower figure than carbon alone insofar that the impregnant cannot withstand temperatures above 340°. This material is readily machineable as retains the self-lubricating properties of carbon; centrifugal pumps of Karbate of high efficiency have given satisfactory service; the pumps utilize the self-lubricating qualities to eliminate the stuffing box. This material is produced in shapes up to 38" diameter, while slabs can be cemeted together with carbon cement to produce much larger objects; the cement has strength approaching that of the Karbate body itself and does not require reduction of operating temperatures. Quick repair by cementation is common. Karbate pipe is good for 75# pressure. Karbate of the 10 series is a poor conductor of heat because of the carbon base.

9-b—**Graphite.** Calcination of carbon (9a) (but with original mix devoid of anthracite coal) in a reducing atmosphere, gradually reaching 5500° F. over an extensive period, causes the carbon to change to graphite, an excellent conductor of heat, with self-lubricating, thermal-resistant, and working

properties even superior to those of the parent carbon. The properties of graphite listed in the table are of the same order as those of carbon except for the thirty-fold increase in thermal conductivity, a very significant factor wherever heat transfer is involved because graphite is the least costly heat-exchange body of sufficiently high conductivity to permit of overall heat transfer coefficients substantially as high as those obtainable with steel. It has thus been most heartily welcomed for heat exchangers within the operational limitations set forth in the table. Of course, graphite body alone is not so suitable for ponderance of heat-exchange equipment because of porosity that limits application close to atmospheric pressure, but the impervious impregnated graphite or Karbate 20 series, has been very extensively used.

10-B—**Karbate, 20 series** has been a boon to the chemical engineer confronted with heat exchange problems of corrosive substnaces.

Considerable ingenuity has been exercised in the use of the Karbates to make larger composite shapes of all-Karbate or of combinations with other materials, by cementation and by various common forms of assembly, i.e., cemented sleeve couplings, flanges, van stone and flexlock joints, spring loading, etc., all fully developed for this body to make application as containers, in moving parts, and for heat transfer, adaptable to a wide range of operating conditions.

Certan new plastic materials seem to possess potentialities for construction of equipment for the chemical industry and will bear watching.

(1) duPont's HM-122 heat-resisting Lucite (methyl methacrylate) now in molding production in tubes up to 6'' I.D. by the Plox Corporation, Hartford, Conn., provides heat resistance between 180 and 198° F. It has the property of bending light. There is some indication, however, that strong mineral acids may cause crazing in time.

(2) Dow's styraloy is also under development for temperatures from 150 to 200° F. and does resist strong mineral acids indefinitely.

(3) Vinly copolymer, and

(4) Polythene so far have not been substantially utilized in piping because of low maximum service temperature.

In conclusion, it should be noted that there is the whole field of composite structure beyond the scope of this paper, but in any complete survey of acid-proof materials, said composite structures must be considered. In this category belong principally the acid-prof linings, usually applied on steel; elastomers, as soft and hard synthetic and natural rubbers, Tygon, Neoprene, Koroseal, Gaco-Neoprene, Pyroflex; phenolics like Heresite and Lastiglas; and fused glass (Pfaudler and Glascote). Some of these linings, often in conjunction with protective sheathing of brick, may be employed in construction of large units with volumes of thousands of cubic feet, able to withstand severe conditions. Much credit, too, belongs to manufacturers of cements able to withstand corrosive and thermal factors encountered, as carbonaceous cement; phenol-formaldehyde and furane (Asplit, Korez, Nu-kem, Durisite); sulfur-base and "silicate" types. While some of the remarks, of course, are based on personal experiences of the writer over 16 years, this paper was rendered possible in large measure by the cooperation of manufacturers of the materials covered herein, to whom our appreciation is extended.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Louisiana Engineering Society, March 11, 1946

The meeting was called to order by President Lassalle, with approximately 80 members and guests present. Minutes of the previous meeting were read and accepted.

Messrs. F. M. Taylor of the New Orleans Section, American Institute of Chemical Engineers, J. Copeland of the New Orleans Geological Society, and H. L. Lehmann of the Baton Rouge Section, Louisiana Engineering Society, announced the forthcoming programs of their respective groups.

The Secretary announced that the Southern Pine Association, through the efforts of Mr. W. H. Scales, had donated to the Society's library approximately 50 volumes of A. S. T. M. bound Standards. He also announced that the Engineering Experimental Station of Texas A & M University had presented the Society with a volume entitled "Bibliography of the Petroleum Industry" by E. DeGolyer and Harold Vance. These books will be indexed by the Library Committee and will be available to all members.

Mr. Steinmayer then introduced the speaker of the evening, Mr. W. G. Gillingham, who delivered a very instructive illustrated lecture on "The Electrical Logging of Wells". Following his address, 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, March 11, 1946

The meeting was caled to order by President Lassalle, with Messrs. Cucullu, Leake, Lehmann, McNiven, Nairne, Steinmayer and Fernandez present. Minutes of the previous meeting were read and accepted.

Reports on the Eleventh Annual Meeting by Messrs. M. C. Abrahm, General Chairman, John V. Dugan, Banquet Committee Chairman, James S. Janssen, Program Committee Chairman, were read and accepted.

A budget for the year 1946, submitted by Mr. Noel P. Kammer, Finance Committee Chairman, was adopted.

The recommendations made by the special committee on advertising rates were accepted with the proviso that the committee prepare a letter notifying present advertisers of the new rates and that such rates would become effective at the expiration of present contracts.

President Lassalle appointed Mr. John K. Mayer to act as chairman of a committee of his own choice to prepare a memorial in honor of Lieutenant E. L. King, Jr., a late member of the Society.

It was moved and passed that the Secretary be authorized to buy a $1000 Series F United States Saving Bond.

The Secretary announced that all appointees to chairmanship of the various standing committees had accepted.

President Lassalle announced the formation of an Engineering Council, consisting of the heads of the various engineering organizations in Louisiana, the President and Secretary of the Louisiana Engineering Society to serve in their respective capacities for this council.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of the 1st Quarterly Meeting, Baton Rouge Section Louisiana Engineering Society

March 12th, 1946 Time: 7:30 P. M.
Place: Wolf's Bakery Auditorium.

President Guelfi opened the meeting at which there was approximately sixty-five (65) in attendance. After a short discussion relative to our Joint Meeting to be held in June, the Secretary was instructed to contact Mr. Fernandez, Secretary of L.E.S. Parent Section—to find out which date in June would be suitable for a joint meeting. No other business, old or new was brought up.

President Guelfi then introduced the Chairman and members of the several committees so that the members present could see and know those on whom would fall the responsibility of taking care of the details of the activities of the Baton Rouge Section.

It was moved, seconded and carried that the reading of last meeting's minutes be dispensed with.

The meeting was turned over to Mr. T. E. Peak, 2nd Vice-President and Chairman of Technical Papers Committee who introduced Mr. Holloway of the La. Civil Service Dept. Mr. Holloway presented a short sound picture entitled, "Shield of Our Freedom" depicting the advantages of Civil Service. Following the picture, Dr. L. W. Morris of the L.S.U. Physics Dept., gave a talk on the subject "Radar".

The meeting was adjourned and refreshments in the form of sandwiches and cold drinks was served.

JAMES J. SAURAGE,
Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society, April 8, 1946

The meeting was called to order by President Lassalle, with approximately 100 members and guests present. Reading of minutes of the previous meeting was dispensed with.

The Secretary read a letter from Captain A. W. Brodtmann appealing for donations of engineering text books to Korean engineers.

Receipt was announced of a new volume for the Library, entitled "A Pictorial Review of Bartlett-Hayward".

Mr. Charles P. Knost, Vice-Chairman of the Technical Papers Committee, then introduced the speaker, Dr. Lloyd W. Morris, Professor of Physics at Louisiana State University, who gave a most instructive and technical talk on "Radar", demonstrating several experiments.

Dr. Morris' lecture was received with enthusiastic applause and, there being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of Meeting of the Board of Direction, April 8, 1946

The meeting was called to order by President Lassalle, with Messrs. Cucullu, Lehmann, Mayer, McNiven, Nairne, Steinmayer and Fernandez present. Minutes of the preceding meeting were read and accepted.

The Treasurer's quarterly report was discussed and approved.

A letter prepared by the Special Committee on Advertising Rates was read, and action on forwarding same to advertisers was postponed.

A communication from Captain A. W. Brodtmann requesting donations of engineering text books for Korean engineers was read and it was decided to forward any books donated by members.

It was agreed to accept the offer made by the Swedish Library Association to exchange publications.

A letter from Mr. John H.Bernhard with reference to his listing in the membership roster was read. The Board ruled that in all cases of

reinstatement of former members, the original membership date would appear in the roster.

A communication from Mr. John E. Pottharst pertaining to congressional bills on the National Science Foundation (S-1285 and S-1850) was referred to the Legislative Committee.

Mr. Steinmayer moved that the Board consider the matter of appointing a representative to the Association of Commerce for a period of several consecutive years. The motion was seconded by Mr. Cucullu and adopted.

Discussion took place regarding the naming of honorary members of the Society, and President Lassalle appointed a committee consisting of Messrs. Cucullu, Mayer and Kerr to study the matter.

The Secretary announced the results of the March election, in which the following new members were admitted to the Society:

Members—Aaron Abramson, Roscoe H. Bowers, Leo E. Broders, George A. DeWolf, Ernest L. Eustis, Jr., Henry W. Gabbe, Leo L. Holzenthal, Frank S. Houghton, Harold C. Lee, Milton L. Levy, Austin J. Mary, A. Hews McCann, Jr., Thomas F. McCrary, Clifton R. Newlin, George B. Oldham, Hubert P. Oliver, William E. Owen, Ambrose K. Ramsey, Jr., George W. Rappleyea, Kearny Robert, Albert T. Rowan, Roy T. Sessums, Frederick E. Smith, and Charless Q. Wiggins, Jr.

Affiliate Members—Ira E. Hall.

Reinstatements—William K. Beenel and Carroll L. Wood, Jr.

Junior Members—Andrew R. Anticich, John W. Cavanaugh, Robert D. Cosgrove.

Receipt of a volume entitled "Pictorial Review of Bartlett Hayward" for the Library was announced.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Executive Committee Meeting, Baton Rouge Section

Time: 5:30 P. M. Tuesday, April 9th, 1946

Place: Highway Testing Laboratory

Those present:

P. J. Guelfi, President
Wm. Whipple, 1st Vice-President
T. E. Peak, 2nd Vice-President
J. J. Saurage, Secretary-Treasurer
H. L. Lehmann, Past President
W. M. Larkin, Chairman—Membership Committee

The meeting was opened with a discusssion of the outcome of proposed joint meeting with other local technical societies at which Dr. Urey was invited to speak. Dr. Urey was unable to accept the invitation to speak, therefore Secretary James J. Saurage was instructed to write Mr. Arnold C. Matthies, Secretary, Baton Rouge Section of A.I.C.E., which society originated the idea of a joint meeting, that the matter was closed and that if the A. I. C. E. was considering joint meetings in the future, we assume that it would be made a subject for future discussion.

The secretary was also instructed to answer Mrs. V. J. Bedell's letter in regards to forming a Woman's Auxiliary—also each member is to be contacted by letter in an effort to determine the reaction among the eligible women.

Next, the business of our joint meeting in June was discussed. The date for this joint meeting was tentatively set for Saturday, June 22nd.

Mr. Lant was appointed as Chairman of the Golf Committee. Mr. Guelfi is to arrange a tour of Gulf States Utilities. The Highway Laboratory is to be the general meeting place in the early afternoon where

there will be horse-shoe pitching and refreshments. The business session and supper to be held at the L.S.U. Cafeteria Venetian Room if possible. Supper expenses to be defrayed by taxing all present. Mr. T. Ellis Peak is to contact several prospective speakers and be prepared to report April 29th when the next Executive Committee Meeting will be held at Mike and Tony's Steak House.

Meeting adjourned.

JAMES J. SAURAGE,
Secretary-Treasurer

April 26, 1946

Board of Direction,
Louisiana Engineering Society,
New Orleans, Louisiana.
Dear Sirs:

I have audited the accounts of the Louisiana Engineering Society for the year ended December 31, 1945 and submit the following:

Balance Sheet, December 31, 1945 and 1944 and Comparison (Cash receipts and disbursements basis) (Exhibit A)

Statement of Income And Surplus For The Years Ended December 31, 1945 and 1944 And Comparison (Cash receipts and disbursements basis) (Exhibit B)

I submit also the following comments:

The cash on deposit at December 31, 1945 in the regular checking account was confirmed by certification obtained from the depositary.

The U. S. Savings bonds and certificates evidencing shares of stock in the various homesteads were inspected by me on February 26, 1946 in the Society's bank box and the amounts to the credit of the Society in the various homesteads were further verified by certifications obtained from those institutions.

At December 31, 1945 the restricted balances in banks and homesteads in liquidation were as follows:

Interstate Trust and Banking Co. in Liquidation, checking and savings accounts	$ 958.92
Standard Homestead Association in Liquidation	195.00
Total	$1,153.92

A reserve for loss aggregating $1,151.92 is set up against the total of these balances, thus effecting a nominal value of $1.00 for each of the above accounts. During 1945 liquidating dividends from banks and homesteads in liquidation were received as follows:

Canal Bank & Trust Company in Liquidation, checking and savings accounts	$ 84.79
Interstate Trust And Banking Co. in Liquidation, checking and savings accounts	575.33
Columbia Building and Loan Association in Liquidation	2.50
Total	$ 662.62

There has now been collected from the Canal Bank & Trust Company in Liquidation, the total frozen balances of the checking and savings accounts, with no resulting loss sustained therefrom. With the receipt of $2.50 from Columbia Building and Loan Association in Liquidation, which was the final liquidating dividend, the Society sustained a loss of $127.50, 25-½% of the original frozen balance. Of this loss, $126.50 was charged against the reserve set up and the remainder was charged to surplus.

Yours truly,
CARLOS J. GRIMADER

FINANCIAL REPORT

EXHIBIT A

LOUISIANA ENGINEERING SOCIETY

Balance Sheet, December 31, 1945 and 1944 and Comparison
(Cash Receipts and Disbursements Basis)

ASSETS	December 31 1945	1944	Increase Decrease
CASH IN BANK:			
Checking account	$2,870.90	$2,019.69	$851.21
Savings account		774.13	744.13
Total cash in bank	$2,870.90	$2,793.82	$ 77.08
UNITED STATES SAVINGS BONDS, SERIES F (maturity value 1945, $3,000.00; 1944, $2,000.00)—redemption value	$2,254.00	$1,494.00	$760.00
INVESTMENTS—HOMESTEADS:			
Columbia Homestead Association	$ 359.52	$ 357.93	$ 1.59
Commonwealth Homestead Association	305.36	305.25	.12
Greater New Orleans Homestead Assn.	1,484.98	1,448.55	36.43
Security Building and Loan Assn.	500.00	500.00	
Sixth District Building and Loan Assn.	500.00	500.00	
Union Savings and Loan Association	500.00	500.00	
Total Investments—Homesteads	$3,649.86	$3,611.72	$ 38.14
PROPERTY—Furniture, Fixtures, Equipment and Books—nominal value	$ 1.00	$ 1.00	
FUNDS ON DEPOSIT WITH BANKS AND HOMESTEADS IN LIQUIDATION:			
Canal Bank & Trust Company in Liquidation (less reserve for loss—1944, $71.66)		$ 1.00	$ 1.00
Interstate Trust & Banking Co. in Liquidation (less reserve for loss—1945, $957.92; 1944, $1,533.25)	$ 1.00	1.00	
Columbia Building and Loan Association in Liquidation (less reserve for loss—1944, $129.00)		1.00	1.00
Standard Homestead Association in Liquidation (less reserve for loss, $194.00)	1.00	1.00	
Total frozen funds less reserve for loss	$ 2.00	$ 4.00	$ 2 00
TOTAS ASSETS	$8,777.76	$7,904.54	$873.22
LIABILITIES			
SURPLUS (Per Exhibit B)	$8,777.76	$7,904.54	$873.22

CERTIFICATE OF AUDIT

Louisiana Engineering Society:

I have audited your accounts for the year ended December 31, 1945 and for two years prior thereto, and in my opinion the above balance sheet and accompanying statement of income and surplus fairly present, respectively, your financial condition at December 31, 1945 and 1944, and the results of your operations for the years ended those dates.

