

THE PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

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ARTHUR M. HILL, Editor.

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PRESIDENT CHARLES M. KERR

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EDITORIAL NOTES AND COMMENT

Our New President. In January Mr. Charles M. Kerr was elected President of the Society. President Kerr is not only an able executive, but is a prominent engineer of the State.

President Kerr is a member of the class of 1907, Civil Engineering, Tulane University. One of his first assignments was that of Office Engineer and Draftsman with the Dock Board, about 1907. In 1908 he held the position of Assistant Engineer. Our present State Highway Department was organized about 1909 and Mr. Kerr was the first Engineer employed, his title being that of Principal Assistant Engineer and Chief Maintenance Engineer.

About 1922 he became active as an engineering consultant in promoting the use of creosoted timbers for construction use.

He travelled extensively in the United States and Canada in connection with field work of the American Wood Preservers' Association. After being associated with the Koppers Co. and engaging in private consulting work, he joined the staff of the American Creosote Works as sales engineer in 1930. This position he holds at present.

It is interesting to note that Mr. Kerr's father, Frank M. Kerr, was the Society's fourth President, 1901. Mr. Charles M. Kerr is the first of a second generation to hold the office of President.

The Society is fortunate in having a President so well known to the engineers of this section.

New Officers and Board. During the coming year President Kerr will be assisted in administering the affairs of the Society by the following: First Vice-President Reinhard A. Steinmayer, Second Vice-President Leo J. Lassalle, Directors Robert E. Gosa and Laurence K. Nelson (elected in January to serve two years) and W. Stone Leake and Clayton L. Nairne, carrying over from the former administration. Mr. Karl P. Kammer, as immediate Past-President is also a member of the Board.

Our efficient and reliable Secretary-Treasurer, John K. Mayer is scheduled for his usual splendid job of attending to the multitude of duties which come his way.

With such an able group, the members can look forward to a very active and effective year.

The Annual Meeting. Our Annual Meeting held in January was something about which to be proud. The attendance was excellent, and a number of outstanding papers were presented. Much credit is due to General Chairman Cucullu, together with the chairman of Technical Papers, Blain; War Production Panel Chairman, Naquin; and Banquet Chairman, Kelly. Others contributing much to the success of the meeting were Chairmen Ross of the Plant Inspection Committee, Heft of Publicity, May of Programs, Bulliung of Registration Committee, and Taylor of Student Papers. These chairmen were ably assisted by vice-chairmen and others who helped make the whole affair a grand success.

During March the American Red Cross will raise its 1944 War Fund. A goal of \$200,000,000 has been set. This must be met if the Red Cross is to continue its work on an undiminished scale. Let's give!

* * *

New Members. The following engineers were elected to membership in the Society in December, 1943. We welcome them into the organization, and hope that they will take an active part in the affairs of the Society.

For Member

Alexander, Albert Mangum. Age 55. Endorsed: C. G. Cap-pel, D. W. Godat, J. K. Woolf. 1920, Struct. Designer, Favrot & Livaudais, N. O.; 1921-23, Contractor (self), Cleveland, Miss.; 1923-24, Civil Engr., Alexander & Humphreys, Camdon, Ark.; 1924-25, Estimator and Const. Supt., Hayden Const. Co., Jackson, Miss.; 1925-26, Cotton planter, Metcalf, Miss.; 1927, Super-
vising Engr., N. W. Overstreet, Arch., Jackson, Miss.; Gen. Const., Supt. Lewis & Garber, Const., Jackson, Miss.; 1928, Struct. Engr., F. P. Gates, Arch., Jackson, Miss.; 1929, Superv. Engr., City Bd. of Ed., Jackson, Miss.; Struct. Engr., various clients, Jackson, Miss.; 1930-31, Struct. Engr., N. W. Overstreet, Arch., Jackson, Miss.; 1932-34, Struct. Engr. various clients, Jackson, Miss.; 1934-37, Res. Engr. Inspector, P. W. A., Atlanta, Ga.; 1937-39, Traveling Engr., P. W. A., Atlanta, Ga.; 1940, Const. Advisor, U. S. Housing Auth., Ft. Worth, Tex.; 1941, Asst. Gen. Supt., W. H. Williams Co., N. O., (Supt. of Matls. Dept. on const. of Camp Polk); Asst. Project Mgr. and Gen. Supt. (Const. of Navy Section Base at Burwood, La.); 1942, Chief Engr., Barnard, Godat & Heft, N. O. (Preparation of plans for U. S. Army Depot at Shreveport, La., Supervised const. of Baton Rouge Engr. Depot); 1943, Prin. Engr., Bernard, Godat & Heft, N. O. (Struct. Des. & Cost Est. on ship-yard facilities, concrete bridges and misc. const.).

Burnett, John O. Age 34. Endorsed: W. S. Guedry, A. J. Negrotto, F. A. Boyle. Attended L.S.U. 1928-29. Employed on location and construction surveys for United Gas Engineering Corp., U. S. Engineers, La. Public Utilities prior to 1934. In

responsible charge as Chief of Party, La. Geodetic Survey, Jan., 1934 to Oct., 1935; Field Engineer, W.P.A., Oct., 1935 to June, 1936; Chief of Parts, S.W.H.P.S., La. Highway Commission, July, 1936 to Feb., 1937 and Sept., 1937 to Dec., 1937; Surveyman, U. S. Engineers, Feb., 1937 to Sept., 1937; Construction Engineer, W.P.A., Jan., 1938 to Sept., 1942; Construction Engineer, Aluminum Company from Sept., 1942 to present.

Derr, James H., Jr. Age 23. Endorsed: J. R. Murphy, G. W. Witmer, F. A. Wilson, Jr. Graduated with a diploma in Power Plant Engineering from 3-year course at Williamson Free School of Mechanical Trades. Student engineer with Gulf States Utilities Co., from July, 1940 to Nov., 1941. U. S. Navy from Nov., 1941 until Jan. 1943. Station clerk with Gulf States Utilities Co. from Jan., 1943 to present.

Doyle, James T. Age 30. Endorsed: C. J. Phillips, Jr., Theo. Chenet, E. H. Goodloe. Attended college for two and one-half years toward engineering degree as follows: Marshall College, Hutington, West Va.; Ohio State University, Columbus, Ohio.; Virginia Polytechnic Inst., Blacksburg, Va. Started with State of Ohio, Dept. of Hwys. as rodman in 1932, and remained with them for six years. Worked during this time as instrumentman, party chief, and project engineer on the construction of asphalt roads. 1938, Project engineer in Arlington, Va. with Mace Properties, Inc. on the construction of duplex homes for one year. Then worked for the Rust Engineering Co. of Pittsburgh, Pa., in Norfolk, Va. as Asst. Engr. on the construction of a warehouse. Now employed by the M. W. Kellogg Company as Asst. Engr. on the construction of an Ammonia Plant.

Eldridge, Lonnie Cothran. Age 38. Endorsed: P. J. Guelfi, H. L. Lehmann, L. J. Lassalle. 1923-27 (3½ yrs.) studied Elect. Engr., La. State. 1924 to present with Baton Rouge Water Works Co., draftsman, Supt. of Distribution. Since 1930, Engineer in charge of all operations, additions or construction, and maintenance of electrical and mechanical equipment. Active member of Am. Water Works Assn., and La. Conference on Water Supply & Sewerage. Grade "A" certificate from La. Conf. on Water Supply & Sewerage.