CARLOS J. GRIMADER
Certified Public Accountant

New Orleans, Louisiana,
April 26, 1946

EXHIBIT B

LOUISIANA ENGINEERING SOCIETY

Statement of Income and Surplus (On Cash Receipts and Disbursements Basis) for the Years Ended December 31, 1945 and 1944, and Comparison

	Year Ended December 31 1945	1944	Increase Decrease
INCOME			
Dues collected	$3,720.62	$3,471.28	$249.34
Advertising revenue	589.52	345.58	243.94
Income from investments and savings accounts	116.98	121.41	4.43
Net profit—sale of certificates buttons, etc.	6.30	.92	5.38
Sale of proceedings and miscellaneous income	11.20	2.80	8.40
Total income	$4,444.62	$3,941.99	$502.63
EXPENSES:			
Salary—secretary-treasurer	$ 900.00	$ 900.00	
Cost of publishing proceedings	1,524.15	1,120.24	$403.91
Cost of annual meeting (1945—less $128.00 paid in 1944 and less receipts of $990.00; 1944, less receipts of $652.50)	350.00	513.33	163.33
Expenses paid in advance—1945 annual meeting		128.00	128.00
Cost of annual golf tournament (less receipts in 1945, $809.00; in 1944, $638.55)	99.47	108.01	8.54
Refreshments at meetings (less pro-rata receipts from joint meetings held in 1945, $119.39; in 1944, $95.57)	228.06	247.09	19.03
Printing, stationery and postage	431.66	315.49	116.17
Payments to Baton Rouge Section	266.50	254.75	11.75
Presents to retiring officers	79.50	33.84	45.66
Library expense—porter, etc.	52.00	11.00	41.00
Social security tax on salaries of editor and secretary-treasurer	30.00	16.00	14.00
Auditing	100.00		100.00
General expenses	170.68	112.31	58.37
Total	$4,232.02	$3,760.06	$471.96
NET PROFIT FROM OPERATIONS	$ 212.60	$ 181.93	$ 30.67
SURPLUS CREDITS:			
Reduction of reserve for loss due to receipt of liquidating dividends from banks and homesteads in liquidation	$ 661.62	300.78	360.84
GROSS SURPLUS FOR THE YEAR	$ 874.22	$ 482.71	$391.51
SURPLUS CHARGE:			
Excess of loss of funds in Columbia Building and Loan Association in Liquidation over reserve set up (liquidation completed)	1.00		1.00
Social security tax, penalty, and interest on salaries for the year 1940-1943		114.933	114.93
SURPLUS FOR THE YEAR	$ 873.22	$ 367.78	$505.44
SURPLUS AT BEGINNING OF YEAR	7,904.54	7,536.76	367.78
SURPLUS AT END OF YEAR	$8,777.76	$7,904.54	$873.22

CARLOS J. GRIMADER
Certified Public Accountant

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXII AUGUST, 1946 NO. 4

CONTENTS

EDITORIAL NOTES AND COMMENTS

Employment Committee. For a number of years the Society has assisted its members in obtaining employment through the activities of the Employment Committee. Members of this group are:

E. L. Fithian, Chairman (Eugene Dietzgen Co.); R. P. Bassich, Vice-Chairman (N. O. Blueprint & Supply); B. H. Bell, A. T. Dusenbury, E. D. Hogg, L. L. Newman, John Riess.

If you are looking for a change in your work consult them. If you are in need of additional staff, they will be glad to assist you.

New Members. The following members have recently been elected to the Society. We welcome these fellow engineers and look forward to their taking an active part in the affairs of the Society.

For Member

JOHN G. BEDELL, New Orleans; Age 30. Endorsed: C. C. Barnard, D. W. Godat, W. S. Nelson. Civil Engineering, Georgia Tech 3 yrs., L.S.U., 2 yrs. Resettlement Admin., Minden, La., Chief of Party and Asst. Engr., 1936-37. City of N. O., Eng. Draftsman, 1937; J. G. White Eng. Co., Inspection Engr., 1940-41; U.S. Engineers, Camp Claiborne, Chief Field Engr., 1941-42; Bernard, Godat & Heft, Chief Field Engr., 1942-44; Barnard & Burie, Chief Field Engr., 1944-45; V. J. Bedell Company, Engineer, 1945-date.

GLEN N. COX, Baton Rouge; Age 43. Endorsed: L. J. Lassalle, H. W. Waterfall, W. P. Wallace, University of Iowa, B. E.; University of Wisconsin, M. S. & Ph. D., majored in hydraulics. University of Illinois, Instructor, 1 yr. L. S. U., 1929-present, now Professor and Head Department Hydraulic Engineering.

HUGH DAVIS, Monroe; Age 52. Endorsed: J. E. Jarman, H. L. Lehmann, R. B. Richardson. L. S. U., B. S. M. E. 1918. La. Highway Comm., Res. Engr. 1922-33 Foreman Forestry Service, 1933-34 La. Highway Comm., Asst. Res. Engr., 1934-36. National Park Service, Supt., 1936-40. La. Dept. Highways, Dist. Maint. Engr., 1941-46.

GEORGE T. DE LA MATYR, Baton Rouge; Age 35. Endorsed: P. J. Guelfi, L. J. Lassalle, F. B. Stirling. L.S.U., B. S., E. E., 1933. Gulf States Utilities, Engineer, 1933-present, with exception of 1941-45, Electronics Officer, U. S. Naval Reserve.

WALLACE P. DE NUX, Alexandria; Age 39. Endorsed: Tom C. David, George A. DeWolf, Leo M. Odom. U. S. Engr. Office, New Orleans, Rodman-Surveyman, 1928-29; La. Hwy. Comm., Baton Rouge, Instrumentman, 1930-32; La. Coast and Geodetic Survey, N. O., Chief of Party, 1932-34; U. S. Forest Service, Alexandria, Chief of Party, 1934-36; C.C.C. Camp Supt., 1936-42; Roads & Grounds Dept., Post Eng., Camp Polk, La., 1942-44; La. State Dept. Public Works, 1944-date.

JAMES KENNETH HESS, New Orleans; Age 31. Endorsed: L. C. H. McLean, J. W. Montgomery, A. R. Wingate. Penn. State College, B. S. C. E. 1940. Jones & Laughlin Steel Corp., Jr. Engr., 1940-41. U. S. Army Corps of Engineers, 1941. Served in Trinidad and Barbados, B.W.I., as Project Engineer in charge of airfield construction. Returned U. S. A. as Engr. Supply Officer, 30th Infantry Division. Served in campaigns of Normandy, France, Belgium, Rhein, and Germany.

CHARLES KELLER, Jr., New Orleans; Age 37. Endorsed: S. C. Blaize, F. C. Carey, C. L. Nairne. U. S. Military Academy, West Point, 1926-1930; M. I. T., B.S.M.E., 1933. U. S. Army Engineer, Corps., 1930-45, various assignments, finally as Commanding Officer, 1135th Engr., and Engineer, VIII Corps, ETO, with approximately 3500 engineer troops under supervision.

M. F. KNOST, New Orleans; Age 51. Endorsed: R. F. A. Benson, Charles P. Knost, J. M. Todd. Miss. A & M, M. & E. Engr., 1917. Westinghouse Elec. & Mfg. Co., Service Engr., Shop Cost Acct., Price control, Shop Co-ord., Sales, Statistical, covering a period of eight years. Bohn Motor Co., Gen. Mgr., 9½ yrs. Gulf Refining Co., Automotive Sales Engr., 10 yrs. Member Tau Beta Pi, S. A. E.

DOUGLAS F. LATIMER, Baton Rouge. Age 32. Endorsed: P. J. Guelfi, H. L. Lehmann, W. M. Larkin. Michigan Tech, 1936, B. S. M. E., B. S. C. E., Engineer, Gulf States Utilities Co., 1937-41. U. S. Navy, 1941-46, Inspection Officer at Airship Air Station, Station Safety Officer. Returned to Gulf States Utilities in 1946.

HELIODORE A. MARCOUX, Baton Rouge. Age 35. Endorsed: W. P. Wallace, H. W. Waterfall, William Whipple. U. S. Naval Academy, Annapolis, Md., B. S. in Marine Eng., 1934; Cornell U., M. E. in Eng., 1942. U. S. Navy, Engineering Officer, 1934-39; Texas Oil Co., Research Lubrication Engr., 1940-41; Cornell Univ., Instructor, 1941-44; Goergia Tech., Asst. Professor, 1944-45; L.S.U., Asst. Prof. Mechanical Engineering, 1945-date.

THURLOW W. PARISH, JR., Monroe; Age 44. Endorsed: J. E. Jarman, H. L. Lehmann, J. E. Ross. La. Polytechnic Institute, 1919-22. La. Highway Comm.: Instrumentman, 1923-25; Res. Engr., construction projects, 1925-44; District Construction Engineer, 1945-date.

BRANDT PEDERSEN, New Orleans; Age 48. Endorsed: B. P. Babin, I. W. Mann, Jr., George D. Cobaugh. Graduate M.E. Royal Polytechnical Inst. of Copenhagen, Denmark, 1923. 1924-34 misc. industrial designing positions. 1934-36, Chief Draftsman, Mathieson Alkali Works, Inc., Lake Charles. 1936-46, Plant Engineer, same plant.

WALTER F. READ, New Orleans; Age 33. Endorsed: C. P. Hoyt, J. K. Mayer, J. C. Nielson. M.I.T., B.S. Chem. Eng. 1934, M. S. 1936 Standard Oil Co. of La., Baton Rouge Refinery, 1936-41. U. S. Army, 1941-46, various engineering assignments, finally as Chief, Munitions Division, Chemical Warfare Service, Edgewood Arsenal, Md. (Lt. Col.) Member American Chemical Society, Alpha Chi Sigma.

GRANTLEY, B. S. RICKETTS, New Orleans; Age 35. Endorsed: J. K. Mayer, C. W. Rieker, James M. Robert. Tulane University, B.E., M. & E., 1934. Tulane Universty, Instructor in Mech. Eng., 1935-36. Scott & Bres, Engineer in waterworks rebuilding project, 1937-39. American Utilities Service Corp., Supervising engineer, 1939-43. U.S.N.R., Instructor at Radar School operated by M.I.T. for Navy. E. B. Mathewson Co., Consulting Engineers, Chicago, Manager New Orleans office, 1946-date.

ROBERT JOHN ROBERTSON, Baton Rouge; Age 39. Endorsed: T. E. Crossan, M. C. Schwartz, F. A. Wilson. Williamson Trade School, Power Plant Engineer, 1926. Tampa Electric Co., various operation positions, 3 yrs., Station Efficiency Engineer, 6 yrs., 1926-34. Gulf States Utilities, Operating Engineer, 1935-40. Stone & Webster Eng. Corp., Power Engineer, 1941-45. Gulf States Utilities Co., Supt. La. Station, 1945-present. Member A.S.M.E.

JOHN Y. SNYDER, New Orleans; Age 28. Endorsed: J. K. Mayer, James M. Robert, R. A. Steinmayer, Tulane U., B. E., M & E. 1929, Standard Oil Development Co. (S.O.N.J.), Mechanical inspection, 6½ yrs. Standard Oil Co. of La., Mech. Inspection and Maintenance, 6½ yrs. Wedgeplug Valve Co., Inc., President and General Mgr., 3½ yrs. Now associated with Patents, Inc., Consulting Engineers.

WALTER P. VILLERE, New Orleans; Age 60. Endorsed: Edw. S. Bres, D. W. Godat, C. M. Kerr. State Board of Engineers of La., 1902-14. Algiers Const. Co., Partner, 1914-18. Highways Const. Co., Partner, 1918-30. Partner, Lower Coast Const. Co., 1930-36. Walter P. Villere, Partner, building roads, levees, bridges, for La., Miss., Ark., 1936-date. Licensed C.E. No. 177.

For Affiliate Member

JAMES H. QUINETTE, New Orleans; Age 47. Endorsed: A. J. Harris, Ole K. Olsen, E. G. Roessle. Tulane University, 1918-19. Engaged principally in supervision of construction since 1922. Major projects supervised: Saenger Theatre, 1926; American Bank Bldg., 1929; Nurse's Home, Charity Hospital, 1938; Southeastern La. College, Hammond, 1939; completion of Southwestern La. College, Lafayette, 1940. Major war activities: Principal Asst. Chief Architect's Supt., Keesler Field, Miss., and Camp Plauche, La.

For Reinstatement to Membership

W. DAVID deLAUREAL, New Orleans; Age 32. Endorsed: Leo J. Lassalle, E. McLellan, L. K. Nelson, L.S.U., B.S. M.E., 1934. Fairbanks Morse Co., Sales Engineer, 6 yrs. Gulf Engineering Co., Mgr. Air Conditioning Dept. 1½ yrs. U. S. Army, Post Engineer, 4 yrs. S. N. Prata Sheet Metal Works, Engineer, 4 mos. At present, Consulting Mechanical Engineer, private practice.

MAYER GODCHANX, New Orleans; Age 53. Endorsed: W. B. Moses, L. K. Nelson, J. M. Todd. Mechanical Engineering Course, John Hopkins, Baltimore. Design and power plant engineer for Riggs, Distler & Stringer, Inc., Baltimore, 4 yrs. During World War I, design and power plant engineer at Newport News, Va., and Camp Meade, Md. Member of L.E.S. for 19 yrs. Since original application, has practiced privately as heating and sanitary engineer and mechanical contractor.

FRANK E. HAIGHT, New Orleans; Age 43. Endorsed: H. P. Henderlite, John H. O'Neill, John L. Porter. Tulane University, College of Engineering, 1921-23. La. Highway Comm., roadway plans and estimates, 1924-30; Vicksburg Eng. Dist., Senior Topographic Draftsman, 1930-31; La. Highway Comm., Covington, Instrumentman, 1931-32; U. S. Public Health Service, Dist. Supervisor, Malaria Control, 1933-38; La. State Board of Health, Eng. Asst., 1938-42; U. S. Army, 3rd Malaria Control Detachment, 1942-45; La. State Board of Health, Eng. Aide in Div. Public Health Eng., 1945-present.

L. H. HIERS, New Orleans; Age 48. Endorsed: H. M. Blain, J. H. Collins, Sr., C. L. Nairne, M. E., Clemson University. Except for 37 months in U.S. Army, Corps of Engineers, as Post Engineer Officer, have been in continuous employ of New Orleans Public Service Inc. since November 1923, with various railway and gas engineering duties.

For Junior Member

JOSEPH T. MONTGOMERY, III, New Orleans; Age 25. Endorsed: V. J. Bedell, E. L. Mire, W. S. Nelson. Miss. State College, B.S. C.E., 1941. TVA, drafting and field work on Ky. dam, 1941; New Orleans Public Belt R.R., Asst. Engr. chg. field work, 1941-42; U. S. Navy, Marine Engr. on destroyer, 1942-45; V. J. Bedell Co., Engineer charge of field surveys, structural design, estimates, 1945-present. Member Tau Beta Pi.

HERRICK J. LANE, JR., New Orleans; Age 26. Endorsed: C. G. Cappel, R. E. Gosa, J. K. Woolf. Tulane School of Civil Eng., 1936-39. W. Horace Williams Co., Timekeeper, 1936; U. S. Army Engineer Corps, Construction Bn., 1942-45. W. Horace Williams Co., Engineer and Supt., 1945-date.

AARON M. ROSENTHAL, JR., Baton Rouge; Age 33. Endorsed: Leo J. Lassalle, H. L. Lehmann, James J. Saurage. L.S.U., B.S. E.E., 1935. La Dept of Highways, Testing and Research Lab., 5 yrs.

For Student Member

PRESTON MOTTRAM, Mechanical Engineering Student, Tulane University.

ANDERSON B. RITTER, Civil Engineering Student, Tulane University.

For Transfer from Student to Junior Member

JACK HINRICHS, Mechanical Engineer; CHESTER G. LOB, Electrical Engineer (Junior Award Winner); NORVIN L. PELLERIN, Mechanical Engineer; FELICIEN PERRIN, Mechanical Engineer; all graduates of Tulane University.

Baton Rouge Meeting. On Saturday, June 22 the Baton Rouge Section entertained with sports and a trip through the Gulf States Utilities plant. A New Orleans member won the golf tournament. After a grand meal at the L. S. U. Venetian Room, the group had the privilege of listening to Mr. W. Locher. Mr. Locher discussed the development and operation of pipe lines.

Southern Progress? At many engineering meetings, able speakers expound at length upon the abundant labor supply, natural resources and ideal climate of the South, advantages which should encourage its economic development.

What they do not mention, however, nor perhaps see hovering in the background, is the ever present specter of illiteracy trailing the chains of the south's inadequate educational facilities. This ghost could be laid once and for all, with adequate school funds.

The Louisiana Legislature recently had the opportunity to better school conditions with a tax on natural gas. More than 50% of the natural gas in our state is helping to enrich other communities, reaching them through pipelines. Many of these communities have fuel resources of their own, which they are cannily conserving while steadily exhausting our supply.

What was the fate of this bill, which would have provided the citizens of our state with educational benefits from natural gas resources? Exactly half of the legislators were so impressed with promises of rewards from natural gas pipeline corporations and other interests, or were so backward-looking, that the possibility of a progressive educational program was "sold down the river."

A community cannot and does not progress when proper educational facilities are lacking. What then is the greatest obstacle to southern progress? Unprogressive southerners!

Annual Outing. On July 25 the annual outing and smoker was held at the Colonial Country Club. Golf and horse shoe pitching held forth through a sunny afternoon. The evening meal was served under the trees. The floor show and the awarding of prizes ended the festivities. The committee members making arrangements and securing prizes deserve much credit.

You Can Help. In April of this year traffic deaths amounted to 2,650, a 47% increase over April 1945. "Public Safety" outlines the following plan to combat this rise in traffic deaths, most of which are preventable. Traffic fatalities are reduced by the cooperation of individual drivers. The plan is worthwhile reading.

The Program

Out of a fast-moving, three-day meeting, eight committees appointed to determine measures needed to launch a nation-wide traffic safety program, came up with the following program to stem the tide of traffic accidents and death. A brief summary of the program adopted by the President's Highway Safety Conference follows:

1. **Accident Records.** That every city and State establish a bureau of traffic accident records to collect and analyze and use traffic accident reports to provide information designed to prevent the repetition of disaster.

2. **Laws and Ordinances.** That all states and municipalities adopt the Uniform Vehicle Code and the Model Traffic Ordinance to achieve uniformity in laws and to cut out existing confusion over rules of the road.

3. **Education.** That schools at all levels conduct traffic safety programs designed to teach accident prevention to more than 30,000,000 young people to prepare them to shoulder their future responsibilities in a motor age.

4. **Enforcement.** That cities and states conduct continuing traffic law enforcement programs that will induce maxi-

mum voluntary observance of driver and pedestrian regulations by providing adequate deterrence to violators. That police departments, prosecutors and courts be provided with adequate personnel, properly selected and trained, to enforce traffic law, and that special courts of record be provided for the hearing of all traffic cases.

5. **Engineering.** That engineering principles and techniques for the elimination or dimunition of physical hazards and for the safe, efficient control of traffic movements be fully utilized. That highway planning surveys conducted cooperatively between the State and Federal governments provide facts for long-range improvement to achieve safety and that the work include urban as well as rural areas.

6. **Motor Vehicle Administration.** That States adopt sound policies and procedures in the field of motor vehicle administration, with special attention to driver licensing, vehicle inspection and other regulatory measures affecting highway safety.

7. **Public Information.** That aggressive, continuing efforts be made through the media of public information, by all public officials concerned, and by every interested organization to disseminate the facts concerning highway safety.

Finally, all national organizations, including their State and local units, were asked to endorse and secure support for such broad and important supplemental highway safety programs as the Police Traffic Safety Check, the National Traffic Safety Contest, and the National Pedestrian Protection Contest.

Papers In This Issue. An interesting abstract of Dr. George Jaffe's paper appears in this issue, together with a story of The Southern Regional Research Laboratory. Both were presented at the Annual Meeting of the Society, and contributed much to the success of the occasion.

ENGINEERING BRIEFS

Private Shipbuilding at Record Level. With the completion of six more vessels of the war shipbuilding program for Maritime Commission account during the past month, building contracts still in existence for the Government dwindled to a low of four ships of 300,409 gross tons—On the other hand—orders for private American interests now total 55 ships of 395,938 gross tons.—June 1946 Marine Engineering & Shipping Review.

Models. An interesting application of plastics is the making of models of such equipment as superchargers and compressors. One such model has recently been completed and the model illuminated by a stroboscopic light. Air flow could be easily observed at speeds of 7,000 r.p.m.

PAPERS AND DISCUSSIONS

ATOMIC ENERGY *

(ABSTRACT)

As far as the physicist is concerned the atomic age started 50 years ago with the discovery of X-rays. Roentgen's discovery inaugurated a new era in physics which is characterized by the rapid progress in the knowledge of the constitution and the behavior of the atom. Two important discoveries, following immediately that of X-rays, posed immediately the problem of the constitution of the atom: J. J. Thomson's discovery of the electron, i.e., the negative atom of electricity which is 1840 times lighter than the hydrogen atom, and Becquerel's discovery of radioactivity, which was so brilliantly supplemented by the Curies.

Radioactivity consists in the constant emission of various types of rays by certain elements. The nature of these rays, called alpha, beta, and gamma rays has been firmly established in the early days of radioactivity, and some of their properties can be rendered visible in a most wonderful way by C. T. R. Wilson's method of the cloud-chamber. The unique feature of the photographs thus obtained is that they make visible the action of single atomic events.

The facts of radioactivity, and the large amounts of energy liberated in radioactive processes, have been coordinated by the disintegration theory of Rutherford and Soddy. According to this theory the atoms of radioactive elements break up under emission of fragments and formation of atoms of different elements. In pursuit of these concepts the atom has been figured as a kind of submicroscopic solar system, having its mass almost completely concentrated in a minute central nucleus around which electrons revolve in relatively large orbits.

* Presented by Dr. George Jaffe, Associate Professor of Physics, Louisiana State University at the Annual Meeting of the Society on Jan. 10, 1946.

Atomic research became nuclear research when Rutherford as the first succeeded in the artificial disintegration of nitrogen atoms in 1919. Many nuclear reactions were studied in subsequent years (about 1,000 of them are known by now) and new elementary particles were discovered, amongst them the neutron which proved to be the most efficient explorer of the nucleus.

The colossal amounts of energy liberated in nuclear reaction derive from the mass of the parent atom itself since mass and energy are equivalent according to a general principle enunciated by Einstein. However, none of the nuclear reactions known until 1939 had any practical significance for supply of power, since they are not self-maintaining. It was only in that year that Hahn and Strassmann discovered an entirely new type of nuclear reaction, the splitting of Uranium atoms into two parts of comparable size, by the action of neutrons. This process, called nuclear fission, does not only release extraordinary amounts of energy but yields also new neutrons. It was immediately recognized that thereby a self-propagating, or chain-reaction might be realized and the physical problem of "atomic energy" became the practical problem of "atomic power" or "atomic bombs."

THE SOUTHERN REGIONAL RESEARCH LABORATORY THROUGH THE WAR AND NOW

By E. A. Gastrock

Southern Regional Research Laboratory*
New Orleans, Louisiana

We, at the Southern Regional Research Laboratory, have a vital interest in industries that utilize farm crops. These industries, since December 1941 fully engaged in the war effort, are now faced with many different problems which are called, for convenience, the problems of reconversion.

Agriculture has always been of great importance to the South's economy. Yet the low per capita income of southern agricultural workers has constituted not only a barrier to progress in the South, but has been a serious national problem. The South must look toward industry, therefore, to improve the status of farm labor by providing better markets for southern crops and new jobs for displaced farm workers. Thus the Southern Regional Research Laboratory endeavors to serve both southern agriculture and industry by the development of new and extended industrial outlets for southern farm products.

So far, research at the Southern Regional Laboratory has been devoted almost entirely to the war effort. This Regional Laboratory, with three others, was authorized by Congress in 1938; building plans were completed early in 1939; the ground was broken in the summer and the cornerstone laid in December of that year. Personnel recruitment and the purchase and installation of fixtures and equipment were intensely pursued, and the research program was underway by the middle of 1941. Then with Pearl Harbor came alteration of the whole aspect of our research. The peacetime program had to be set aside for urgent wartime research, and practically all long-range effort had to be eliminated. But interestingly enough, this conversion was more a change of focus than anything

* One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

else. Our peacetime research plan had been to develop new and extended uses for cotton, sweet potatoes, and peanuts. Under the changed war program work continued on these three crops, but every effort was directed toward finding utilizations that would help win the war. As it happens, nearly all the Laboratory wartime projects are of considerable peacetime significance.

An example of primary importance is our research on cotton tire cord. Tire cord normally is the largest single use of cotton, having consumed about 700,000 bales annually during recent prewar years, or more cotton than is usually grown in the entire state of Louisiana. The South thus has much at stake in cotton's retention of this specific market.

With the coming of war, tire manufacturers were forced to use large quantities of synthetic rubber which placed new and heavier demands on tire cord performance because such rubber generates more heat and has other characteristics which differ from natural rubber. Military authorities decided early in the war that rayon cord should be used in tires for certain classes of military vehicles and aircraft, and as a result production of rayon tire cord was stepped up until by now it is the equivalent in weight of nearly 400,000 bales of cotton annually. This decision to use rayon for tire cord emphasized the fact, if this huge market was to be kept for cotton, intensive research was immediately needed. And not only was it necessary to direct this research along lines that might yield an improved cotton tire cord but it was necessary to embrace as well such related fields as adhesion between tire cord and rubber, cord construction, hysteresis, heat build up, rubber properties, and testing procedures.

Our research, therefore, on cotton tire cord has had two main approaches; first, the selection, use, and testing of specific varieties of cotton, to find those best serving the purpose; and second, the improvement of cotton tire cord by chemical and mechanical treatments. I shall not attempt to describe the many experiments and thousands of tests we have made, nor all the scientific findings that have arisen from this work. I believe you will be particularly interested,however, in the

major results of several service tests carried out on sets of tires made from our experimental cotton cords.

For hte first service trial, 7.50-20 light truck tires, made of specific varieties of cotton, selected on the basis of laboratory tests of their physical properties, were put through a grueling test simulating war front conditions on 2-½ ton trucks by the Army Ordnance Tire Test Fleet on the Army's test course near San Antonio, Texas. This course consists of 70 per cent paved highway, 15 per cent graveled road, and 15 per cent cross country terrain. In this run the tires made with low-gauge cord manufactured from stoneville 2 B cotton performed 20 per cent better than those made with standard high-gauge cotton cord; those made from S x P cotton, 75 per cent better; and those made from Wilds 13 cotton, 132 per cent better.

More recently, another test was made on 6.00-16 passenger car tires on 1942- 4-door sedans run at 60 miles per hour on the Government Tire Test Fleet course, also in San Antonio. Both standard and experimental cotton cords gave fully satisfactory performance. With only one recapping, both sets of tires ran a total of 68,000 miles, with the carcasses still in good condition. With another recapping they could have gone much farther. The results show that these cotton cords perform with entire satisfaction in high speed passenger car service.

In highway tests on light truck tires, both the rayon and the improved cotton cord tires performed much better than those made with standard cotton cord. In the 7.00-20 rear wheel service tests, Wilds improved cotton tries gave three times the mileage of standard cord tires; and the rayon tires 16 per cent more than the Wilds. This slightly better performance of the rayon cord was due mainly to a difference in the type of cord construction, since no fabric failures occurred in any of the tires made with the improved cotton cord. The rate of tread wear was less on the cotton than on the rayon tires.

The overall results of these tests were gratifying in that they showed conclusively that improved tires can be made from cotton. They also supplied much valuable information regarding the influence of such important factors as cord gauge

and construction on synthetic rubber tire performance. The possibilities for further improvement have not been exhausted, and the information obtained is being used to guide further research on the development of improved types of cotton cord for use in larger size truck and bus tires.

Another important wartime project at the Southern Regional Laboratory had for its objective the preservation against damage, by weather or micro-organisms, of cotton used for sandbags, camouflage fabrics, tents, and other military textiles. This research has involved the development of new testing methods, extensive laboratory and service tests of commercial preservatives, and the development of new treatments. As a result of such research, a process has recently been developed for rotproofing cotton goods that is more effective than any other known treatment. It consists in the partial acetylation of cotton in yarn or fabric form, and is somewhat related to the making of rayon by the acetate process. In the latter, cellulose derived from cotton linters or from purified wood pulp is combined chemically with acetic acid and dissolved in an organic solvent. The resulting solution is converted to fiber by forcing it through the tiny openings of a spinnerette and permitting evaporation of the solvent. The fiber so produced is usually twisted before weaving into cloth. In the method developed at the Laboratory, on the other hand, cotton is first formed by conventional methods into a yarn or fabric which is then treated chemically to bring about a combination with acetic acid. The ratio of acetic acid to cotton cellulose is less than in acetate rayon. With this method the high strength, durability, and general appearance of the cotton fabrics are retained and yet the rot-resistance of the acetylation treatment is secured. Samples of cotton fabrics treated by partial acetylation have retained more than 80 per cent of their strength after burial for an entire year in the ground near the Laboratory, and I don't need to tell you that the wet, warm soil conditions we have in New Orleans provide a rather severe test for rot-resistance. In contrast, control samples of untreated cotton fabrics went to pieces in one week.

Cotton fabrics treated by this process, besides being outstandingly rotresistant and retaining the strength and appearance of ordinary cotton, do not have an odor, and are neither sticky nor toxic. With the war over, it is easy to visualize peacetime applications of the treatment to bags for packaging various commodities, awning, fabrics for use in river control work, fish nets, clothing, thread, and other uses.

Still another wartime project that has peacetime significance is our work on flameproofing cotton fabrics. While effective treatments for this purpose have been available for a number of years, they usually have such disadvantages as being easily washed out or making the fabric too stiff and heavy. As a result of recent work at the Southern Regional Laboratory, a flameproofing treatment has been devised which retains its flame resistance after many launderings, yet alters only moderately the physical characteristics of the fabric. This process does not prevent burning in the actual presence of a hot flame, but will do so when the flame is withdrawn. The so-called "afterglow" has not yet been entirely eliminated, and this phase of the problem is receiving further attention. As a result of this project, the flameproofing of outer garments has been made more practicable. Here again it is easy to think of the value of such a process for civilian use, as in firemen's clothing, draperies, circus tents, and other applications where fire is a hazard.

Another investigation undertaken with military objectives resulted in the development of a new, disk-type, cutting machine, specifically designed for cutting lint cotton into lengths comparable to linters. At the beginning of the war, when our country was faced with a shortage of linters for making cellulose for smokeless powder, it was proposed that lint cotton should be used as a supplementary emergency source of supply. It was found, however, that the equipment used in commercial plants for purifying cotton linters would not handle the long cotton fibres, and that existing types of cutting machines were inadequate for reducing lint cotton to a length comparable to linters at the production rate needed. In view of this deficiency, a high capacity, disk-type cutting

machine was designed involving a new type of feeding device and other innovations. A full-size model was built under a special appropriation from Congress and a successful trial run made through the cooperation of a large purifier of linters. In this run, cotton was cut at the rate of 4-½ tons, or 18 bales per hour. On the basis of the results, the W.P.B. arranged for the construction of an experimental machine designed to cut both lint cotton and first cut linters. Although the contract for construction was awarded only shortly before V-J Day, it was decided to complete construction and testing in the event of future emergency requiring cut cotton or for possible peacetime use in cutting other products.

Other wartime research projects on cotton at the Laboratory have resulted in the development of an improved, semi-elastic cotton bandage fabric, an unlined cotton fire hose to replace similar linen hose, and an acid-resistant cotton thread. All have potentialties for providing more useful products for peacetime use.

As a direct outgrowth of research initiated by another unit of the Bureau of Agricultural and Industrial Chemistry and now carried out in the Southern Regional Research Laboratory, a substantial sweet potato starch industry for the South is about to become a reality.

With the aid of technical information and advice originating in this project, construction of a $7,000,000 sweet potato starch plant was planned by the United States Sugar Corporation at Clewiston, Florida. This plant has been completed, test runs have begun and regular production is imminent. The daily output capacity of the plant is expected to be about 120 tons of finished starch, with an annual production of 50 million pounds, or more. Thus the supply of high-grade domestic root starches for industrial applications will be augmented without dependence on foreign sources; and some 10,000 tons of byproduct pulp per year will be added to the supply of carbohydrate feed for southern livestock enterprise. This single undertaking will afford an outlet for the crop from some 12,000 to 18,000 acres of sweet potatoes annually.

The design and equipment of the plant at Clewiston are based largely on experience acquired in the experimental starch plant at Laurel, Mississippi, and on the results of extensive tests of modern processing units carried out in 1941 under actual factory operating conditions through the joint efforts of the Southern Regional Research Laboratory, the Laurel Starch Plant, equipment manufacturers, and the U. S. Sugar Corporation. Under a cooperative agreement, technical advice and assistance to the Clewiston starch enterprise were intensified in connection with final details of layout, accessory equipment units, installations, adjustments of equipment and process, chemical control procedures, test operations, and related problems.

In the Clewiston factory a basic process for manufacture of sweetpotato starch, developed in the Bureau of Agricultural and Industrial Chemistry, carried to commercial scale in the experimental plant at Laurel, and progressively improved by continued research of the Bureau at the Southern Regional Research Laboratory, has been translated to large volume, highly mechanized production.

The development in the maufacture of starch from sweetpotatoes represented by the work at Clewiston would not now be a reality, if it had not been for continued operation of the Laurel experimental starch plant with technical supervision under the laboratory project during the past five years. As the only source of sweetpotato starch in the United States, the Laurel plant was able, despite handicaps imposed by the war emergency, to contribute over 5,000,000 pounds of first-grade product to the supply of urgently needed root starches for the textile, food, dry battery, and other industries. At the same time, the Laurel plant afforded facilities, not otherwise available, for development and demonstration of improved processing and control equipment and procedures, materially bettering the quality and uniformity of the product.

Other important research projects at the Southern Laboratory include the work on cottonseed and peanuts. The storage of cottonseed has been under investigation in an effort to discover some effective means for reducing the losses and deterio-

ration which occur, especially when moist or off-quality seed must be stored. Four storage tests were conducted in cotton oil mills during the 1944-45 season on a total of 350 tons of seed. Promising results have been obtained, and further large scale work is in progress to confirm these findings.

Interesting results have been obtained from laboratory experimentation on processes for separating cottonseed and peanut oils into fractions or, simply stated, by separating from cottonseed or peanut oils one or more fractions that have greater utility than the original oils. Three different processes have been used for accomplishing this separation: first, crystallization of the natural oils from solvents at low temperatures; second, modification of the natural oils, as by hydrogenation, followed by the low-temperature crystallization step; and third, separation of the mixed fatty acid components from the oil followed by the low-temperature solvent crystallization of these acids. Some of the results obtained so far with these processes are: a winterized salad oil from cottonseed oil in about 1-½ hours instead of 4 ro 5 days as in the present commercial process; a "tailor-made" olive oil substitute from peanut oil for industrial uses such as a lubricant in spinning worsted yarns; an "enrobing" fat, similar to cocoa butter suitable for candy manufacture, pharmaceuticals, etc. Installation of some pilot plant equipment for this project has been made and other equipment, which is in process of procurement and installation, will permit the accumulation of practical operational and cost data on this process and made possible the manufacture of the various new products in sufficient quantity for end use evaluation.

Another interesting project on peanut utilizations is one that was undertaken in an effort to product a satisfactory fiber from peanut potein. It was found that a fiber equal or superior to soybean and casein fibers could be produced from peanut protein. Investigations along this line are continuing at the Southern Laboratory.