Ewing, Marshall Brookshire. Age 33. Endorsed: F. A. Boyle, F. A. Billhardt, L. J. Lassalle. Attended Louisiana State University from 1928 to Jan., 1931. Worked for Bridge Dept. of La. Hwy. Dept. for one year, then returned to L.S.U. and received degree in Elect. Engr. in 1934. In June, 1934 started work with the relief agencies of the U. S. Government as Asst. Parish Engr., then to Parish Engr., Office Engr., and Area Engr. from 1937 to May, 1942. Responsible for smooth operation of Public Work Program in 6th Congressional Dist. May, 1942 to date, Construction and mechanical revisions in the material handling, grading and clarification dept.

Knost, Charles P. Age 54. Endorsed: K. P. Kammer, D. W. Stewart, Allen Harris, Stanley Nelson. Four years, Miss. A. & M. College; two years graduate apprenticeship with Westinghouse Elect. & Mfg. Co. (completed course); six months engineering salesman; five and one-half years electrician and Ch. Elect. with mining companies in Arizona and New Mexico; 22 months, U. S. Army; 17½ yrs. Westinghouse Sales Engineer; seven years, Dist. Rep., Moloney Elect. Co.

Lechtenberg, Wendel J. Age 20. Endorsed: C. J. Phillips, Jr., Theo. Chenet, E. H. Goodloe. Jan., 1940 to Feb., 1942, Engineering Draftsman, N.Y.A. of Oklahoma; Feb., 1942 to May, 1942, Engineering Draftsman, Benham Engineers & Architect, Leesville, La.; May, 1942 to July, 1942, Engineering Draftsman, Hudgins-Cott-Thompson, Altus, Okla.; July, 1942 to Oct., 1942, Engineering Draftsman, Benham Engineers & Architects, Leesville, La.; Oct., 1942 to date, Engineering Draftsman, The M. W. Kellogg, Co., Lake Charles, La., Member, Southern Association of Engineers.

Lewis, Henry F. Age 37. Endorsed: C. J. Phillips, Jr., Theo. Chenet, E. H. Goodloe. From July, 1929 thru Nov., 1940, employed by the Louisiana Highway Commission of Baton Rouge, La. in both the road and bridge Depts. in the following capacities: Rodman, Jr. Instrumentman, Inspector, Asst. Resident Engineer and Maintenance Supt. Dec., 1941 to June, 1942, employed by F. Shutts' Sons of Lake Charles, La. as Asst. Engineer

during construction of Lake Charles Airport. June, 1942 to present, employed by the M. W. Kellogg Co. as Instrumentman and Asst. Engr. Member, Southwestern Association of Engineers.

Lobstein, Robert. Age 56. Endorsed: C. J. Phillips, Jr., Theo Chenet, E. H. Goodloe. Mechanical-Engineer Degree at the University of Vienna; Doctor of Science Degree at the University of Prague. Employed at Solvay & Co., Central-Europe for more than twenty-five years and so specialized for the chemical industry.

Shelly, George F. Age 52. Endorsed: David Godat, Arthur Seaver, B. H. Grehan, R. J. Kuhn. Attended Union College, electrical engineering. Worked for: General Electric Co., Schenectady, N. Y.; Lord Electric Company, New York City; General Motors Co., Dayton Ohio. At present supervising engineer for the Defense Plant Corp. in the New Orleans general area. Member (assoc.) A.I.E.E., 1919-1920.

For Transfer from Junior Member to Member:

William H. Bohne, Thomas G. Broussard, Wallace V. de Gruy, P. Leon Godchaux, Donato E. Guiza, Robert N. Habans, Edward L. King, Wilday Tudury, George F. Williamson.

For Transfer from Student Member to Junior Member:

Harold A. Timken, Jr.

Our History for 1943. In this issue are printed President Kammer's report on the year's activities of the Society; Secretary-Treasurer Meyer's report on the finances. Both these reports show an active and progressive year, an increase in membership and an increase in finances. Much credit is due President Kammer and the officers and committee members for carrying on so actively in the face of war time difficulties.

The Kilgore Bill. The following is an extract* concerning two bills which are of vital importance to engineers:

*From "Mechanical Engineering", January, 1944.

The Kilgore Bill (S. 702) was introduced in the United States Senate by Senator Harley M. Kilgore of West Virginia in February, 1943. It is now in the hand of the Senate Committee on Military Affairs. A similar bill (H.R. 2100) was introduced in the House of Representatives. The purpose of these bills, according to the language of S. 702, to which this discussion will be confined, is "to mobilize the scientific and technical resources of the Nation, to establish an Office of Scientific and Technical Mobilization, and for other purposes."

The following extracts from the bill are given in order that it may be understood:

DECLARATION OF POLICY

SECTION I. The Congress hereby authorizes that the full development and application of the nation's scientific and technical resources are necessary for the effective prosecution of the war and for peacetime progress and prosperity, and that serious impediments thereto consist in—

The unassembled and uncoordinated state of information concerning existing scientific and technical resources.

The lack of an adequate appraisal, and the unplaned and impro- at training, development, and use of scientific and technical personnel, resources, and facilities in relation to the national need.

The consequent delay and ineffectiveness in meeting the urgent scientific and technical problems of the national defense and essential civilian needs.

The trend toward monopolized control of scientific and technical data and other resources with lack of access thereto in the public interest.

The absence of an effective Federal organization to promote and co-ordinate, in the national interest, scientific and technical developments.

PURPOSE

The purposes of this Act accordingly are:

(1) To appraise the current use of scientific and technical knowledge, facilities, and personnel, and to develop comprehensive national programs for the maximum use of science and technology in the national interest in periods of peace and war.

(2) To mobilize for the prosecution of the war all scientific and technical facilities and personnel.

(3) To facilitate after the war the transition of the national economy from the tasks of war to peacetime enterprise.

(4) To assemble, co-ordinate, and develop for use, in the public interest, all scientific and technical data and facilities; to facilitate access to scientific and technical literature and to aid and encourage the writing and publication thereof.

(5) To promote the full and speedy introduction of the most advanced and effective techniques—for the benefit of agriculture, manufacturing, distribution, transportation, communication, and other phases of productive activity; for economical and efficient Federal, State, and local government; and for the national defense and general welfare.

(6) To aid, encourage, and protect the research and enterprise of inventors, scientists, technicians, scientific and educational institutions, research laboratories, and Government establishments engaged in scientific and technical work, and to make their resultant discoveries and data more readily available, and without discrimination, to all sections of industry, agriculture, and the public, to aid the war effort and to promote full employment and higher standards of living after the war.

(7) To discover and develop substitutes for strategic and critical materials, and to promote the most beneficial use of agricultural, mineral, and other natural resources.

(8) To promote interest in scientific and technical education, and to provide for all qualified persons the means of scientific and technical training and employment.

(9) To provide guidance in scientific and technical matters to the President, the Congress, and all Federal, State, and local government agencies and establishments, and to contribute guidance and, in all proper cases, financial and other assistance to solution of the technical and scientific problems of industry, agriculture, and of any agency or individual inventor.

(10) To promote the maintenance and expansion of free enterprise by making available to smaller businesses the benefits of scientific advancement.

(11) To standardize, when in the public interest, scientific and technical designs, practices, and specifications.

Finally, to carry out these purposes, the bill would

(12) *Establish a national scientific and technical office* to assure maximum co-operation and integration of the facilities and personnel of governmental and all private agencies, and to co-ordinate the activities of these facilities and personnel where necessary in the national interest.

Some slight condensations have been made in this statement of purposes, but essentially the wording follows the language of the bill. Throughout, it will have become evident, no qualifying clauses or phrases are used which tend to limit the scope of the purposes contemplated with respect to the future control of scientific and technical facilities and personnel. Indeed, these statements are replete with evidence of the purpose that the national government shall control the use of all scientific and technical research and laboratory facilities, irrespective of ownership, during war and peace.