Thus far I have mentioned some of the specific new products and developments that have arisen as a result of re-

search at the Southern Regional Laboratory. In so doing, I think it is important to remind you that a research laboratory is very similar to a football team in at least one respect. To make touchdowns a good line and good blocking are needed just as much as a good back to carry the ball. That is, then, to support the specific accomplishments I have noted, a multitude of basic investigations in chemical, physico-chemical, physical, engineering, and other fields, must be carried on. As an example, our Laboratory's basic research program which seeks to define and measure the physical and chemical properties of cotton fiber, and to develop a greater knowledge of relationships of these properties to the characteristics needed in cotton products, contributed extensively to the cotton tire cord project. Likewise the study being made of the characteristics and properties of peanut proteins is fundamental to the development of fibers, adhesives, and other products from peanut meal.

In reconverting to the normal peacetime research program for which the Southern Laboratory was originally set up, the same principles of team work applied in carrying out the wartime projects just described must be observed.

No longer needing to ask themselves "Did this day's work help win the war?" workers at the Southern Laboratory must now ask, "Are we helping the farmer by making it possible to use more agricultural products in industry?"

But in answering this question we must be practical. We must keep our feet on the ground. A beautiful sample product does not quarantee a successful industrial enterprise. The gap between technical possibility and commercial utilization is large. As research scientists and engineers, we have much to do to bridge this gap. We are fully aware that workers in many fields, including agriculture, industry, transportation, labor, economics, sociology and others, will contribute to the final solution. The complexity of the problem is evidenced by the variety of the program of this meeting.

If in making progress, it appears, to use again the analogy of a football team, that someone else is carrying the ball, let

us, in that case, be willing to function as linesmen only. Luckily the number of players on this theoretical team is not limited, nor is there ever need for anyone to "sweat it out" on the bench.

In closing, I quote from Secretary Anderson of the United States Department of Agriculture: "Every time science can find a profitable new industrial use for a farm product, it adds to farm prosperity as well as to industrial opportunity."

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, May 13, 1946

The meeting was called to order by President Lassalle, with Messrs. Cucullu, Lehmann, Mayer, McNiven, Nairne, Steinmayer and Fernandez present. Minutes of the previous meeting were read and accepted.

The auditor's report for 1945 was presented and motion to accept and publish same in the proceedings was adopted.

A letter from the Membership Committee recommending the following applicants for admission to the Society was read and approved:

For Local Member	State Member
W. D. deLaureal	George T. De La Matyr
Mayer Godchaux	Douglas F. Latimer
Frank E. Haight	H. A. Marcoux
James K. Hess	Robert J. Robertson

For Local Junior

Herrick J. Lane, Jr.

A communication and reply to William F. Standke was read by the Secretary.

The secretary's letter addressed to Mr. W. A. Feuillan, Regional Vice-President of the Illuminating Engineering Society, relative to holding an annual meeting in New Orleans, was read.

A letter from Mr. Frank W. Macdonald, Assistant Secretary, relative to a forthcoming vacancy on the State Board of Engineering Examiners was read. It was moved and passed that the Secretary write to the Governor of Louisiana recommending the following in the order named: B. W. Pegues, F. F. Pillet, T. Baker Smith.

A communication from Colonel C. H. Stem addressed to the Governor of Louisiana was read. It was moved and passed that the Board endorse Colonel Stem's recommendation and that said endorsement be forwarded to the Governor and to the Adjutant General.

The resignation of Mr. E. L. Mattison was accepted with regret.

Announcement of the death of H. L. McLean on February 27, 1946 was made and the Secretary was authorized to name a committee to write a memorial in honor of the deceased member.

A letter addressed to Mayor Morrison of New Orleans, requesting that the Louisiana Engineering Society be represented on any future committees concerning civic matters, was read.

It was moved and passed that the following members be dropped for non-payment of dues: Ben Barnes, Robert W. Bringhurst, N. S. Catchings, J. T. Doyle, John P. Letz, Albert B. Nevils, A. F. Rideout, Jess L. Walker.

It was moved and passed that certificates of membership be advanced from $0.75 to $1.00, in order to cover the increased cost of same.

After some discussion of pending legislation on the Engineers' License Law, the matter was referred to the Committee on Legislation.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society, May 13, 1946

The meeting was called to order by President Lassalle, with approximately 100 members and guests present. Minutes of the previous meeting were read and accepted.

Mr. Charles M. Kerr then introduced Colonel C. H. Stem, who addressed the Society briefly on the advisability of having an engineering regiment in the Louisiana National Guard which is now being reorganized. The Secretary read a copy of Colonel Stem's letter addressed to the Governor of the State, and it was announced that the Board of Direction had endorsed the recommendation.

Mr. Frederick H. Fox moved that a committee be appointed to continue working on Colonel Stem's recommendation. The motion was seconded and carried.

Out of town members were introduced.

Mr. Nat L. Marks requested that Mr. Kerr as Chairman of the Legislative Committee report what legislation concerning the Engineers' License Law was in process, and Mr. Kerr complied. Mr. Harold A. Levey proposed that a progress report on pending legislation be made at the June meeting, but the motion was stopped by Mr. Marks with the statement that time was of the utmost importance. After some discussion President Lassalle ruled that further discussion on the matter could not be had at that time, in conformity with the Society's constitution, by-law No. 2, Section 3, which reads:

> "Technical exercises are to begin not more than one-half hour after a meeting is called to order".

President Lassalle then introduced the speaker of the evening, Mr. Calvin Gore of the York Corporation, who delivered a very interesting illustrated lecture on "Quick Freezing Methods and Equipment", which was received with a rising vote of thanks from the audience.

Mr. Lassalle then relinquished the chair to Mr. C. L. Nairne, Vice-President, in order to participate in a discussion of the pending Engineers' Licence Law. A motion was made by Mr. Marks to authorize the Legislative Committee to make careful and accurate study of all legislation introduced into the 1946 state legislature on the question of engineering licensing, and to take such steps as in their judgment will best protect the interest of the engineers of this state. The motion was seconded by Mr. W. B. Mosses and carried unanimously.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of Joint Meeting with the Baton Rouge Section, Louisiana Engineering Society, June 22, 1946

The meeting was held in the Venetian Room of Louisiana State University at Baton Rouge. After a delightful supper, the meeting was called to order by Mr. P. J. Guelfi, President of the Baton Rouge Section and immediately turned over to Mr.W. S. Leake, Vice-President of the Louisiana Engineering Society, who announced that there was no business of the parent society to be brought up. The chair then was returned to Mr. Guelfi, who stated that the customary procedure would be reversed, that the business of the section would follow the technical exercise so that the speaker might leave by plane later in the evening. Mr.

T. Ellis Peak then introduced the speaker, Mr. W. Locher, Electrical Engineer of the Plantation Pipe Company, who presented a very interesting talk on the development and operation of pipe lines. Mr. Guelfi then extended a welcome to out-of-town members and guests.

Mr. N. E. Lant reported the scores of the golf matches held earlier in the day, and it was moved and passed unanimously that a letter of appreciation be written to Louisiana State University for the use of its golf course.

A report was made by Mrs. B. W. Pegues on a meeting held by the ladies during the afternoon for the purpose of organizing a Baton Rouge Chapter of the Woman's Auxiliary, to the Louisiana Engineering Society.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

AUGUST, 1946

"PATRONIZE OUR ADVERTISERS"

INDEX TO ADVERTISERS

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

Vol. XXXII OCTOBER, 1946 NO. 5

CONTENTS

EDITORIAL NOTES AND COMMENTS

The Engineer's Licensing Law.....This important subject is very completely discussed by Mr. Kerr, in the following letter, addressed to the editor.

August 27, 1946

Dear Sir:

Following our recent conversation pertaining to certain activities of the Legislature of our Soverign State during it's 1946 Session, I would like to high-light some of the details relative to the efforts made to amend the one and only law of this State affecting the Professional Engineer.

Reference is, of course, made to the original Act No. 308 of 1908, subsequently amended by Act No. 200 of 1914, and Act 242 of 1920. These Amendments had the support of everyone interested in the raising and maintaining of the Standards of our profession, and up to

this year—1946, no serious attack had been made upon this Act, as it stood prior to this year's assembly of the State Legislature.

It has been the desire of the membership of the various branches of Professional Engineering, as represented by the Local Sections of the National Societies throughout the State, to introduce and have passed a law, similar in scope, at least, to the Act now pertaining to Civil Engineers and Surveyors. Several unsuccessful attempts have been made to enact such a law—covering the Professional Practitioner in all branches of Engineering. At the previous Session of the Legislature the last of several attempts to have such an act passed was defeated. It was decided by the Louisiana Engineering Society, during the early part of this year, that no effort to reintroduce such Legislation would be made at the 1946 Session, but that serious thought would be given to the matter, and an attempt would be made at the next regular Session to introduce a bill that would be acceptable—if possible—to all interests concerned.

The fact developed, however, when this year's session convened, that the question of the introduction of legislation, affecting the practice of Civil Engineering in this State, was very much under consideration, and that a determined effort was being made to amend the Act of some 38 years standing. This movement came as a complete surprise to the Louisiana Section of the American Society of Civil Engineers, and to the Louisiana State Institution of Civil Engineers and Surveyors.

An immediate and thorough investigation of the situation clearly indicated that the principal bills involved were extremely objectionable and if permitted to become a law would deprive the licensed practitioner of the protection and benefits that now are his.

As we are interested more in results than in the campaign waged to obtain them, I will not attempt to give a detailed account of the determined efforts made by my associates in the two organizations mentioned, to defeat this movement. We, of course, were not successful in completely protecting our rights as outlined in the original law and amendments, as we found it expedient to compromise, in order to protect certain interests which were worthy of consideration. I am attaching a copy of House Bill No. 740, which was subsequently passed as Act No. 43 of 1946, which clearly indicates the nature of this compromise. I believe that it is self-explanatory.

In its limitations, it protects the Professional Civil Engineer and Surveyor in private practice, and definitely eliminates—for all time—the grand-father clause as it applies to the Civil Engineer and Surveyor of this State.

I sincerely hope and trust that some concerted action will be undertaken by all interested factions, to prepare and have passed a General Engineering licensing law, so that definite action may be taken at the next regular session of the State Legislature.

I have been rather brief in outlining this most recent legislative campaign. However, as I mentioned before, it is the results that count, and while it was deemed expedient to effect a compromise, it is the judgment of my associates and myself that the very best was made of a difficult situation. I sincerely trust that this will be the opinion formed by everyone who reads the amendment carefully.

Sincerely yours,

Louisiana State Institution of Civil Engineers and Surveyors

CHAS. M. KERR, President

ACT NO. 43

HOUSE BILL NO. 740

BY: MR. DELONY (SUBSTITUTE FOR HOUSE BILL NO. 659 BY MR. DELONY)

AN ACT

To amend and reenact Section 12 of Act 308 of 1908, as embeded and reenacted by Act 200 of 1914 and amended as Section 13 of Act 242 of 1920, being "An Act to regulate the practice of Civil Engineering and Surveying; to create a State Board of Engineering Examiners, and regulate the fees and emoluments thereof; to prevent the practice of the said callings or professions by unauthorized persons; and to provide for the trial and punishment of violators of the provisions of this Act by fine or imprisonment; and to repeal all laws or parts of laws in conflict or inconsistent with this Act."

Section 1. Be it enacted by the Legislature of Louisiana, that Section 12 of Act 308 of 1908, as amended and reenacted by Act 200 of 1914 and amended and reenacted as Section 13 of Act 242 of 1920, be and the same is hereby amended and reenacted to read as follows:

"Section 13. That this Act shall not apply to the Engineering Department of the United States, nor to the Civil Engineers or Surveyors of other States and Territories, when in actual and bona fide consultation with registered Civil Engineers of the State nor to any person employed by the State of Louisiana, or any of its political subdivisions engaged in the practice of Civil Engineering at the time this Act becomes effective; and provided that such employees of the State of Louisiana or its political subdivisions may continue the practice of Civil Engineering for the State of Louisiana or any political subdivisions thereof so long as they are bona fide salaried employees of the State or any of its political subdivisions. The exemption herein granted to present employees of the State of Louisiana and its political subdivisions shall not be forfeited or lost by virtue of a change of employment by the person so holding said exemption from one Department of the State or political subdivisions thereof to another department of the State or political subdivisions thereof to perform kindred work in accordance with his past training and experience as a salaried employee. Provided that nothing in this section shall be construed to permit any person exempted to accept employment by the State of Louisiana or its political subdivisions or by any firm, person or corporation as an engineer on a fee or commission basis. Provided further, that nothing in this Act shall be construed to require any persons exempted as employees of the State of Louisiana or its political subdivisions by the provisions of this Section to hold a certificate of registration as a Civil Engineer when employed on salary as a Civil Engineer by or performing any type of Civil engineering work for the State of Louisiana or its political subdivisions, whether under jurisdiction of the Department of Civil Service or not."

Section 2. That all laws or parts of laws in conflict herewith be and the same are hereby repealed.

N. NORMAN BAUER
Speaker of the House of Representatives

J. E. VERRET
Lieutenant Governor and President of the Senate

J. H. DAVIS
Governor of the State of Louisiana

APPROVED: July 4, 1946.

Those At The Helm. In a few days, the nominating committee of the society will be appointed. They will appreciate receiving suggestions from the membership concerning nominations for officers and board members for the coming year. At this time, the names of the committee are not available, but if your suggestions are sent in address to The Nominating Committee, c/o Prof. J. P. Fernandez, Secretary L. E. S., P. O. Station 20, New Orleans, 15, they will be passed on to the committee. This subject deserves your careful consideration.

Donors of Prizes. The members of the Society are indebted to the following persons and organizations for generous donations of prizes at our annual golf tournament and smoker. The lucky winners are also listed.

PRIZE AWARDS—1946 GOLF TOURNAMENT
JULY 25, 1946

Prize		Donated by	Won by
President's Trophy		Leo Jos. Lassalle	R. A. Steinmayer
Guest—Low Net:			
1st	Dixie Machine Works		Ham Weddle
2nd	Crane Co.		Lt. Cmdr. Fredette
3rd	Dixie Mill Supply Co.		J. H. Holmes
4th	Robert W. Hunt Co.		Ed Duffy
5th	General Electric Co.		V. L. Parker
Members—Low Net:			
1st	W. Horace Wiliams Co.		H. P. Newton
2nd	Equitable Equipment Co.		W. M. Larkin
3rd	E. L. Fithian and R. P. Bassich		R. A. Steinmayer
4th	National Valve Mfg. Co.		C. M. Rogers
5th	A. M. Lockett & Co. Ltd.		K. P. Kammer
6th	Allis-Chalmers Mfg. Co.		C. P. Knost
7th	American Cresote Works		H. M. Blain
8th	Pittsburgh Plate Glass Co.		J. J. Saurage
9th	Flintkote Co.		J. J. Bulliung
10th	Taylor-Seidenbach Co.		R. H. Earl
11th	James M. Todd		Z. W. Bartlett
12th	Pittsburgh Testing Lab.		J. T. O'Brien
13th	R. E. Gosa		D. W. Stewart
14th	F. P. Fisher Eng. Co.		A. C. Hays
15th	H. M. Shilstone		C. O. Lee
16th	United Gas Pipe Line Co.		R. L. Nall
17th	H. W. Fletcher		J. V. Dugan, Jr.
18th	John Riess		C. S. Williamson, Jr.
19th	Jones & Laughlin Corp.		A. W. Betz
20th	Graybar Electric Co.		Dave Moodie
Members—Low Gross:			
1st	Southern States Eqpt. Co.		J. J. Saurage
2nd	Allan J. Harris		C. M. Rogers
3rd	R. P. Farnsworth Co.		C. P. Knost
Horseshoe Pitching—Singles			
1st	N. O. Public Service, Inc.		F. M. Taylor

2nd	Murray-Baker-Frederic	C. J. Kelly
3rd	C. Glenn Cappel	C. A. Burton
4th	Ole K. Olsen	J. F. Vogt
Horseshoe Pitching—Doubles:		
1st	Menge Pump Co.	C. A. Burton
2nd	Geo. J. Glover Co.	Wm. Hardy
3rd	J. K. Woolf	F. J. Hoffman, Jr.
4th	Eckhardt Inspection Co.	P. G. Ingram
Attendance—Guests:		
1st	Westinghouse Electric Co.	Olin Linn
2nd	C. T. Patterson Co.	W. C. Lee
3rd	Shell Oil Co.	Lt. Cmdr. Fredette
4th	Shell Oil Co.	Chester Wooten
5th	Shell Oil Co.	L. J. Adam
Attendance—Members:		
1st	Adler's	R. P. Lockett
2nd	Boh Bros. Construction Co.	R. F. Muller
3rd	Freeport Sulphur Co.	A. C. Hays
4th	Johns-Manville Co.	C. O. Lee
5th	Gulf Engineering Co.	W. M. Larkin
6th	Maritime Electric Co.	A. W. McDougall
7th	Charles P. Knost	K. P. Kammer
8th	Mexico Refractories Co.	R. E. Gosa
9th	Fredrichs Lumber Co.	J. J. Bulliung
10th	A. B. Paterson	C. M. Kerr
11th	Stauss & Haas	L. E. Savage
12th	N. O. Cement Products Co.	R. H. Earl
13th	Lone Star Cement Corp.	R. J. Robertson
14th	Paul F. Jahncke	H. C. Peterson
15th	Anchor Packing Co.	G. W. Hill
16th	Ralph Holt Testing Lab.	Aaron Abramson
17th	John H. Carter Co.	R. A. Steinmayer
18th	Lyman C. Reed	H. J. Lane, Jr.
19th	Allen Hackett	A. W. Durning
20th	Labiche's	J. V. Dugan, Jr.
22nd	G. E. Supply Corp.	A. M. Alexander
21st	Southern Cotton Oil Co.	C. G. Cappel
23rd	La. Power & Light Co.	A. J. Harris

Note: The Sinclair Agency, Inc., donated cash for the purchase of a prize but check was received too late and was returned.

Oh Where, Oh Where? A number of our members have moved and left no address with us. Secretary Fernandez would appreciate your looking over the list, and if you see someone whose address known to you, please drop him a line. He will appreciate your cooperation in this matter. Please write to him at P. O. Station 20 or call him at WAlnut 1971-J.

Fred A Billhardt, Charles Bittenbring, Jr., A. B. Bush, Mark C. Carrigan, Howard E. Edmondson, Lloyd P. Fadrique, J. I. Hebert, Jr., Warren E. Ibele, James P. Kemper, John T. Knight, Jr., Irwin M. Lais, John W. Mullen, Jr., Thomas J. Rennie, John A. Riley.

ENGINEERING BRIEFS

An Electrically Operated Runway. The equivalent of a round motor stator some thirteen hundred feet long has been recently used to launch airplanes. The affair might be visualized as the stator of an induction motor unrolled, forming a flat runway. The moving part, travels over this "stator" carrying the plane with it. A five ton plane can be brought up to a speed of about one hundred seventeen miles per hour in a distance of three hundred forty feet. The launching gear develops about ten thousand horsepower.

Plastics. Two new interesting developments are described in a recent issue of the Bakelite Review. By means of an expanded structural plastic, it is possible to construct a permanent five room house, weighing only about one ton. The usual weight using conventional materials is about forty tons. A fourteen foot canoe, constructed in sections, has been fabricated from cotton impregnated with a synthetic resin. The canoe weighs only sixty-five pounds, draws four inches of water when carrying a load of eight hundred pounds. These units are now in production.

Electronic Wheel Balancer. A device is now available for balancing automobile wheels without removing them from the car. Vibrations caused by both static and dynamic unbalance are picked up by a magnetic unit attached to the axle. The front wheels are rotated by a portable "spinner"; the rear wheels are driven by the engine.

Low Temperatures. Fourteen American laboratories are equipped to handle liquid hydrogen; seven of these can take care of helium, with a boiling point of only 4°F above absolute zero. Two laboratories have equipment, which using the magnetic cooling cycle, can come within .001°F of absolute zero.

PAPERS AND DISCUSSIONS

CHEMICAL SMOKES AND SMOKE SCREENS*

Smokes as a defensive agent have been used by the lower animals both on land and in the sea. These animals discharge a cloud behind which they hide for protection. In a similar manner smoke screens have been used by armed forces for sometime past. However, their more extensive use began with World War I, during which conflict they received the greatest impetus of their development. This was due largely to the fact that trench warfare was the prevailing type, and as this is a static type of military activity, screens of smokes were more effective in shrouding their activities.

The advent of the airplane as an offensive weapon, together with the greater mobility of the armed forces in this last conflict, contributed conspicuously to the superceding of the earlier tactics by the so called "Blitzkrieg" methods. These conditions made it difficult to employ the older methods of screen casting, and as a result their applications were limited to the shrouding of beachhead landings, troop movements, and the screening of industrial targets in certain localities.

Obviously, smoke screens are essentially defensive in nature. The only offensive aspect of screens are the nuisance value to the enemy through the inhibiting of the progress of their forces, and the tendency to effect some confusion in their actions. In some cases in the first World War smoke screens which carried some odors were also used to develop in the enemy the fear of possible gas attack. The result was less effective progress of the enemy through the handicap of wearing gas masks.

Types Used

While the major portion of screens have been used as a means of hiding, screens in the form of puffs of smoke have

---

Presented before the regular meeting of the Society on July 8, 1946 by Harold A. Levey,, member of the Society and consulting chemical engineer.

also been used for signal purposes. With the use of airplanes as a basic element of all forms of warfare in this past war, smoke screens were substantially of two types, i. e., vertical sheets of smoke usually being termed "curtains", while smoke screens casting a sheet in horizontal planes were usually termed "blankets". Obviously, "curtains" were invariably used as a sheet between two armed forces in conflict, while "blanket" screens were used to inhibit the visibility of troop activities.

The permanence of useful longevity of smoke screens are naturally functions of the nature of particles which prevent visibility, while their permanence of location is a function of winds and their rate of travel. Smoke screens, so called, are essentially of two compositions, i.e., a dispersion of solid particles in air, which are true smokes; and dispersions of minute liquid particles in an atmosphere. If such liquids are converted into the gaseous state, there usually results a mixture of the two gases resulting in no opacity or cloudiness. In nature we know fogs and mists, both of which are dispersions of liquid water particles in air. We observe complete visibility and transpareney of the atmosphere as soon as the water particles are converted into the gaseous phase. The term "fumes" usually refers to minute particles of products other than water, and might be either liquids or solids dispersed in the atmosphere. Many of the products of toxic gas warfare included the use of fumes of these types of products.

Forms of Smokes

Initially, military smokes were formed by burning oils with restricted amounts of air resulting in black smokes. Oils and moist straw or other substances burned with a limited amount of air, resulted in incomplete combusion and smoke. In the first case the so-called smudge pots emitted varying volumes of black smoke, which was composed of fine particles of carbon dispersed in the atmosphere, while the second form produced gray smokes made up of carbon particles plus water vapor from the moisture in the straw. If the relative humidity was high, both of these types of smokes exhibited a fair degree of permanence, while at low relative humidities the second type

promptly changed from gray to black due to the evaporation of the water particles into the gaseous phase. To cast smoke screens over extensive areas such as the obliterating of complete communities, or even nominally large areas such as docks, industrial plants, and the like, it obviously becomes necessary to use some medium for the formation of screens low in cost. The screen should be opaque and reasonably permanent. It soon became apparent that petroleum products closely approximates these conditions both when burned for the formation of black smokes or when vaporized forming white smokes. Crude petroleum has been and is still used by the various navies to form smoke screens at sea by burning with restricted air forming black clouds of smoke. However, for the formation of white smokes only the lubricating oil fractions serve effectively. The lower fractions have too high a vapor pressure and evaporate readily forming transparent gas mixtures with the atmosphere. The screen-forming properties of liburicating oils have long been observed in view of their use with internal combustion engines when they were discharged as a vapor through the exhaust pipes of these engines. Chemical Warfare Service, Marine Corps, and Army Engineers at Fort Belvoir, Va., were actively engaged in studying the utility of lubricating oil vapor as a screen forming medium. While the obscuring power or opacity of oil vapor is substantially less than phosphorous pentoxide, titanium tetrachloride, zinc and hexachlorethane, nevertheless on a cost basis it is more affective. Further, it is practically non-toxic.

Smoke Compositions

Lubricating oil vapor alone, however, does not produce wholly satisfactory results. Oil vapor smokes have to be formed by both an atomizing device and a considerable degree of heat, and these heated gases and vapors tend to rise. As the smoke cloud rises, its effectiveness is gradually lost as a "Curtain screen," and its obscuring power as a "blanket screen." Therefore its value is doubly improved when ammonium chloride is added to the oil as a fine divided powder. When the source of heat vaporizes the oil, the ammonium chloride becomes divided into small particles and results in giving greater

opacity to the screen as well as to contribute somewhat to its average density making it hold closer to the ground longer. In order to prevent the particles of ammonium chloride from settling out too rapidly and packing into a dense mass at the bottom of the shipping drums, sodium or aluminum stearate is dissolved in the oil to increase its viscosity to the desired degree.

Colored Smokes

As indicated above the smokes described are either black smokes made up of carbon particles or white smokes made up of oil globules or vapors or water or steam fogs. Under great difficulty, however, gray smokes could be formed by mixing or generating these types together. Early in World War II the need for smoke screens to serve an additional purpose other than for signally and obscuring, viz; for camouflage. It soon became apparent that from an airplane even though the armed forces of the enemy may be completely obscured by an effective smoke or oil vapor screen, such a blanket screen was either snow white or jet black and thus stood out boldly to the observers above, who may not be able to identify any troop movements. Such areas promptly became active targets for bombs or strafing shells. The smoke screen, however, made anti-aircraft fire ineffective from such an area. These blanketing screens therefore, should have a color value closely simulating the environment. This meant foliage green smokes for use on Guadalcanal and tan smokes for the shores and sands of North Africa. Accordingly, intensive efforts were directed toward means for tinting or coloring these white smokes with suitable agents. This end was successfully achieved under the proper conditions by the use of both dyes and pigments. One to three pounds of suitable dye-stuff were dissolved in each gallon of oil vapor smoke composition as previously described. For tints the smaller amount of dyes were used, while for the deeper colored smokes three or more pounds of dyes were incorporated in each gallon. The dyestuff need not be soluble in the oil, however, if it is soluble the problem of the settling out of the days is removed and a more uniform smoke is produced. Dyes belonging to the anthraquinone group serve effectively.

The important requirement of the dyestuff is that it must vaporize or become volatile at the temperatures at which the oil smoke screen is formed, resulting in a smoke screen similar to the designated color of the dye. The vaporization of the dye alone does not produce a satisfactory smoke. It has been found in practise that the best procedure is to color a white smoke. This yields a composition with the proper working characteristics which can be successfully handled and cast into effective screens with available smoke generating and casting equipment and at a very much lower cost than a smoke made up of dyestuffs only.

Multi-Fluid Smoke Compositions

When pigments instead of dyes are used to form colored smokes it has been found necessary to use two or more separate fluids to effect the desired results. For example, to produce a tan smoke, the paint pigment known as raw sienna, is used as the coloring agent. Other pigments of this general type may also be used, such as the ochres, umbers, both raw and burnt. A special smoke generator is used to form and cast the smoke and is described in detail later.

In order to form smokes from pigments automatically and continuously, it has been found to be preferable to suspend these pigments in a suitable volatile liquid vehicle. While any volatile liquid may be used, it is preferable to use one of a medium boiling point. If a liquid of low boiling point, i.e. less than 100°C is used, the fluid on coming close to the smoke generator, will be heated to the vaporization point causing a gas pocket in the line. This interrupts the continuity of flow. If the boiling point is above 200°C, the colored pigment will dry out too slowly and will not become dispersed in the hot gases sufficiently rapidly. A liquid like water would be unsuited because of the large amount of heat energy required to evaporate the water, due to its high latent heat of evaporation. The liquid is admitted into the smoke generator at a point some distance away from the point where the oil vapor smoke fluid is admitted. These two fluids cannot be mixed before casting into a smoke. If they are, no matter what the color of the pigment or how much is used, a white smoke, equivalent

to the smoke formed from oil alone, results. It appears that, when the two fluids are initially mixed the colored pigments are wetted and when the mixture is vaporized each pigment particle is surrounded with a film of oil. The structure is similar to that of a city fog wherein a film of water builds up around a dust particle. It therefore becomes apparent that the colored pigments surrounded by a thin film of oil produces a smoke screen of the same color as the oil smoke screen without the added coloring agents. All types of oil-like nonvolatile products regardless of color produce white smoke screens. If a large amount of lamp black or carbon black is mixed with lubricating oil and the mixture cast into a smoke screen, it will be white, the same as that formed by the lubricating oil alone. If a solution of asphaltum, bitumen or pitch in a solvent such as coal-tar naphtha to make it workable, is then cast into a smoke screen; it also will be white.

Smoke Generating Equipment

For the formation of small volumes of smoke for screening limited areas for short periods of time; the use of cans of grenade types may be used. These types are made up of a combustible material like a hydrocarbon or sulfur, a supporter of combustion like a supplier of oxygen such as potassium chlorate, and an ammonium salt like ammonium chloride. They burn for a short time forming a local smoke cloud. However, this paper is concerned with the continuous generation of large volumes of smoke. To attain this end, four essentials are required for the formation of smoke screens using the oil base compositions previously described. These conditions include: first, a satisfactory and adequate source of heat to vaporize the oil; second, an atomizing nozzle to divide the oil into small particles and thus accelerate vaporization; third, a means for rapidly moving the vapors to and from the heat source, such as a pump or blower; and fourth, an atmosphere free from a supporter of combustion such as the oxygen in air; otherwise at the temperatures of vaporization and the concentration or ratio of oil vapor to air used, explosion or combustion would take place.

It so happens that the exhaust manifold of an internal combustion engine closely approximates these conditions. Accordingly, a standard automobile or boat engine is suitably mounted to generate and cast these smoke screens. The oil composition is carried in a storage tank usually above the engine from which it is drawn or pumped under suitable pressure which depends upon the viscosity of the oil mixture, the size of atomizing nozzle and the rate of smoke generation; the pressure varying between five and 50 lbs. per square inch.

The admitting or atomizing nozzle is fitted into the exhaust manifold at a point a few inches beyond the exhaust ports. The atomizing jet must be swept by the burnt moving gases, both to facilitate mixing and to be adequately supplied with heat from these gases. Dead pockets should be avoided. The entire exhaust system should be amply insulated to avoid loss of heat by conducting and radiation. In addition, the inner walls of the exhaust piping should be equipped with baffles or vanes causing the gases to travel in a helical path, thus effecting better dispersion of the vapor globules in the exhaust gases. The tail pipe of the exhaust system is then led vertically and on one surface there is milled a long slot, or a series of holes through which the gases are discharged in to the air and forming a "smoke curtain" eight to twenty feet high. If there is a slight wind the smoke generator is placed in such a position as to have the wind carry the smoke to form the curtain in the in the desired location. On the other hand, the tail pipe may be fitted with a telescoping vertical pipe, then a 90°elbow attached to a supplemental tail pipe extension running in a horizontal direction. This extention pipe is drilled with a row of holes or equipped with a slot the length of the pipe, and when properly placed to cast a "blanket smoke screen."

These smoke generators and accessory equipment are mounted on a frame with wheels like a motor car and the assembly is pulled around by a jeep or manually for short distances. A Ford Model A standard four cylinder engine can vaporize from 5 to 20 gallons of oil smoke forming composition per hour, and other sizes of engines with capacities in propor-

tion to their horsepower. About eight of these units are required to cast and maintain a blanket smoke screen over a medium size dry dock in a ship yard.

Another type of smoke generator developed by the Standard Oil Company and using the same type of oil base smoke forming compounds, consists of a steam boiler, the steam from which passes through a Venturi nozzle. In the throat of the nozzle is admitted the smoke forming composition which is mixed with the steam and then discharged into the atmosphere. This is a more efficient method of smoke generation than the gasoline engine type and of much greater capacity, per unit. In addition the cost of casting the smoke is considerably less. Further, the steam admitted contributes to the opacity. The steam fog is, however, comparatively short lived, except when the relative humidity is very high.

Evaluation of Smokes

The salient aspects of smokes are first, its opacity or obscuring power, second, its permanence, then low toxicity and cost. Its obscuring power is usually appraised as the degree of opacity required to obscure a 40 Watt Mazda lamp through a smoke screen one foot thick. The number of cubic feet yielded per pound of material is usually indicated to give comparative values of the obscuring power of a given smoke forming compound. A photo-electric cell assembly has also been developed for measuring obscuring power. Glass plates are placed opposite each other on the sides of a metallic duct, a section of which is a square with one foot sides. The quantity or volume of gas is measured with Pitot tubes, while the obscuring power is measured and charted by means of the amount of light which impinges on the photo-electric cell.

The oil smoke compound described above can be cast in the form of a blanket screen to shroud a square mile for about $200 per hour with an air movement of five miles per hour or less. Using the steam smoke generator type an equivalent screen can be cast for about $160 per square mile per hour.

Post War Applications

In the motion picture industry these smoke forming compounds find application in the formation of fogs for certain atmospheric conditions which are to be reproduced. There have also been displays of white smoke screens in parks and playhouses on which have been projected multicolored and changing flood lights producing spectacular and fantastic scenic effects.

The most intriguing aspects of these developments are, however, the single fluid colored smokes. They appear to be the complete complement of colored pyrotechnic lights. Specifically thse colored lights are only faintly visible in bright daylight while these colored smokes are most visible in bright sunlight. Conversely, colored lights are most visible in the dark of night when the colored smokes are completely invisible. We have, however, cast smoke screens which were visible at night due to the inclusion of fluorescent or phosphorescent pigments such as the polysulfides of cadmium, zinc and calcium. Accordingly, the motion picture industry finds uses for these colored smokes for certain glamorous displays and special color effects recorded in technicolor.

These colored smokes have also formed use to increase the visability of life boats and rafts and to attract aircraft to come to their rescue. This condition is effected through the use of a small container which is thrown on the water after a small cap is removed, exposing a wick which brings water in contact with metallic potassium. This ignites or lights a fuse which in turn ignites a combustible material intimately mixed with an active oxygen releasing material. The heat generated vaporizes the volatile dyestuff forming the colored smoke which is discharged in a steady stream through an orifice which is opened by the internal pressure developed. The unit is designed to operate from three to five minutes and covers an area of several thousand square feet, making the location of a raft visible to aircraft many miles away and at altitudes of many thousands of feet.