Purpose (1) for instance, is, in part, to develop comprehensive programs for the use of science and technology "*in periods of peace and war.*"

Again, purpose (4) is to assemble, co-ordinate, and develop for use "*in the public interest,*" etc.

A particularly impressive example is purpose (5) to promote the introduction of the most advanced techniques for the benefit of a comprehensive list of economic functions, which is concluded with the phrase "*and other phases of productive activity.*" Then follows the inclusion of governmental agencies, and, to clinch the matter, the paragraph concludes with "*and for the national defense and general welfare.*"

Purpose (6) is to aid research "*in order to aid the war effort at the present time and to promote full employment and higher standards of living after the war.*"

THE EFFECT ON INVENTION

The Office of Scientific and Technical Mobilization, headed by an Administrator, is vested with the duty and the necessary powers to perform 15 separate functions. The duties are closely related to the stated purposes of the act.

This is not to be an agency solely devoted to fostering and promoting the development and use of scientific and technical facilities and personnel by working through and stimulating other agencies. It is granted the power "*to initiate*

and carry out" projects and programs of its own formulation. It may "*solicit and receive aid and support from any source for the advancement of scientific and technical methods.*" To finance the operations authorized by the act the Office has broad powers for acquiring and disposing of property, both real and personal, and may acquire, but not sell, patents, for the use of which it may grant nonexclusive licenses and collect royalties. It may make loans or grants. The bill carries an initial appropriation of \$200,000,000 and the Administrator is authorized to organize corporations where they can be used for the more effective exercise of the powers of the Administrator and the Office.

To carry out purpose (4) to assemble, co-ordinate, and develop for use in the public interest all scientific and technical data and facilities, it is the duty of the office "*to formulate and promote projects and programs*" for development and use of laboratories and other technical facilities and "*when necessary, to initiate and carry out such projects.*"

It seems clear that therein lie the legal powers to control and gradually to socialize all scientific and technical research.

Purpose (6) is to aid, encourage, and protect the research and enterprise of inventors, and others, and "*to make their resultant discoveries and data more readily available*" to everybody. Section 7 tells how this is to be done. It vests in the Office "*the exclusive right to use and the exclusive right to cause others to use*" any invention in the discovery or development of which the Office or other governmental agency has rendered any assistance, either monetary or in the form of use of facilities or personnel. It is the duty of the Office to buy out any other interests in such discovery or invention. Here is the machinery for a governmental monopoly of invention.

In Section 2 "scientific and technical facilities" are defined as including "real property and personal property, tangible and intangible," used for scientific or technical purposes and further including "all methods, processes, procedures, techniques, designs, specifications, patents, inventions, and scientific or technical information of every description used or intended to be used for scientific or technical purposes in research and development in the production or supply of war or civilian goods or services." In the light of this definition, the duty of the Office (Section 4b) to formulate and promote as well as to initiate and carry out

projects for the use of scientific and technical facilities carries the influence of the Office far down into the working processes of the production and service industries.

SCIENTIFIC AND TECHNICAL PERSONNEL

To carry out the purpose of the bill "to mobilize for the prosecution of the war all scientific and technical facilities and personnel" Section 5 amends the selective training and service act to transfer the control of occupational deferments of persons engaged in scientific and technical occupations or receiving scientific or technical training from the Manpower Commission to the Office of Scientific and Technical Mobilization. Its powers in this respect, however, are not final under the bill, but are "subject to direction by the Chairman of the War Manpower Commission." The bill adds no new functions for the wartime mobilization of scientific and technical personnel which are not already under other administrative agencies.

The effects of the features of the bill pertaining to personnel to which attention is particularly directed, however, are not confined to the period of the war emergency. Purpose (8) is "to promote interest in scientific and technical education and to provide for all qualified persons the means of scientific and technical training and employment." The Office is charged with the duty (Section 4b) to "formulate and promote projects and programs for the development and use of scientific and technical personnel and, when necessary, *to initiate and carry out such projects.*" This provision of the bill empowers any national administration which so chooses to place the government squarely in the business of scientific and technical education.

ADMINISTRATION

The Office of Scientific and Technical Mobilization (Sec. 3), is in charge of an Administrator who is appointed by the President, by, and with the advice and consent of the Senate, and to serve at the pleasure of the President. His salary is fixed at \$12,000. No qualifications for the Administrator are set forth in the bill. He is assisted by a National Science and Technical Board of six other members appointed by the President, of whom one each represents industry, agriculture, labor, and the consuming public, and two are scientists or technologists serving as members at large. These men are full-time employees at the rate of \$10,000 a year. Their duties are such as the Administrator may assign to them. To establish the basic policies governing the administration

of the act the bill proposes a National Scientific and Technical Committee. This consists (a) of the Board and (b) one representative each from such federal departments as the President may designate, four additional representatives of the consuming public, three additional scientists or technologists, six additional members representing labor, and six additional members representing management (who must include representation of small business). These additional committee members are appointed by the President and serve without compensation.

The number of government representatives on this policy committee depends upon the number of federal departments the President chooses to have represented. It would seem probable that at least five departments would be represented and possibly seven and the make-up of the committee would be:

Representatives of the government (probable).....	6 to 8
Representatives of the consuming public.....	5
Scientists and technologists.....	5
Representing agriculture.....	1
From management (production and service).....	7
Labor	7
Probable total	31 to 33

Thus would the determination of the future course of scientific and technical development in the United States be transferred to political control.

CONCLUSIONS

The Council of A.S.M.E. is opposed to the bill because

(1) The statement of "serious impediments" to the full development and application of the Nation's scientific and technical resources for the prosecution of war are misleading and not justified by the facts, a few of which are:

(a) The government has access to all scientific and technical data which it has authority to use in the interest of the national defense or public welfare.

(b) Industrial and educational laboratories, guided by O.S.R.D., have been and are carrying on needed investigations for the Armed Forces and for war industry.

(c) This Society is directing and co-ordinating research activities for several government agencies.

(2) With respect to "peacetime progress and prosperity" the statement of impediments is without justification. It would be difficult to find another nation where scientific and technical progress has been greater or more widely distributed than in the United States since World War I.

(3) The transfer of existing functions pertaining to the mobilization of scientific and technical personnel from one government agency to another will cause confusion.

(4) The bill regiments invention and scientific and technical resources and education.

(5) The administrative board would consist of seven members only two of whom would necessarily be scientists or technologists; and the policies governing the administration of the act would be determined by a politically constituted committee of 30 or more persons of whom only five would necessarily be scientists or technologists.

For these reasons, and others, the Council of A.S.M.E. opposes the passage of the Kilgore Bill (S. 702), or of any measure of similar intent.

* * *

Note particularly the Number 5 conclusion. If you do not like the idea of being "pushed around" by a committee on which engineers are very much in the minority write or wire your senators and representatives. From Louisiana they are as follows:

Allen J. Ellender, Senate Office Bldg., Washington, D. C.

John H. Overton, Senate Office Bldg., Washington, D. C.

The following Congressmen may be addressed at House Office Bldg., Washington, D. C.

- | | |
|---------------------|------------------------|
| 1. F. E. Hebert | 5. Charles E. McKenzie |
| 2. Paul H. Maloney | 6. James H. Morrison |
| 3. James Domengeaux | 7. Henry D. Larcade |
| 4. Overton Brooks | 8. A. L. Allen |

PAPERS AND DISCUSSIONS

MARINE PIPING SYSTEMS AND THEIR DESIGN*

By W. O. PAGE

The proper operation of a ship's machinery, the proper care of the ship and of its cargo, and the comfort of the crew and the passengers are inextricably woven into the design of the piping systems.