A conspicuous post war application of smoke screens has been their use as an insulating blanket and protective cover-

ing for sugar cane of the types which are cut and harvested during the later part of the season. As some of these canes are not cut until the early part of December and as such growths are in latitudes approximating 150 miles north of the Gulf Shore, temperatures below freezing frequently destroy such crops.

As a protection against such conditions, it has been established that if a smoke screen made up of properly atomized petroleum oil bases and formulated to have a density to maintain a position fairly close to the ground, that adequate protection against freezing under these conditions have prevailed. The smoke is cast from a nozzle which develops a blanket or smoke screen in a horizontal plane immediately above the tops of the cane stalks. Most of these screens are discharged by means of a steam jet and venturi nozzle as described previously, which while it costs less per 100 square feet covered, is not quite as effective an insulator as the screen cast by the gasoline engines as previously described. The measurements of insulating values indicate that the protective nature of such screens are limited to approximately a temperature differential not exceeding three degrees Fahr. However, as the temperatures seldom fall less than his amount, many valuable crops have been saved through this means. A striking aspect of this application is that the salient property of military smokes are based upon their opacity, while these smokes utilize their resistance to heat transmission.

REFERENCES

"Chemicals in War". A. M. Prentiss. McGraw-Hill Book Co.

"Production of Colored Smokes". A. B. Ray. Ind. Eng. Chem. 18, 10 (1926).

"Colored Signal Smoke". Tech. Command of the Chem. War Service. Chem. and Eng. News. 22, 1990 (1944).

"Colored Signal Smokes". W. F. Kieffer and J. M. Resko. J. Chem. Educ. 22, 385 (1945). U. S. and Foreign Patent Literature.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, July 8, 1946

The meeting was called to order by President Lassalle, with Messrs. Cucullu, Leake, Mayer, McNiven, Nairne and Fernandez present. Minutes of the previous meeting were read and accepted. The Treasurer's semi-annual report was examined and accepted.

A statement of expenses incident to the Eleventh Annual Meeting was read, and the Secretary was instructed to write to Mr. M. C. Abrahm, General Chairman, expressing additional commendations of the Board for the success of the meeting. It was noted that the deficit for this meeting was the lowest in the history of the Society.

A report of the Library Committee was read and the Secretary was instructed to ask the committee to investigate the possibility of making an arrangement with the Tulane University Library.

A letter from the Engineers' Council for Professional Development was read, and the Secretary was instructed to contact the Council with regard to the possibility of sending a speaker to address the Society's Twelfth Annual Meeting.

A letter from the Membership Committee requesting a ruling on whether or not Junior Members are authorized to endorse applicants for membership was discussed, and it was decided that, since there is nothing in the constitution to restrict junior members from endorsing candidates, such endorsements will be accepted.

The resignation of Mr. Ira L. Thomas, Jr., was accepted with regret.

A committee consisting of Mr. H. L. Lehmann, Chairman; W. P. Wallace and Arnold C. Matthies, was appointed to prepare obituaries of Messrs. Hamilton Johnson and M. C. Schwartz, recently deceased members.

It was moved and passed that back dues be waived for all members in military service for the period in which their addresses have been unknown.

It was moved by Mr. McNiven, seconded by Mr. Mayer, that Mr. R. Mallard Seago be appointed General Chairman for the Twelfth Annual Meeting.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society, July 8, 1946

The meeting was called to order by President Lassalle, with approximately 60 members and guests present. Reading of minutes of the previous meeting was dispensed with.

In the absence of Mr. Charles M. Kerr, Chairman of the Legislative Committee, President Lassalle read a report on the committee's activities and the status of the engineering license laws recently introduced in the State of Legislature.

Mr. W. H. Scales deplored the lack of participation by engineers in civic affairs. President Lassalle read a letter received from the Engineers' Council for Professional Development, and informed the members present that the Society had written to Mayor Morrison of New Orleans offering its services in civic matters.

The discussion drifted to the subject of publicity, and finally to re-employment for veterans, and it was suggested that the Employment Committee advertise itself at the armed forces separation centers.

Mr. James S. Janssen, Chairman of the Publicity Committee, gave a report on the activities of his committee.

President Lassalle then introduced the speaker of the evening, Mr. Harold A. Levey, Chemical Engineering Consultant of New Orleans, who delivered a most instructive lecture on "Chemical Smokes and Smoke Screens", followed by a technicolor picture on the subject.

Following the lecture is was moved by Mr. Nairne, seconded by Mr. Babin, that the speaker be given a rising vote of thanks, which promptly was executed.

President Lassalle extended a welcome to the unusually large number of young men present, following which the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Meeting of the Board of Direction, August 12, 1946

The meeting was called to order by President Lassalle, with Messrs. Cucullu, Lehmann, Mayer, McNiven, Nairne and Fernandez present. Minutes of the previous meeting were read and accepted. It was decided that a copy of the uncorrected minutes be mailed to each member of the board following each meeting.

A report of Mr. R. M. Seago, Chairman of the Annual Outing Prize Committee, was read. It was moved and passed that a list of donors and prize awards made at the outing be published in the Society's Proceedings.

The Secretary was instructed to invite Mr. Seago, as General Chairman of the 1947 Annual Meeting, to be present at the next meeting of the board to report upon the progress of plans for the meeting.

President Lassalle read a letter addressed to the Governor of Louisiana by Mr. B. W. Pegues concerning his non-acceptance of reappointment to the State Board of Engineering Examiners.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Joint Meeting of the Louisiana Engineering Society With the Society of American Military Engineers, August 12, 1946

The meeting was called to order by President Lassalle, with approximately 140 members and guests present. Reading of the minutes of the previous meeting was dispensed with.

The Secretary reported on the activities of the Publicity Committee in the interest of reemployment of veterans in the engineering field.

It was announced that the following books were received as donations to the library:

"Geological Investigation, Alluvial Valley, Lower Mississippi River", given by the President of the Mississippi River Commission, Vicksburg, Miss.

"Shell—Soldier and Civilian", given by Shell Oil Company, Norco, La.

President Lassalle then introduced Mr. O. J. Baker, Director of the Low Cost Housing Project, Engineering Experiment Station, Louisiana State University.

The meeting then was turned over to President Charles M. Kerr of the Society of American Military Engineers, who, after completion of their business, introduced Colonel C. T. Newton, Director of the U. S. Waterways Experiment Station at Vicksburg, Mississippi, who spoke on "Engineering Services of the U. S. Waterways Experiment Station".

The chair then was return to President Lassalle, who accepted the motion of Mr. C. L. Nairne for a rising vote of thanks to the speaker, which was executed promptly.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

September 4, 1946

Lean L. J. Lassalle, Pres.,
Louisiana Engineering Society,
College of Engineering,
Louisiana State University,
Baton Rouge, La.

Dear Dean Lassalle:

The Board has asked me to transmit to you the following opinions which were received from the Louisiana State Department of Justice concerning the practice of civil engineering and surveying in Louisiana:

1. "A New York Corporation is engaged in manufacturing in this State and incidental to its operations, in the past, has acquired a substantial amount of land. As a part of its staff, in connection with its manufacturing and other operations, it has an employee who has had some engineering and surveying experience but is not a public surveyor and does not hold himself out as such; but as part of his employment, he makes maps and surveys of the plant and its properties, which belong to the corporation, and the corporation desires to sell some tracts of land which this employee has surveyed and desires to refer to the plats made and signed by that individual, to be referred to in the Act as Corporation Map No..... It is desired to know whether there is a violation of the law by the corporation in using such plats or maps and incidentally whether there is any violation of the law by the said employee.

"Section 10 of Act 308 of 1908, as amended by Acts 200 of 1914 and 242 of 1920 (Dart's Statues, Volume 6, Sec. 9553), reads as follows:

> 'Any person who shall practice or attempt to practice the profession of a Civil Engineer or Surveyor, either as an individual, employee or as a member of a Company or Corporation domiciled in or out of this State, without having complied with the provisions of this Act, shall be fined not less than $100.00, nor more than $500.00, or shall be imprisoned not less than 30 nor more than 90 days for each offense, by a Court of competent jurisdiction.'

"It is therefore our opinion that the employee of the Corporation in question is guilty of a violation of the law above quoted, and subject to the penalties therein provided, and should be so advised.

"We have found no law that penalizes the Corporation for the use of the surveys mentioned in the letter, but if the law is properly

and strictly enforced it would not be possible for a corporation to have such surveys made by an employee who has not been licensed and issued a permit, after proper examination, by your Board.''

2. ''In answer to the inquiry made by you, and supplementing the opinion rendered your Board, under date of January 28, 1946, I beg to advise that the interpretation which you state your Board has placed upon the opinion just referred to, to the effect that any one practicing 'structural engineering' in this State without having first obtained a license as Civil Engineer, would be practicing illegally and subject to the penalties provided for by Act No. 308 of 1908 (creating your Board), as amended by Acts 204 of 1914 and 242 of 1920, is correct.''

3. ''You ask whether a Corporation could practice surveying in Louisiana.

   ''The Legislative enactments creating your Board and fixing your authority, which we cite din the opinion furnished you under date of January 28, 1946, provides that no one can practice the profession of surveying and/or civil engineering without having first obtained a permit or license from your Board after the examination, provided for in said Acts.

   ''Since corporations cannot take such examinations and can act only through their officers or directors, it is therefore the opinion of this Department that corporations cannot take such examinations as are contemplated and required by the Acts of the Legislature. Therefore, cannot obtain licenses or permits, and hence are not permitted to practice the profession of surveying and/or civil engineering in this State.''

The Board will appreciate it very much if the Louisiana Engineering Society could arrange to have these opinions read at the next meeting and also if they could be published in the Proceedings of the Louisiana Engineering Society.

Very truly yours,
F. W. MACDONALD

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

Vol. XXXII DECEMBER, 1946 No. 6

CONTENTS

EDITORIAL NOTES AND COMMENTS

Straws in the Wind? The following appeared in the November issue of "Civil Engineering":

"Professional Bargaining Units. A convention of representatives of seven collective bargaining groups met at the Hotel Whitcom in San Francisco on October 5, 6, 7 and organized a National Professional Association of Engineers, Architects and Scientists. Collective bargaining groups represented at the convention have a combined membership of 3,000 professional engineers, industrial scientists and similar employees . . ."

The Annual Meeting. In January the three day annual meeting will again be held. This year, another industrial exhibit is planned. The General Chairman is Robert M. Seago; General Vice Chairman, John K. Mayer; Secretary, John P. Fernandez; President, Lassalle Chairman Ex-officio.

Committee chairmen and vice chairmen are as follows: Banquet Committee: Allen W. Betz, C. Perrilliat; Contact with Auxiliary, John L. Porter, Lyman C. Reed; Industrial Plant Inspection, Gerald C. Kerr, J. Y. Taylor; Finance Committee, Norman H. Ross, N. P. Kammer; Reception Committee, C. Glen Cappel, J. M. Todd; Program Committee, W. H. Johnson, W. S. Nelson; Publicity Committee, W. J. Amoss, L. E. Savage; Technical Papers Committee: J. S. Janssen, A. W. Durning; Recreation Committee, Allan J. Harris, William Hardy; Registration Committee, J. J. Bulliung, Sydney Ellis, Jr.; Student Conference Committee, H. J. Molaison, W. P. Wallace; Technical Exhibits Committee, L. V. Cressy, I. H. Purinton.

The efforts of the above committees will result in an effective and interesting convention, which is of growing importance to the Society, and the community.

One of the most important phases of the annual meeting is the bringing together of the local membership of many national organizations. The day may yet come when we will have a single unified national engineering group, one hundred thousand strong!

OBITUARY OF
HAMILTON JOHNSON

The sudden death on June 15, 1946 of Hamilton Johnson, Professor Emeritus of Mechanical Engineering at the Louisiana State University, has brought a keen sense of loss to his large circle of friends.

Death came at Nashville, Tennessee where he had gone to attend a 50th class reunion at Vandervilt University.

Professor Johnson was born in Mississippi and educated at Rollins College, Winter Park, Florida and at Vanderbilt University at Nashville, Tennessee. He held the B. E. and M. E. degrees from Vanderbilt. He was a member of the American Association of University Professors, American Society of Mechanical Engineers, Louisiana Academy of Science, Louisiana Engineering Society, National Geographic Society, Phi Beta Kappa, Phi Kappa Phi, and was First honor man at both Rollins and Vanderbilt.

Following graduation he spent twenty-five years in various branches of engineering as a consultant and construction engineer. He came to Baton Rouge in 1923 as engineer to the architect, T. C. Link, who was employed to design the new L. S. U. plant. When the buildings on the new campus were practically complete, Mr. Johnson was invited by the Dean of the College of Engineering to take the chair of mechanical engineering at the University. He was retired by L. S. U. in 1942 as Professor Emeritus of Mechanical Engineering.

Professor Johnson, who was 74, had contributed in many ways to the engineering profession as inventor, engineer, and educator. He was an outstanding scholar. His influence for good will reach on through the years and his large circle of friends will remember him as a gentleman of the old school whose life was exemplified by the "Golden Rule" in principle and practice and who literally inspired those who came in contact with him.

Professor Johnson, as he was affectionately called, was a member of the Louisiana Engineering Society since 1937, a past Vice-President of the Baton Rouge Section, a position he served very well.

By his death we have lost a beloved associate whose outstanding character as an engineer and educator reflected high honor upon our profession and whose memory is a fitting inspiration for all time.

It is fitting that the Louisiana Engineering Society pay tribute to our late fellow member, Mr. Hamilton Johnson, by adopting the following resolution:

BE IT RESOLVED, That the Louisiana Engineering Society adopt resolution embodying the facts as expressed and,

BE IT FURTHER RESOLVED, that this resolution be spread upon the minutes of the Society and published in its proceedings and that copies be sent to his two daughters, Mrs. Roger Richardson, the former Cary Johnson, and Miss Elizabeth Johnson, and his son, Mr. Hamilton Johnson, Jr., as an expression of our sympathy and heartfelt condolence.

H. L. Lehmann, Chairman
W. P. Wallace
Arnold C. Matthies

OBITUARY OF
MORRIS C. SCHWARTZ

The untimely death, after a brief illness, of Morris C. Schwartz, Assistant Professor of Chemical Engineering and Assistant Director of the Engineering Experiment Station at the Louisiana State University, deprived the Society of one of its ablest members and brought a keen sense of loss to his colleagues and many friends.

Dr. Schwartz came to Baton Rouge in 1931 as a research chemist for the Stone and Webster Corporation, later becoming Director of Power Plant Chemical Research for Gulf States Utilities. In 1939 he began his affiliation with the University as a part-time Research Associate in water technology, at the same time acting as a consultant in feed water problems in the Baton Rouge industrial area, and in 1941 became Assistant Professor of Chemical Engineering. In 1944, he was appointed Assistant Director of the Engineering Experiment Station in addition to his other duties and served in this capacity until his death. In November, 1945, he was promoted to Associate Professor of Chemical Engineering, effective July 1, 1946.

Dr. Schwartz held the degree of Bachelor of Science in Chemistry and Doctor of Philosophy from New York University and was a member of the following professional societies: American Chemical Society, American Institute of Chemical Engineers, Louisiana Academy of Sciences, Louisiana Conference on Water Supply and Sewerage, Louisiana Engineering Society, Society for the Promotion of Engineering Education, Alpha Chi Sigma, Phi Lambda Upsilon and Sigma Xi.

Because of his research activities and leadership in his field, Dr. Schwartz was appointed by a Committee for "Revision of Standard Methods of Analysis of Water and Sewage," to modernize the sections dealing with physical and chemical analysis of water. In addition to this assignment he also served on The Boiler Feedwater Studies Committee, which was jointly sponsored by the American Society for Testing Materials, Committee on Industrial Uses of Water, the Edison Electric Institute Power Station Chemistry Committee, and the American Water Works Association Committee on Testing Zeolites.

The products of Dr. Schwartz's research activities in water chemistry were well known, particularly his colorimetric and photometric methods for the determination of silica and a technique for dissolved oxygen. He was also interested in a method of demineralization by means of synthetic resins, in addition to methods for testing purity of steam and removal of silica from feed water. He had also compiled several extensive bibliographies.

In addition to his regular activities, Dr. Schwartz gave freely of his time to the Annual Short Course for Superintendents and Operators of Water and Sewerage Plants, held annually at Louisiana State University, by appearing on the programs and editing the Proceedings.

It is with these things in mind and the esteem with which he was held by those who knew him intimately, that your committee feels that the Louisiana Engineering Society should honor the memory of Morris C. Schwartz by adopting the following resolution:

BE IT RESOLVED, That in behalf of the entire membership of the Louisiana Engineering Society this memorial be adopted in tribute to the memory of our late fellow member Morris C. Schwartz.

BE IT RESOLVED, That this memorial be spread upon the minutes of the Society, and a copy be sent to his wife, mother and brothers, with an expression of sympathy and heartfelt condolence.

L. J. Lassalle, Chairman
W. P. Wallace
W. A. Wintz

On Our Front Cover is pictured the plant of the Gaylord Container Corporation at Bogalusa, Louisiana. This large industrial plant provides income not only to the plant personnel, but assists land owners in the surrounding territory through the purchases of pulp wood. Several members of the organization are members of the Louisiana Engineering Society.

ENGINEERING BRIEFS

Gas Turbine Developments. Recently an experimental model of a combination Diesel engine-gas turbine has been constructed. The unit consists of a compressor, and an opposed piston Diesel which exhausts into a gas turbine. Thus the conventional combustion chamber is replaced by a power producing engine. This combination is a step toward realization of higher efficiencies in the gas turbine cycle because of higher pressures.

Air Entraining Agents for Concrete. Recent tests have shown that spheroids of air in concrete (sizes of spheroids vary from 30 to 100 sieve size) result in less water being required in the mixing process, less tendency to rupture due to formation of ice crystals, and longer pavement wear when de-icing salts are used.

Minute Temperature Changes are detected by means of semiconductors of the oxide class. These products, developed by Bell Telephone Laboratories, have electrical resistance so sensitive to temperature changes that in some cases a variation of one millionth of a degree can be detected.

Refrigeration is being used in certain surgical cases to reduce both shock and infection. Amputations are particularly amenable to this form of treatment. The tissues in some instances are cooled down to about 40°F, which eliminates the sensation of pain, and retards poison and infections. It is never desirable to actually freeze the tissue.

Fractional Horsepower Motor Standardization is being planned by the National Electrical Manufacturer's Association. Such a move would greatly simplify the application of motors to machines, and would mean cheaper and more reliable replacement units. The effort is directed to accurate, complete and standardized name plate ratings.

International Aviation brings problems of setting up rules for standard navigation equipment for air planes. Such standardi-

zation of equipment would lessen the hazards of planes in transcontinental flights. A world wide committee is now at work on this problem.

Batteries for Electric Spot Welding. Spot welding may be costly because of power demand, or peaks. A battery operated welding unit has recently become available. In this equipment a three phase charger may be used. The charger draws a comparatively small current and has a power factor of about 85%, against 40% for the conventional spot welder. Batteries have a capacity of as many as 20,000 welds before recharging is necessary.

Radiant Heating. What is perhaps the largest radiant heating job in the U.S. is being installed in a manufacturing plant at Kaukau, Ill. The area heated totals 400,000 square feet. The heating units consist of pipe imbedded in the concrete floor. Offices have additional pipes placed in the ceiling. Water at a temperature of 140°F is circulated; it is estimated that the maximum floor temperature will be about 85°F.

PAPERS AND DISCUSSIONS

GAS PROCESSING PROBLEMS*

The Gas Processes Division of The Girdler Corportaion, Louisville, Kentucky is an engineering organization engaged in the design and construction of plants for the separation of acidic gases from other gases and liquids by the Girbotol Process, as well as gas dehydration plants and hydrogen manufacturing plants.

This paper will present descriptions and flow diagrams of some of these plants.

The Girbotol Process for the separation of acidic gases such as hydrogen sulfide and carbon dioxide from other gases and liquids utilizes amines for this purpose. The amines react with the acidic gases to form salts. The absorbed acid gases are then separated from the amine solutions by heating, which reactivates the solutions for further use. This reactivation is made possible by the fact that amine salts of weak acids dissociate at moderately elevated temperatures so that the amines may be separated from the acid gases which they have absorbed at lower temperatures.

This process like so many others, was developed in an attempt to solve a specific plant operation problem. In 1928 The Helium Company, one of the units which later became The Girdler Corporation, was engaged in the recovery of helium from natural gas. They obtained a supply of natural gas near Thatcher, Colorado, which contained 8 per cent of helium, but which also contained 15 per cent of carbon dioxide. It was necessary to remove this carbon dioxide from the natural gas before it could be liquefied. R. R. Bottoms of The Helium Company discovered that amines, which are alkaline substances derived from ammonia, would react with carbon dioxide to form salts which could be decomposed on boiling a solution of the amine salt to separate the carbon dioxide and regenerate

* Presented at the regular meeting of the Society, November 18, 1946 by R. M. Reed, Chief Chemical Engineer, Gas Process Division, The Girdler Corporation.

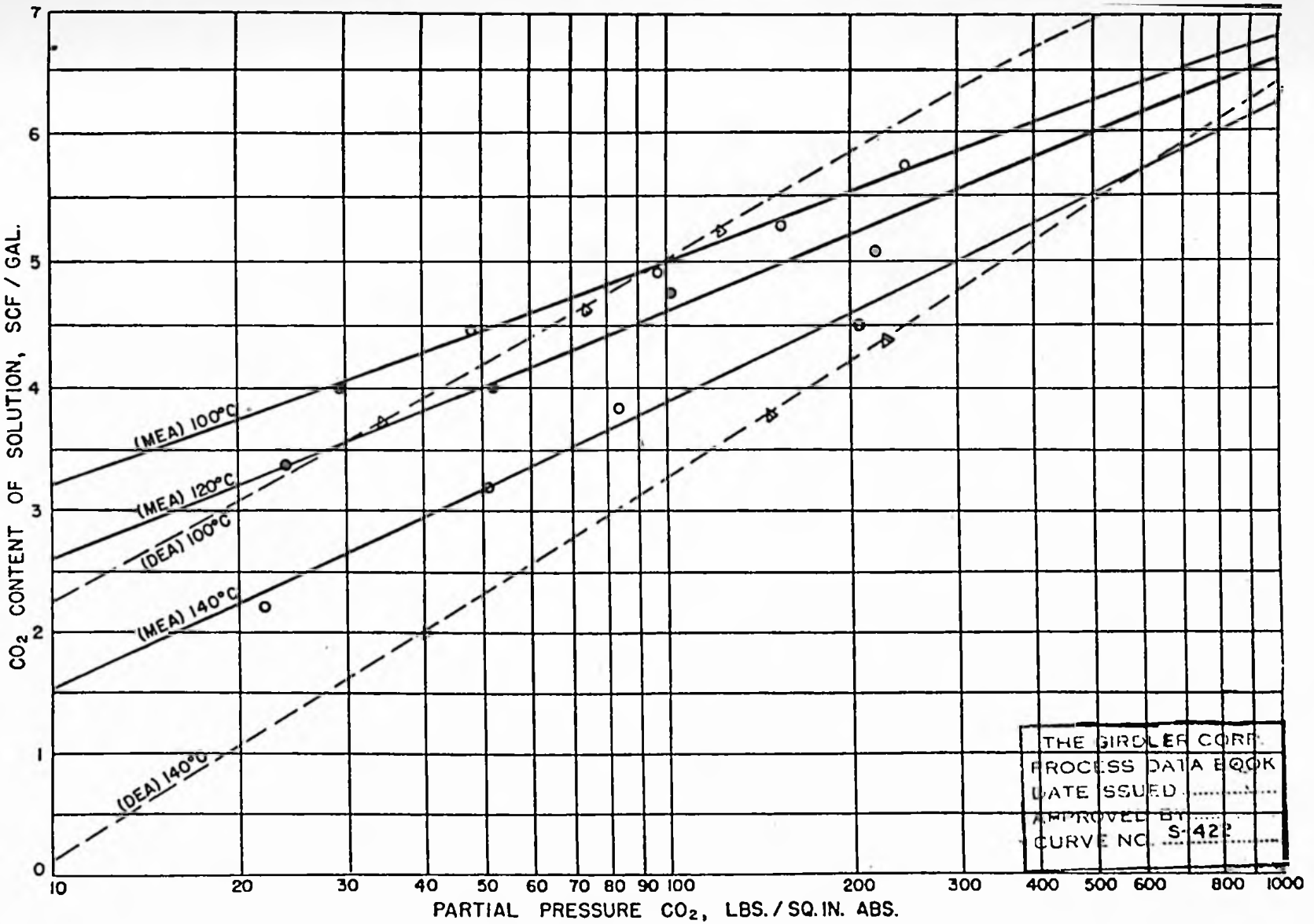
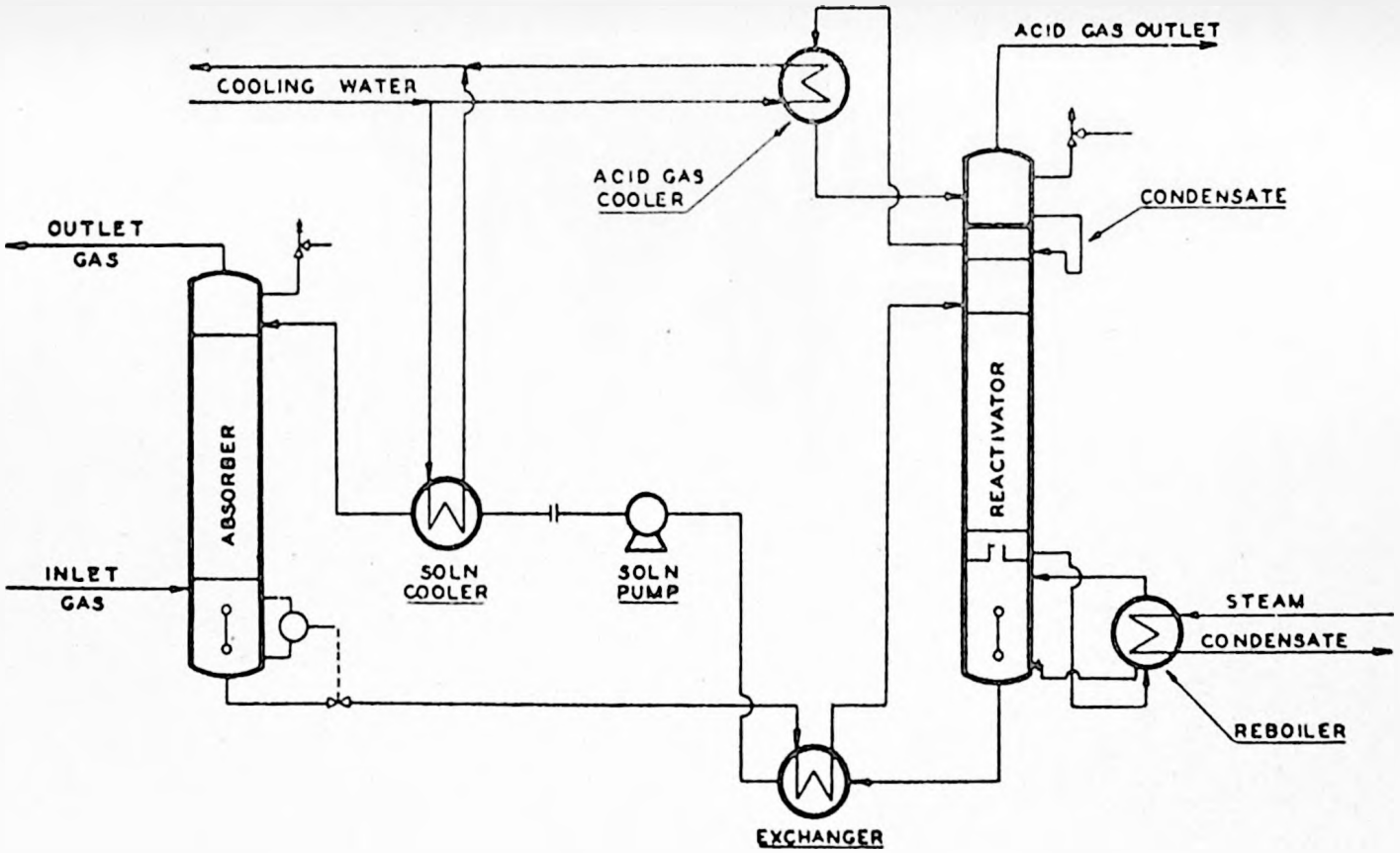


FIGURE 1—Equilibrim Pressure of CO_2 from 2.5N Monoethanolamine and 2.5N Diethanolamine

the amine. About this same time, The Carbide and Carbon Chemicals Corporation announced that a new amine, triethanolamine, was available commercially. Bottoms recognized that this compound would be a suitable one for use in a cyclic carbon dioxide removal process since it would react readily with carbon dioxide, and it was water soluble and sufficiently nonvolatile so that no loss occurred when its water solutions were boiled. On checking the performance of triethanolamine as a carbon dioxide absorbent it was found to be suitable enough for the purpose so that a plant was constructed near Thatcher, Colorado for removing carbon dioxide from the helium- bearing natural gas being processed there for helium recovery. The operation of this plant demonstrated the practicability of the process, and it was later adapted to the removal and recovery of hydrogen sulfide from various gases and liquids. Thiethanolamine has since been replaced largely by monethanolamine and diethanolamine as absorption agents.

To obtain the information needed for the design of commercial plants, it has been necessary to determine the physical and chemical properties of the absorbent solutions. Figure 1 is illustrative of such data. This graph shows the equilibrium dioxide contents of 2.5 normal aqueous monoethanolamine (MAE) and diethanolamine (DAE) solutions at various temperatures in the presence of various partial pressures of carbon dioxide. As would be expected, the carbon dioxide content of the solutions in standard cubic feet (SCF) per gallon increases with increasing carbon dioxide partial pressure and decreases with increasing temperature.

Figure 2 shows a typical flow diagram of the Girbotol process. The equipment shown in the flow diagram consists of an absorber tower in which the gas is scrubbed by amine solution to remove hydrogen sulphide or carbon dioxide, a reactivator tower in which hydrogen sulphide or carbon dioxide is boiled out of the amine solution to reactivate it for further use, and the necessary heat exchangers and pumps for handling the solution. Raw gas containing hydrogen sulphide or carbon dioxide flows into the base of the absorber which is a bubble plate or a packed tower. Lean amine solution enters the absorber near its top and flows in countercurrent relation to the



FLOW DIAGRAM OF GIRBOTOL PROCESS
PATENTED

FIGURE 2—Flow Diagram of Girbotol Process

rising gas, absorbing hydrogen sulphide or carbon dioxide in its downward passage. Purified gas leaves from the top of the absorber.

Rich amine solution containing the removed acid gas flows by absorber pressure, or is pumped from the base of the absorber through the heat exchanger and thence into the upper section of the reactivator.

The reactivator is also a bubble plate or packed tower. In or near its base there is a reboiler which is an indirect heating element supplied with low pressure steam or other suitable hot medium for boiling the amine solution and expelling the acid gas. As the solution flows down the reactivator, it is heated by ascending steam generated in the reboiler, and the hydrogen sulphide or carbon dioxide is expelled from the solution. In the reboiler, the solution reaches its boiling point, which is usually slightly above the boiling point of water.

Reactivated amine solution flows through the heat exchanger and is then pumped through the solution cooler back to the top of the absorber.

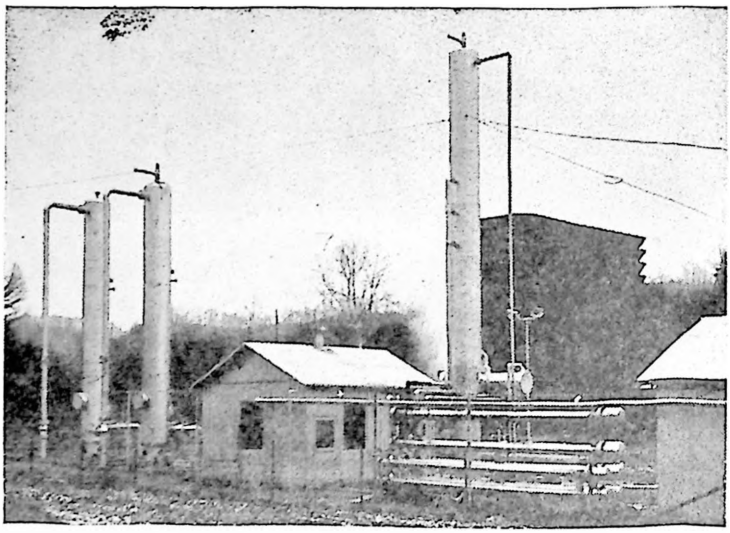


FIGURE 3—Natural Gas Purification Plant

Hydrogen sulphide or carbon dioxide and steam flow together from the top of the reactivator to the acid gas cooler where the temperature of the mixture is reduced to atmospheric and the steam is condensed. The condensate returns to the top of the reactivator as reflux and the cooled acid gas in pure, concentrated form flows to disposal or recovery.

Figure 3 shows a typical Girbotol plant for the purification of natural gas. The two towers at the left are the absorber towers in which the natural gas is purified by having hydrogen sulfide removed from it, the building houses pumps and control instruments, while the reactivator and heat exchange equipment are shown on the right.

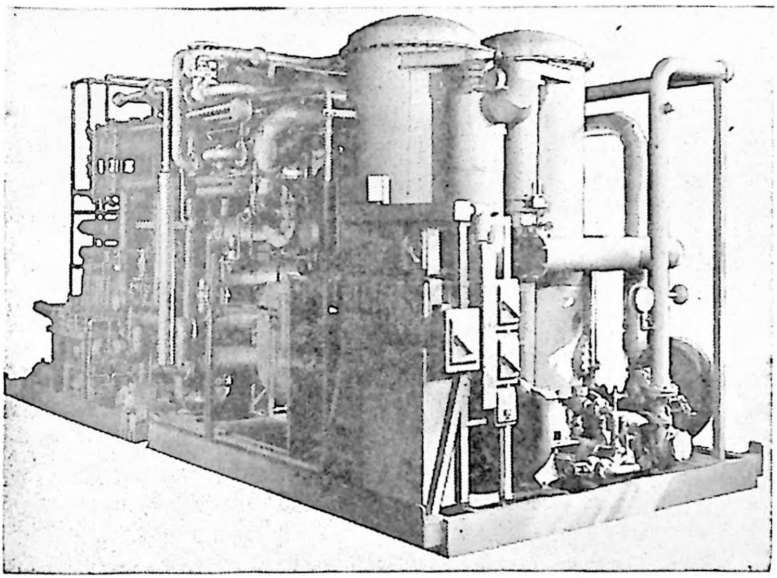


FIGURE 4—Portable Liquid Carbon Dioxide Plant

The plant pictured in Figure 4 is a complete carbon dioxide recovery plant for producing 300 pounds of liquid carbon dioxide per hour. Fuel oil is burned in a combustion chamber to produce carbon dioxide and furnish heat for reactivating the amine solution used for absorbing the carbon dioxide from the flue gases produced by the combustion. The purified carbon

dioxide from the reactivator is compressed, liquefied and delivered to cylinders for storage. This plant was developed to provide carbon dioxide for the use of armed forces and has been in operation in Japan for the past year.