The designer is of course first concerned with the workability of the system being considered. In the marine field, he must be a little more conservative because his design must be independent of any outside assistance in case of breakdown. He cannot be ultra-conservative because of weight and space limitations. The vessel must sail to all parts of the world and may be sold or operated by a foreign country and must therefore meet the requirements of innumerable agencies.

The various regulatory bodies normally considered by merchant ship designers and whose certificate must be obtained, are:

- (a) The American Bureau of Shipping—an insurance classification society for both ship and cargo.

*Presented at the Annual Meeting of the Society, January 15, 1944 by O. W. Page, Chief of Engineering Plan Approval Section, U. S. Maritime Commission. Mr. Page was born in Virginia and graduated from the Virginia Polytechnic Institute with a B. S. degree in Mechanical Engineering in 1927. Until 1938 he was employed in the Engineering Technical Division of the Newport News Shipbuilding and Dry Dock Company, assisting in the development of main and auxiliary machinery, preparing stress and thermodynamic calculations for engines, turbines, and heat transfer equipment and research in connection with expansion stresses in piping. Studied supplementary courses in Naval Architecture and Marine Engineering and taught Marine Engineering in the University of Virginia Extension School. Was awarded first prize open competition conducted by the Navy Department in 1938 on steam propelled subchaser design. Entered the services of the Maritime in Washington in late 1938 in the preparation of specifications on boilers, heat transfer and auxiliary equipment, particularly active in the development of reheat machinery for marine propulsion. He is a member of the Propeller Club, Port of New Orleans, American Society of Naval Architects and Marine Engineers, and has presented several discussions before the Annual meeting of that society. He was one of the contributing editors to modern Marine Engineers Manual, Cornell Press, 1941.

- (b) The Merchant Marine Inspection Service of the Coast Guard—concerned primarily with safety.
- (c) U. S. Public Health Service.
- (d) Panama Canal regulations, and
- (e) Senate Report No. 184 administered by the Maritime Commission.

The Naval designer is not required to build to these regulations. During the emergency, each of these agencies have had to relax their requirements considerably in order to get ships built. The design discussed here may be considered to represent very good merchant ship practice during normal times.

The value of a merchant to the owner lies in its ability to carry either a heavy or bulky cargo a great distance in a short time. This ability requires the design of a relatively large power plant of minimum weight and space for plant and fuel capacity. In more recent years, weight in the engine room has been reduced considerably by the development of better materials and designs, while weight topside has been increased with the development of more electrical and convenience equipment. At the same time the Naval Architect has steadily reduced the cubic capacity of the engine room until space is perhaps the governing factor of design.

Other special considerations confronting the marine designer involve hogging (lifting the ship on a wave at the midship section) and sagging (lifting the ship on the wave crest at the fore and aft perpendiculars). This produces a condition of weaving equivalent to expansion and contraction on lines running from bulkhead to bulkhead and on long deck lines.

There are also considerations of gradient and inertia effects due to list and trim and to roll and pitch. The vibration problem is more acute than for land work.

The first step in designing marine piping systems occurs when the Naval Architect begins to design the vessel. The piping systems are concerned with the type of machinery to be installed and the type of service into which the ship is to be placed. For that reason we must first concern ourselves with

the selection of the type of ship and type of cargo which is to be carried.

The design of the ship and the service into which the ship will be placed will determine largely the length of time which the vessel will be at sea and entirely self-sustaining. Tanks must therefore be provided to carry sufficient fresh water for the greatest length of time at sea, or provision must be made to evaporate sea water during the same time. Merchant vessels do not ordinarily carry evaporator plants to evaporate all of the fresh water required. The Maritime Commission has proposed such a vessel, but thus far none have been built. The Army and Navy have made this provision by the installation of large evaporator plants of either double or triple effect types. Ordinarily merchant vessels carry a single effect evaporator of a capacity in the order of 25 tons per day, more for emergency than for general operation. Deck filling lines and vents must be provided to the fresh water tank.

Formerly, coal was the most common fuel in use at sea, but with the advent of fuel oil, which requires much less bunkering space, oil is used almost exclusively. Tanks must be provided for carrying this fuel. Filling, vent and overflow and sounding tube systems are necessary for filling these tanks.

The vessel may carry either bulk or liquid cargo, or passengers. If bulk cargo is carried it may be necessary to provide ventilation, refrigeration or air conditioning for cargo as well as for passenger comfort and ship's stores. The vessel may carry steam deck auxiliaries in which case a steam and exhaust system must be provided for the winches. If liquid cargo is carried, it may be of several types; Bunker fuel oil, light distillates, vegetable or edible oils. For the heavier bunker oils a cargo oil system with filling and discharging lines, vents and overflows and tank heating coils must be provided. For light distillates the same general systems must be provided, but the vents must be fitted with special pressure-vacuum relief valves and the heating coils may be omitted. Vegetable and edible oils are ordinarily carried as special cargo on a bulk cargo vessel and are usually filled and discharged by means of special hose in order to prevent contamination, rather than through a fixed

piping installation. Where heavy paraffin base oils or molasses are carried, special provisions may have to be made to maintain heat on the liquids throughout the trip to prevent coagulation. For liquid cargoes, special provisions may have to be made for cleaning tanks, which is usually done by pumping hot salt water from the fire main through revolving nozzles.

Hot and cold fresh water for washing purposes is supplied from the tanks and circulated throughout the vessel the same as for a large hotel. It is usually necessary to provide a separate system for drinking and culinary purposes since the Public Health Service provisions will not permit carrying fresh water in tanks against the skin of the ship. These are known as portable and non-portable systems. The heating system may likewise be any of the types found on land except that steam pressures of 30 to 50 lbs. are used.

The vessel must be provided with adequate deck drainage, fire protection and sewage disposal. Freeing ports, which are openings in the shell, just at deck line, are used to relieve the heavy seas washing over the deck. Special drains with plate strainers are placed at strategic locations along the deck to prevent water from standing. Above the weather deck, these drains run from open deck to open deck down to the weather deck which drains through scuppers at the load water line. The internal spaces throughout the ship are drained through a bilge system.

The sanitary flushing system is often taken from the fire main, or may be a separate system. The drains from the water closets and urinals may be combined when possible and are led to scupper valves discharging near the water line where the fixtures are placed above the water line, or they may be led with those located below the water line to a tank fitted with eductors or float operated pumps for pumping overboard.

The fire main consists of a suction from the sea and a discharge main led throughout the vessel in such a manner that every point within the vessel which is accessible to the crew while at sea may be reached from at least two hose connections fitted with 50'0" hose. The main is designed so that the farthest

and highest hose connection on the vessel may discharge through the nozzle with 50 lb. pressure.

The fire main can only protect those spaces which are accessible to the crew at sea. Within cargo spaces and fuel tanks a steam smothering or CO₂ Smothering System is used. The cargo space also is provided with a fire detecting system consisting of a separate pipe from each hold to the wheelhouse, fitted with a visible and audible alarm system. For large passenger vessels a sprinkling system is installed in the public spaces and passenger quarters.

The piping systems connected with the Public Utility Service are generally of the same nature and type as provided for the main propulsion plant and are connected and inter-connected in such a manner as to be almost inseparable. The public utility functions are performed by an auxiliary power plant which furnishes power to drive all of the auxiliary equipment used on the vessel, as well as the auxiliary equipment in connection with the main propulsion plant.

The main propulsion power plants may be broadly classified as Diesel or Steam.

If Diesel, it will be necessary to provide air, fuel oil service, lubrication oil and purifying systems. Also a fresh water circulating system for cooling the main engines and a salt water circulating system for cooling the fresh water and lubricating oil.

If a steam installation is made it may be a reciprocating engine, turbine and gear, or turbo electric plant. In any case it will be necessary to provide boilers with their soot blowers, blow-off pipes, a fuel oil service system, a main and auxiliary steam system, auxiliary exhaust and escape system, a bleed system, a drain system, a condensate and feed system, and a salt water circulating system for the main and auxiliary condensers and lube oil coolers, and if the plant is turbo electric, a system for cooling the air or hydrogen for the main generators and main motors.

Most of the long-range vessels built by the Commission, as distinguished from the Emergency Program, have been of the

C1, C2 or C3 types. Insofar as their machinery and piping are concerned, these vessels are very similar. The C1's have a 4000, the C2's a 6000 and the C3's an 8500 H. P. power plant consisting of two water tube boilers, and a high and low pressure turbine driving a single shaft through double reduction gears. There are two 250 or two 300 KW auxiliary turbo generators. The boilers are designed for 450 pounds 750° F. steam at the superheater outlet and the turbines are designed for 425 pounds 740° F. and 28½" of vacuum. The diagrams used in this discussion show piping systems involved in the design of these vessels.

The two major divisions of piping systems on merchant vessels are those used by the Coast Guard. All water piping over 200° F. and oil piping over 150° F. regardless of pressure and all other piping over 125 lbs. pressure are Class 1. Other piping systems are Class 2. Most of the systems then are Class 2, which may be further subdivided into systems by the fluid handled—as steam, fresh water, salt water, oil and miscellaneous.

There is normally no main turbine exhaust line, since the main low pressure turbine casing is, if possible, attached direct to the top of the main condenser. This is true of larger turbo generator sets for auxiliary use or when auxiliary turbo generator sets are arranged in complete units. The more usual practice, however, has been to have one auxiliary condenser receiving the exhaust from all turbo generators. In this case, seamless drawn copper for small pipes (10" and under) and built up copper pipe for larger sizes are used. Expanded and brazed forged steel flanges, brazed copper fittings and iron body valves are common. The exhaust is often led to the main condenser during sea service for economy.

The exhaust from deck auxiliaries should be galvanized.

The contaminated evaporator system is for the purpose of supplying steam to oil heaters and heating coils from an evaporator instead of direct from the main boilers, thus preventing any possibility of contaminating the feed to the main boilers with oil. On some designs the heating system steam has also been taken from this system.

Low pressure fresh Water System is recommended to be copper but may be seamless steel, electric resistance or lap welded

steel or for small sizes seamless drawn brass. When of copper, expanded and brazed or silver brazed bronze flanges, fittings, and valves are desirable; sheet rubber with wire or cloth insertion or compressed asbestos gaskets are used. For small sizes ground joint unions of bronze or malleable iron may be used.

Piping for the salt water systems might be selected as galvanized wrought iron for the fire, sanitary and plumbing and deck drains; built up copper for very large and seamless drawn copper for circulating lines and miscellaneous services; and wrought iron or seamless drawn steel for calcium chloride brine. Bolted ring unions ("Victaulic" or "Rolagrip" type) may be used on the bilge and ballast; other systems would preferably be expanded, socket welded, or silver brazed flanges, fittings and valves. Sheet rubber or compressed asbestos are generally suitable for gaskets.

The main circulating system is provided with a low suction for use at sea and a high suction for use in shallow water, and an emergency suction thru a non-return valve from the bilge. The discharge is through the main condenser and overboard. The lube oil coolers are usually circulated from the same line by a connection from the discharge to the main condenser and led back into the overboard discharge. The same method is used to circulate cooling water through the air coolers for the main generators on turbo electric ships. For high speed vessels, generally above 18K designed speed, scoops are used for ahead operation and a propeller type pump of small capacity installed in the line for maneuvering and particularly for astern operation. The auxiliary and other circulating systems are generally a miniature of the main system.

Lines to the aft portion of the vessel are run in the shaft alley to centrally located manifolds to tail pipes leading to each tank. The tail pipes serve as both suction and discharge lines. Those for double bottom tanks are led directly to the manifolds, those from deep tanks where the head of the liquid could flood portions of the ship in case of damage, require deck operated valves inside the tank. Where tanks are of considerable size and damage to a tank on one side of the vessel could cause considerable list, cross connections are provided so that both sides

may be flooded in the same manner. These cross connections have deck operated valves also.

Inside the engine room a fuel oil filling line (also serving as a deck discharge) is led to a six valve manifold from which the fuel oil settling tanks may be filled through the tail pipes with deck operated valves, and all fuel oil storage tanks may be filled through either or both the fuel oil suction and discharge mains.

The fuel oil transfer pump takes its suction from any tank or from the sea through the suction main. It discharges to any tank or overboard through the discharge main. In an emergency it can discharge to the oil and water separator through a reversible ell.

The ballast pump takes suction from the fuel oil and ballast suction main, the sea, and in an emergency through a reversible ell from the bilge system. It discharges through stop checks to the F. O. and ballast discharge main as a transfer pump, the oil and water separator and overboard as a bilge pump.

The general service pump takes suction from the bilge main, the sea, the clean ballast main, and in an emergency from the fuel oil and ballast main through a reversible ell. It discharges to the clean ballast main for filling, overboard as a bilge pump, to the oil and water separator, and in an emergency to the fuel oil and ballast discharge main through a reversible ell as a transfer pump.

The fuel oil service standby pump connection is for stripping the settling tanks, through the low suction. The cross connection between the settling tanks is for damaged stability. The clean ballast connection to the refrigerator condenser circulation is for use when the vessel is in drydock when circulating water is not obtainable.

Deck operated valves are required where compartments may be damaged by a break in the pipe line and when run near the shell of the ship, the deck operated valve must be stop check lift valves.

Narrow compartments sometimes have a single bilge suction, but most compartments have one port and one starboard so that

it may be maintained dry when the vessel lists. The suction is usually at the after end of any compartment, since most vessels will be trimmed by the stern.

For design pressures above 600 lbs., 750° F. carbon molybdenum steel piping, valves and fittings are recommended. For lower pressures and temperatures, seamless drawn low carbon steel piping is used. The pressure drop through the boiler plus about 5 pounds, is deducted from the design drum safety valve setting to obtain the safety valve setting at the superheater outlet. This is to assure the superheater safety valve being the first valve to blow.

The size of piping is normally based on an approximate pressure drop of from 5 to 10% of the superheater outlet pressure.

To make it possible to limp home under almost any emergency, various emergency cross-connections are provided and stored aboard the vessel. If the low pressure turbine should be damaged, a cross-over pipe is provided to permit the H. P. turbine to exhaust to the main condenser direct. If the H. P. turbine is down, the H. P. turbine can be blanked off and an emergency connection made from the de-superheater main to the L. P. turbine chest. The auxiliary turbo generators take their steam from the main steam line from either or both boilers as shown. They are also provided with a connection from the de-superheated steam line for emergency operation.

Consideration must be given to the layout of the steam lines to permit operation of the auxiliaries during the annual hydrostatic test required by the Coast Guard without shutting down the entire ship. This annual test is 150% hydrostatic from the main boiler to the throttle valve. Care must be taken that during this test steam will not be on one side of a valve with water on the other side.

The main steam is ordinarily the largest and least flexible of all of the steam lines on the vessel and is usually the first piping arrangement to be made. It should be as short and direct as possible, avoiding any pockets and sloping either towards the boiler or the turbine. If pockets are not avoided, they must be drained. By-passes are provided around valves to prevent wire

drawing through the valve seat while warming up the turbines and to permit equalizing the pressure before opening the main valve. Because the main steam line is short and flexibility is difficult to obtain, connections with large castings should be avoided; the auxiliary connections should be made from other lines if possible. Welding has not been widely used for main steam lines, but with the advent of higher pressures and temperatures will be used, I am sure, to a greater extent. Where used, it is preferable to have welded sections with a few flanges which will permit removal of the lines for overhaul.