Another application of the Girbotol Process has been in the production of hydrogen for military purposes. One of the problems encountered in World War II was the construction of mobile units for the production of hydrogen for use in barrage balloons. A process was developed for manufacturing hydrogen by the catalytic decomposition of methanol with steam to produce hydrogen and carbon dioxide. Figure 5 is the flow diagram for a hydrogen plant utilizing this reaction in connection with the Girbotol process for producing hydrogen for barrage balloons. The methanol is mixed with water, vaporized and passed through the catalytic converter at about 500°F. The mixture of hydrogen and carbon dioxide is cooled and passed through the absorber, where the carbon dioxide is removed with monoethanolamine solution. The solution is regenerated in the normal manner.

While this process for producing hydrogen proved useful during World War II, it is likely to have only limited commercial application because of the relatively high cost of methanol.

Another process for manufacturing hydrogen which has had wide commercial application is the steam-hydrocarbon process. Hydrocarbons such as methane, ethane and propane will react with steam in the presence of a nickel catalyst at elevated temperatures (about 1500°F.) to produce a mixture of carbon monoxide, carbon dioxide, and hydrogen. By passing this mixture over an iron oxide catalyst at about 700°F., with more steam, the bulk of the carbon monoxide will be oxidized to carbon dioxide, with the simultaneous production of an equivalent quantity of hydrogen, resulting in a mixture of hydrogen and carbon dioxide containing a small amount of carbon monoxide and hydrocarbons. By utilizing the Girbotol Process for removing the carbon dioxide from this mixture, a relatively pure hydrogen is obtained.

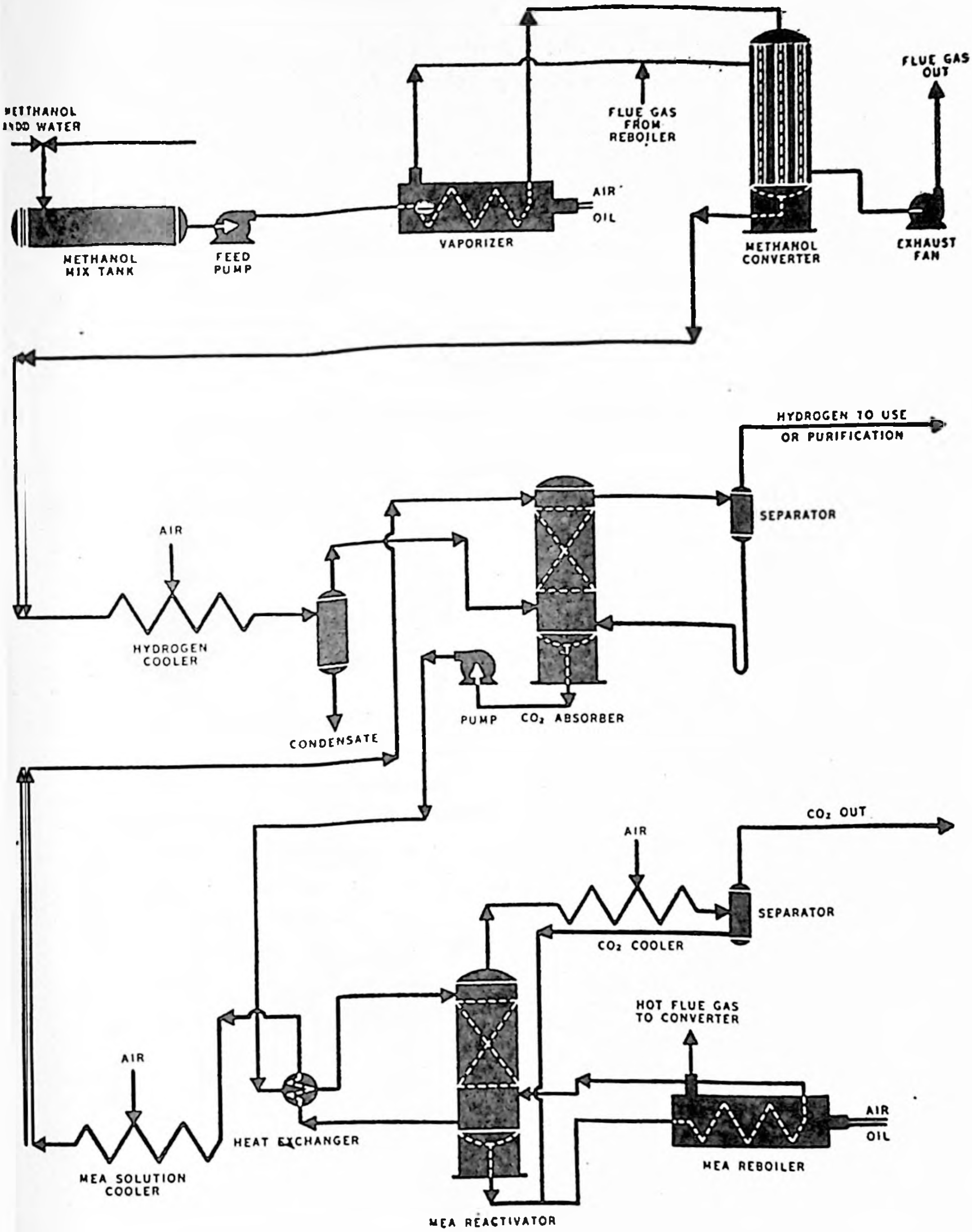


FIGURE 5—Steam-methanol hydrogen plant yow diagram

Table I is illustrative of the data which have been obtained on the methane-steam reaction for use in hydrogen plant design. This gives the equilibrim composition of the reaction products formed when one mol of methane reacts with two mols of steam at various temperatures. It will be observed that at temperatures of 1500/F. or higher, the rection proceeds substantially to completion as far as the decomposition of methane is concerned.

Table I

Equilibrim Compositions Methane-Steam Reaction

Component	Percentage Composition		
	980°F.	1500°F.	1800°F.
H_2	61	76.1	75.9
CH_4	23	0.1	0.01
CO	4	19.1	20.7
CO_2	12	4.7	3.4

The Girdler Corporation has adapted the steam-hydrocarbon process for manufacturing hydrogen to the production of hydrogen of high purity by adding suitable purification steps to the process outlined above. The Flow diagram of a plant for producing high purity hydrogen from propane and steam is shown in Figure 6. Propane from storage passes through a catalytic desulfurization step to remove organic sulfur compounds, after which it is mixed with steam and passes through the hydrogen furnace. On the furnace outlet more steam is added and the mixture is passed through the first stage carbon monoxide converter. After cooling, the carbon dioxide is removed from the hydrogen in the first stage carbon dioxide absorber. This hydrogen is then purified by two more stages of carbon monoxide oxidation with steam, each followed by carbon dioxide removal.

The analysis of the hydrogen produced in a typical Hygirtol plant is shown in Table 2.

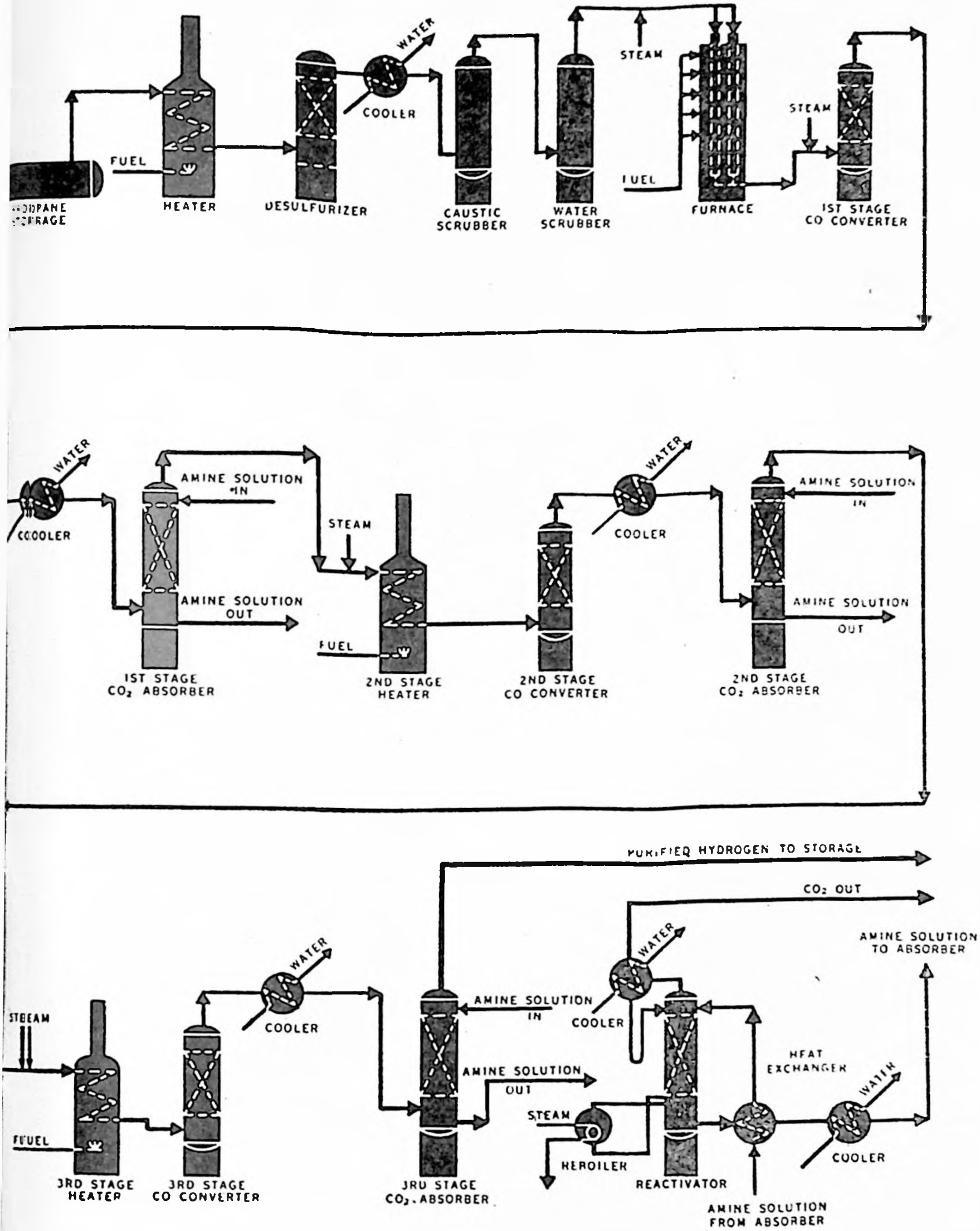


FIGURE 6—Hygirtol hydrogen plant flow diagram

TABLE II

Analysis of Hygirtol Plant Hydrogen

Component	Per Cent
CO_2	0.01
CO	0.00
CH_4	0.10
N_2	0.01
O_2	0.00
H_2	99.88
Total	100.00

Hydrogen of this purity has been found suitable for use in the hydrogenation of edible oils and in other operations where high purity hydrogen is required.

MINUTES OF MEETING AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction September 9, 1946

The meeting was called to order by President Lassalle, with Messrs. Cucullu, Lehmann, Mayer, McNiven, Steinmayer and Fernandez present. Mr. R. M. Seago, General Chairman for the 1947 Annual Meeting, also was present by invitation. Minutes of the previous meeting were accepted as read.

A financial report on the annual outing was accepted, and the Secretary was instructed to thank the outing committee for its good work.

Mr. Seago recommended the following gentlemen to serve as chairmen and vice-chairmen of the various committees to function in connection with the annual meeting, which recommendations were accepted unanimously:

John K. Mayer, General Vice-Chairman

Committee	Chairman	Vice-Chairman
Technical Papers	J. S. Janssen	A. W. Durning
Banquet	Allen W. Betz	Claiborne Perrilliat
Program	Wm. H. Johnston	W. S. Nelson
Publicity	W. J. Amoss	L. E. Savage
Registration	J. J. Bulliung	Sidney Ellis, Jr.
Ind. Plant Inspection	G. C. Kerr	J Y. Taylor
Reception	C. G. Cappel	J. M. Todd
Student Conference	H. J. Molaison	W. P. Wallace
Technical Exhibts	L. V. Cressy	I. H. Purinton
Contact with Woman's Aux.	John L. Porter	L. C. Reed
Finance	N. H. Ross	N. P. Kammer
Recreation	A. J. Harris	Wm. Hardy

Mr. Lehmann moved that the sum of $1,000 be underwritten for expenses of the annual meeting. The motion was seconded by Mr. Cucullu and passed.

A letter from the Community Chest requesting the privilege of addressing a meeting of the Society was read. It was moved and passed that the Chest be invited to send a speaker to address the October meeting for a period of five minutes.

A letter from Mr. Frank W. Macdonald, Assistant Secretary of the State Board of Engineering Examiners concerning recent opinions of the Louisiana Department of Justice on the practice of civil engineering and surveying in Louisiana, was read. It was moved and passed that this letter be published in the Proceedings.

Discussion took place on the matter of inviting distinguished guests such as the Mayor of the City or the Governor of the State to address the annual meeting.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Joint Meeting of the Louisiana Engineering Society with the American Institute of Electrical Engineers, September 9, 1946

The meeting was called to order by President Lassalle, with approximately 225 members and guests present. Reading of minutes of the previous meeting was dispensed with.

The Secretary gave a brief outline of a communication dated September 4 received from Mr. Frank W. Macdonald, Assistant Secretary of the State Board of Engineering Examiners, concerning opinions received from the Louisiana State Department of Justice on the practice of civil engineering and surveying in Louisiana. It was announced that the letter would be published in the October issue of the Proceedings.

Mr. Charles M. Kerr then announced that the Louisiana Section, American Society of Civil Engineers, would hold a meeting on September 30 concerning the engineering license bill. All those present were invited to attend.

The meeting then was turned over to Mr. Frank E. Johnson, Jr., Chairman of the New Orleans Section, American Institute of Electrical Engineers. After their business was completed, Mr. William J. Drawe introduced the speaker of the evening, Captain W. C. Eddy, U.S.N. (Retired), Director of Television Station WBKB, Chicago, who gave a most interesting talk on "The Age of Electronics".

Following his address, the meeting was returned to President Lassalle, and closed with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ
Secretary-Treasurer

Minutes of Meeting of the Society, October 14, 1946

The meeting was called to order by President Lassalle, with approximately 100 members and guests present.

Obituaries of the late Hamilton Johnson and the late Morris C. Schwartz were read by Messrs. Lehmann and Lassalle respectively, following which the audience rose and observed one minute of silence in memory of the two deceased members.

It was announced that the Nominating Committee, composed of past presidents R. A. Steinmayer, D. W. Stewart, and Wm. H. Rhodes, had been appointed at the board meeting, and had expressed a desire for suggestions for nominees in the forthcoming election of officers.

President Lassalle introduced Mr. Bentley Byrnes, who gave a short talk in behalf of the Community Chest.

The President then introduced the main speaker of the evening, Mr. W. T. Green, who gave a very interesting lecture on "The Manufacture of Plywood".

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, October 14, 1946

The meeting was called to order by President Lassalle, with Messrs. Leake, Lehmann, Mayer, Nairne, Steinmayer and Fernandez present. Minutes of the previous meeting were accepted as read.

The Treasurer's financial report for the third quarter of the year was presented.

The Secretary reported on the progress of plans for the Annual Meeting and a complete list of the various subcommittees was given to each member of the Board.

A letter from the Membership Committee recommending the following applicants was read:

For Local Member: John S. Burke, George A. Crowder, Ralph E. Lind, Jr.

For Local Junior Member: Walter C. Byrne, Jr., Seymour Cambias, Jr., James A. Evans.

For Affiliate Member: Richerson D. Rhodes.

For State Member: Alvin P. Andrews, George S. Covert, Walter G. Horstman, Kenneth M. Loughmiller, Walter H. Mercier, Wiley D. Poole, Thomas B. Smart, Charles P. Walters, Gerald C. Williams, Burris D. Wood.

It was moved and passed that these names appear on the next membership ballot.

Resignations of the following were accepted with regret: James E. Harvey, Jr., Robert Lobstein.

Mr. Charles M. Kerr was appointed chairman, with authority to designate his own associates, of a committee to prepare the obituary of the late Edward S. Lanphier, a past president of the Society who died on October 5.

The President recommended the appointment of a Nominating Committee consisting of past presidents R. A. Steinmayer, Chairman, Wm. H. Rhodes and D. W. Stewart, to consider nominations for offices in the forthcoming election.

The Secretary announced that the regular meeting of the Society would be addressed briefly by Mr. Bentley Byrnes in behalf of the Community Chest.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

INDEX TO VOLUME XXXII