The contaminated evaporator is provided with a reducing valve maintaining a pressure on the coils as required up to 250 pounds in order to maintain 100 pound pressure on the evaporator shell. The vapor from the evaporator is then used for all oil heating services, fuel oil heaters, steam smothering and steaming out, lube oil purifiers and tanks, fuel oil heating coils and oil and water separator.

The other auxiliaries take steam reduced from boiler pressure to about 150 pounds. A shore connection is brought into this line and an emergency cross connection made to the contaminated evaporator vapor line.

The auxiliaries are the whistle, clean out connections to sea chests, reciprocating pumps, steam hose connections and turbine gland sealing steam and steam through a reducing valve to make-up and salt water evaporators and to the heating system.

What has been said may give you some idea of the many and the varied nature of the piping systems used aboard merchant vessels. Anything that might be said in this discussion could hardly convey the whole picture. The systems described have been for one type of ship. Practically every new feature added to the vessel and every new application of design introduces new problems for the marine piping designer. It is only hoped that I may have added something to your knowledge and interest in our marine piping problems.

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H. M.: Honorary Member	J.: Junior Member
L. M.: Life Member	N. R. J.: Non-Resident Junior Member
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- ENSIGN HAROLD ANDREW TIMKEN, JR., (N. R. J.), (1944), *Electrical Engineer*, U. S. Naval Reserve. Mail: 5922 Laurel St., New Orleans, 15.
- MAJOR JOHN PAUL TOBIN, (N. R. J.), (1940), Corps of Engineers, U. S. Army, Foreign Duty.
- JAMES M. TODD, (1923), *Mechanical and Electrical Engineer*, Consulting Engineer, James M. Todd. Home: 17 Richmond Place. Mail: 410 Maritime Bldg., New Orleans, 12.
- SIDNEY E. TROUARD, JR., (1928), *Electrolysis Engineer*, New Orleans Public Service, Inc. Home: 2328 Gen. Taylor St. Mail: 317 Baronne St., New Orleans, 9.

- WILDAY TUDURY, (1941), *Mechanical Engineer*, Dixie Machine Welding & Metal Works, 1031 Annunciation St. Mail: 155 Homestead Ave., Metairie, New Orleans, 20.
- WILLIAM NEWTON TULLER, (S), (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*, Resident Engineer and Chief Inspector, Travelers Insurance Co., 2830 Palmer Ave. Mail: 611 Union Bldg., New Orleans, 12.
- W. O. TURNER, (1931), President and General Manager, Louisiana Power & Light Co., 142 Delaronde St., Algiers, 14, La.
- JOHN R. TUSSON, (N. R. J.), (1942), *Chemical Engineer*, 1109 Columbia Ave., Sheffield, Ala.

— U —

- WILLIAM URBAN, JR., (N. R. Aff.), (1942), *Construction Engineer*, Address unknown.

— V —

- ROBERT H. VAUGHAN, (S), (1942), *Civil Engineer*, District Construction Engineer, La. Dept. of Highways, 1508 East Kings Highway. Mail: P. O. Box 38, Shreveport, La.
- LT. (j.g.) WALTER J. VERLANDER, (N. R. J.), (1942), *Mechanical Engineer*, U. S. Naval Reserve, Foreign Duty. Mail: 1140 Louisiana Ave., New Orleans, La.
- 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*, President, Ford, Bacon & Davis, Inc., 39 Broadway, N. Y. C., Green Acre Lane, Westport, Conn. Mail: 39 Broadway, New York, N. Y.
- ALVIN A. VOSS, (N. R.), (1927), *Civil Engineer*, Assistant Structural Engineer, U. S. Government, Naval Air Station. Mail: 1420 E. Lee St., Pensacola, Fla.

— W —

- FRANK H. WADDILL, (L. M.), (1910), *Civil Engineer*, 2003 Ursuline Ave. Mail: 1240 Canal Bldg., New Orleans, 12.
- GEORGE D. WADDILL, (L. M.), (1911), *Civil Engineer*, Senior Engineer, U. S. Mississippi River Commission, Vicksburg, Miss. Mail: 7433 Maple St., New Orleans, 18.
- 1st LT. BATAILLE HARRISON WADE, (S), (1942), *Civil Engineer*, U. S. Army. Mail: Box 307, Jennings, La.
- LT. RICHARD E. WAGNER, (N. R.), (1933), *Civil Engineer*, U. S. Naval Reserve, Assistant Yard Officer and Safety Engineer, U. S. Naval Air Station, Miami, Fla. Home: 4201 Elba St., New Orleans. Mail: U. S. Naval Air Station, Miami, Fla.
- ARTHUR L. WALKER, (1943), *Civil Engineer*, Vice-President, Sternberg Dredging Co. Home: 1229 Neptune St., Memphis, Tenn. Mail: 1709 Pere Marquette Bldg., New Orleans, 12.
- J. D. WALKER, (L. M.), (Jan. 8, 1908), *Civil Engineer*, Partner, Craven-Lang Co. Home: 1104 Nashville Ave. Mail: 2500 Poydras St., New Orleans, La.
- WAYNE PAUL WALLACE, (S), (1936), *Civil Engineer*, Assistant Professor of Civil Engineering, Louisiana State University, 420 Stanford Ave. Mail: Atkinson Hall, Louisiana State University, Baton Rouge, 3, La.
- WILLIAM WALLACE, (L. A.), (1931), *General Contractor*, Owner, 131 No. Jefferson Davis Parkway, New Orleans, 19.
- CAPT. STEPHEN J. WALLBILICH, (N. R.), (1926), *Civil Engineer*, C. of E., U. S. Army, Assistant Post Engineer, Harlingen Army Air Field. Mail: 312 E. Harrison St., Harlingen, Texas.
- KYLE WARD, JR., (1941), *Chemical Engineer*, Chief, Cotton Fiber Research Division, Southern Regional Research Laboratory, 2100 Robert E. Lee Blvd. Mail: 937 Wilson Drive, New Orleans, 19.
- HARRY W. WATERFALL, (S), (1937), *Mechanical Engineer*, Professor and Head Of Mechanical Engineering, Louisiana State University, 416 State St., Baton Rouge, La. Mail: College of Engineering, Louisiana State University, Baton Rouge, La.

- THOMAS A. WATSON, (S), (1942), *Civil Engineer*, Industrial Sales Engineer, Gulf States Utilities Co., 340 Florida St. Mail: 3340 Hollywood Dr., Baton Rouge, La.
- HARRY WAUGH, (S), (1941), *Civil Engineer*, Road Design Engineer, La. Dept of Highways. Mail: 2707 Morning Glory Ave., Baton Rouge, La.
- 1st LT. ALVIN A. WEHRMANN, (N. R.), (1940), *Civil Engineer*, Corps of Engineers, Address unknown.
- LEO S. WEIL, (1920), *Consulting Engineer*, Leo S. Weil & Walter B. Moses. Home: 478 Broadway. Mail: 801 Audubon Bldg., New Orleans, 16.
- CHESTER O. WEILBACHER, (N. R. J.), (1940), *Electrical Engineer*, Designer of D. C. Machines, Allis-Chalmers Company, Electrical Dept., Milwaukee, Wis. Mail: 1710 S. 76th St., West Allis, 14, Wis.
- LEON C. WEISS, (1918), Weiss, Dreyfous & Seiferth, Architects, 7425 Dominican St., New Orleans, 18.
- WILLIAM WHIPPLE, (S), (1936), *Mechanical Engineer*, Professor of Steam Engineering, Louisiana State University, 4666 Vanderbilt Drive. Mail: Box 8524, University Station, Baton Rouge, La.
- RICHARD KNOWLES WILKERSON, (S), (1943), Chief Engineer, Gulf States Utilities Co. Mail: 4085 Park Drive, Baton Rouge, La.
- LAWRENCE V. WILLEY, (S), (1939), *Construction Engineer*, Robinson & Young, Contractors. Mail: 430 Centenary Dr., Baton Rouge, 14, La.
- ROBERT W. WILLIAMS, (S), (1940), *Chemical Engineer*, Process Engineering Division, Standard Oil Company of La. Mail: 2936 Adams Ave., Baton Rouge, La.
- 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*, Estimator and Engineer, W. Horace Williams Co., 833 Howard Ave. Mail: 2611 Octavia St., New Orleans, 15.
- CHARLES S. WILLIAMSON, (1916), *Chemical Engineer*, Head, Chemical Engineering, Tulane University, 1334 Webster St. Mail: Chemical Engineering, Tulane University, New Orleans, 15.
- CAPT. GEORGE F. WILLIAMSON, (N. R. J.), (1939), *Civil Engineer*, Operations Officer, Bn. 3, U. S. Marine Corps, Engineer Battalion Headquarters. Mail: Headquarters, Engineer Bn., TC, Camp Lejeune, N. C.
- VICTOR L. WILLOZ, (L. M.), (Jan. 1, 1900), Distribution Engineer, New Orleans Public Service, Inc., 4439 So. Miro St. Mail: 317 Baronne St., New Orleans, 9.
- FRIEND ASBURY WILSON, JR., (S), (1943), *Mechanical Engineer*, Assistant to Superintendent, Gulf States Utilities Co. Mail: 4125 Shelley St., North Highlands, Baton Rouge, La.
- JAMES NORMAN WILSON, SR., (L. M.), (1911), *Mechanical Engineer*, Sewerage & Water Board of New Orleans, 8821 Spruce St. Mail: 2425 Audubon St., New Orleans, 18.
- LT. COMDR. A. R. WINGATE, JR., (N. R.), (1923), *Civil Engineer*, U. S. Naval Reserve. Home: 1525 Exposition Blvd., New Orleans, 15. Mail: Acorn Tradet, Port Hueneme, Calif.
- WILLIAM A. WINTZ, JR., (S), (1942), *Civil Engineer*, Instructor in Engineering Mechanics and Civil Engineering, Louisiana State University. Mail: 3029 Highland Road, Baton Rouge, La.
- GUY WILLARD WITMER, (S), (1943), Maintenance Foreman and Assistant Maintenance Engineer, Louisiana Steam-Electric Generating Station. Mail: 1870 Walnut St., Baton Rouge, La.
- A. ALFRED WOODS, (L. M.), (1914), *Civil Engineer*, Chief Engineer, Maintenance of Way and Structures, Southern Railway System, Western Lines. Home: 2492 Observatory Road. Mail: 307 East 4th St., Cincinnati, 2, Ohio.
- D. F. WOODS, (S), (1922), Litcher, La.
- JOHN KING WOOLF, (1943), *Civil Engineer*, Member of Firm, W. Horace Williams Co., 1825 Calhoun St. Mail: 833 Howard Ave., New Orleans, La.
- CHARLES J. WYLER, (1919), *Mechanical Engineer*, Assistant Chief Engineer, A. M. Lockett & Co., Ltd., 308 Whitney Bank Bldg. Mail: 530 Jackson Ave., New Orleans, 13.

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LOVETT YOUNG, (S), (1943), *Chief Chemist*, Gulf States Utilities Co. Mail: 2404 Hale St., Baton Rouge, La.

— Z —

- MARIO G. ZERVIGON, (1943), *Electrical Engineer*, Assistant Professor of Electrical Engineering, Tulane University. *Home*: 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.

Student Members

- ENSIGN WILLIAM S. ADAMS, 2101 Elliot St., Alexandria, La.
- ENSIGN R. WORTLEY BATTY, JR., 5007 Perrier St.
- ENSIGN ARTHUR B. BUSH, 5107 Conti St.
- EDWIN ROBERT COUSINS, 3301 Baudin St.
- TIMOTHY A. CRAIN, 8002 Willow St.
- GEORGE L. CUNNINGHAM, JR., 9 Trianon Plaza
- ENSIGN DAVID D. DAVIS, 3016 Tulane Ave.
- WALLACE B. DIBOLL, JR., 7428 Benjamin St.
- ENSIGN ERNEST S. GAIENNIE, JR., 4602 Banks St.
- JAMES E. HASSINGER, JR., 2021 So. Carrollton Ave.
- ENSIGN RICHARD A. HEEHS, 73 Popular Ave., Memphis, Tenn.
- ENSIGN WARREN E. IBELE,
- ENSIGN OWEN V. LEBLANC, 2927 Bell St.
- ENSIGN ROBERT E. LEBLANC, III, 715 Exposition Blvd.
- ENSIGN ALLISON M. LEVY, 1930 Robert St.
- GEORGE LONG, 1542 Calhoun St.
- ENSIGN WARD C. PURDUM, 520 So. Scott St.
- LOUIS J. ROSENBOHM, 347 Joseph St.
- EDWARD LOUIS SCHNEIDER, 221 So. Genois St.
- ENSIGN JAMES K. SIMPSON, 2921 Leonidas St.
- CHARLES E. STEIDTMANN, JR., 1421 Hillary St.
- SAM J. STOKES, 4460 Music St.

Summary

Honorary Members	2
Charter Members	3
Life Members	39
Local Members	211
State Members	144
Non-Resident Members	72
Associate Members	2
Local Affiliate Members	14
State Affiliate Members	1
Non-Resident Affiliate Members	1
Local Junior Members	29
State Junior Members	11
Non-Resident Junior Members	30
Members: Unknown Address	8
Student Members	22
Total	589

Past Presidents

*Sidney F. Lewis.....	1898	R. S. Manley.....	1921
*Thos. L. Raymond	1899	Donald Derickson	1922
Henry J. Melochee.....	1900	*J. S. Bareli.....	1923
*Frank M. Kerr.....	1901	James M. Robert.....	1924
*Alf. F. Theard.....	1902	Marcel Garsaud	1925
*Alf. Raymond	1903	Farrar P. Hamilton	1926
J. F. Coleman.....	1904	Edward S. Lanphier	1927
W. B. Wright.....	1905	John L. Porter	1928
*W. H. Hoffman	1906	Frederick H. Fox	1929
*G. L. Lawes.....	1907	James M. Todd	1930
*C. W. Wood	1908	*Frank G. Frost	1931
*J. T. Eastwood.....	1909	Frederick N. Billingsley	1932
W. B. Gregory.....	1910	John H. O'Neill	1933
*J. C. Haugh.....	1911	A. L. Dunlap.....	1934
D. S. Anderson.....	1912	Edward S. Bres.....	1935
*A. M. Shaw.....	1913	Allen S. Hackett.....	1936
W. H. Williams.....	1914	C. S. Williamson.....	1937
*L. C. Datz.....	1915	Bernard H. Grehan.....	1938
*Samuel M. Young.....	1916	David W. Godat.....	1939
A. T. Dusenbury	1917	William H. Rhodes.....	1940
John Klorer	1918	David W. Stewart.....	1941
Ole K. Olsen.....	1919	C. Glenn Cappel	1942
John Reiss	1920	Karl P. Kammer.....	1943

* Deceased:

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board, January 3, 1944

The meeting was called to order with the following members present: Kammer, Cappel, Gosa, Leake, Nairne and Mayer. The minutes of the last meeting were read and accepted.

The question of organizing a bargaining agency to represent the professional engineers in the State of Louisiana was discussed. It was voted that the President of the Louisiana Engineering Society invite the various local sections of the National Engineering Societies to each appoint two members from their officers to meet with officials appointed from the Society for discussing the organization of a collective bargaining agency for professional engineers. This group is to be known as the Committee on Employment Conditions and is to report its findings back to the Board of Direction. It was decided that the incoming president and two other members of the Board to be selected by him represent the Society on this committee. The new president is also to contact the local sections inviting them to make appointments to the committee mentioned above.

Mr. Leake reported that as yet he had been unable to obtain the necessary information to prepare an obituary on the death of Mr. L. P. Elberson. Another attempt to secure this information is to be made.

The resignation of Mr. F. W. Edwards of State College, Pennsylvania, was accepted with regret. Messrs. Charles H. Fenstermaker of Oakdale, Louisiana and A. Arthur Woods of Cincinnati, Ohio were transferred to the grade of Life Member by virtue of having paid dues in the Society for thirty years.

A financial report and a membership were rendered by the Secretary-Treasurer. Summaries of these reports are to be presented at the Annual Meeting and the complete reports published in the February issue of the Proceedings.

A letter from the New Orleans Association of Commerce was read, requesting that the Society donate to a Postwar Reserve Fund. It was voted that no such donation be made.

President Kammer thanked the members of the Board for their cooperation during the year and especially for carrying on during his illness. Mr. Cappel, in retiring from membership on the Board, expressed his pleasure upon having served thereon. There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

The Minutes of the Meeting of the Board, December 6, 1943

The meeting was called to order by President Kammer with the following members present: Cappel, Gosa, Kerr, Kuhn, Nairne and Mayer. The minutes of the last meeting were read and accepted.

Mr. Kuhn stated that he had no report to make at this meeting relative to plans for the organization of an Engineers Club in New Orleans. It was voted to appropriate \$600.00 to cover the expenses of the Annual Meeting of the Society in January, 1944. It was decided that the old Public Ad-

dress System be donated to the Department of Electrical Engineering, Tulane University to use as may be desired.

A letter from Mr. F. E. Johnson, Jr., Secretary-Treasurer, New Orleans Section, A.I.E.E. was read. This letter called the attention of the Board to a section of the minutes of the meeting of the New Orleans Section, A.I.E.E. regarding the organization of an Engineers Club in New Orleans as a post-war project. This was noted and referred to Mr. Kuhn, Chairman of the House Committee, who is now considering the matter.

A letter ballot was ordered for the following applications for membership: these applications have been approved by Membership Committee "B".

For Member

Albert Mangum Alexander
John O. Burnett
James T. Doyle
Lonnie Cothran Eldridge
Marshall Brookshire Ewing

Charles P. Knost
Henry F. Lewis
Robert Lobstein
George F. Shelly

For Junior Member

James H. Derr, Jr.

Wendel J. Lechtenberg

For Transfer from Junior Member to Member

William H. Bohne
Thomas G. Broussard
Wallace V. de Gruy
P. Leon Godchaux
Donato E. Guiza

Robert N. Habans
Edward L. King
Wilday Tudury
George F. Williamson

For Transfer from Student Member to Junior Member

Harold A. Timken, Jr.

A letter from the New Orleans Association of Commerce was read requesting the Society to consider material submitted regarding the introduction in the next session of the Louisiana Legislature of a resolution in the support of a proposed constitutional amendment to impose taxes on income, inheritances, and gifts to a maximum rate of 25%. The Secretary was directed to write Mr. Devlin, Chairman, State Legislation Committee, New Orleans Association of Commerce, that the matter had been taken under advisement and that appropriate action would be taken.

The Secretary read a letter which had been mailed on November 26 to sixty-two members who were delinquent in whole or in part for 1943 dues. It was announced that to date eighteen of these members had paid up.

The meeting was adjourned at 8:15 in order that the members of the Board might attend a meeting of the Board of Directors of the various local engineering groups for a discussion of the effect of unionism upon the engineering profession.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with the New Orleans Section, A.I.E.E., December 13, 1943

The meeting was called to order by President Kammer with approximately 200 members and guests present. The minutes of the last meeting were read and accepted.

Lieutenant W. J. Thomas, U.S.N.R., representing the Office of Naval Officer Procurement, made a brief plea for those present to assist in securing technical engineers for the United States Navy.

Mr. C. G. Cappel, Chairman of the Nominating Committee, reported the following nominations for 1944:

Charles M. Kerr, President
Reinhard A. Steinmayer, First Vice-President
Leo J. Lassalle, Second Vice-President
John K. Mayer, Secretary-Treasurer
Robert E. Gosa, Director
L. K. Nelson, Director

President Kammer then turned the meeting over to Chairman Charles P. Knost of the New Orleans Section, A.I.E.E., who requested Mr. Oliver to introduce the speakers on the program.

Mr. Oliver introduced Mr. Bolte, Manager, Gulf District Sperry Gyroscope Company, who gave a brief history of the development of the practical applications of the gyroscope, and mentioned a number of its varied uses. Mr. Bolte then introduced Mr. Robert M. Cust, Marine Instructor, Sperry Gyroscope Company. Mr. Cust first showed a sound motion picture on "The Marine Gyro-compass and Gyro-pilot" and explained the development and principal features of these instruments. Electricians Mate 1/C, Guy Staples, U.S.N.R., assisted in demonstrating the action of the Gyroscope. Mr. Bolte next introduced Mr. N. J. Hutchins, Aero-Engineer, Sperry Gyroscope Company, who first presented a film on "Automatic Gyro-pilot for Aircraft." He then further explained the operation of these instruments. Mr. Bolte then returned the meeting to Mr. Oliver who thanked the speakers for presenting such interesting material. Chairman Knost and President Kammer expressed the thanks of the A.I.E.E. and L.E.S. in turn.

Professor R. A. Steinmayer introduced several members of the New Orleans Geological Society who were in attendance and also extended to those present an invitation to attend a coming illustrated lecture by Dr. Fred M. Bullard on "Paratutin—The World's Newest Volcano."

The meeting was then adjourned so that those present could witness a demonstration of a marine gyro-compass and numerous gyroscopic aircraft instruments which had been set up by the Sperry Gyroscope Company.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Annual Meeting of the Society, January 13, 1944

The meeting was called to order by President Kammer with approximately 259 members and guests present. The minutes of the last meeting were read and accepted. President Kammer introduced the Chairman of the various local engineering groups and distinguished guests.

Mr. A. B. Paterson, District Chairman, Committee for Economic Development, presented an interesting and informative key-note address on "Planning for Louisiana's Post War Problems."

The financial report and the membership report for the year 1943 were presented by the Secretary-Treasurer. President Kammer presented his annual report reviewing the activities of the Society for the past year and mentioning some of the problems for the future.

The recipients of the University Scholarship award, the Junior Membership award, and Life Memberships in the Society were announced by

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John O. Burnett	Henry F. Lewis
James T. Doyle	Robert Lobstein
Louise Cothran Eldridge	George F. Shelly
Marshall Brookshire Ewing	

For Junior Member

James H. Derr, Jr.	Wendel J. Lechtenberg
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For Transfer from Junior Member to Member

William H. Bohne	Robert N. Habans
Thomas G. Broussard	Edward L. King
Wallace V. de Gruy	Wilday Tudury
P. Leon Godchaux	George F. Williamson
Donato E. Guiza	

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J. K. MAYER,
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L. K. Nelson, Director

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J. K. MAYER,
Secretary-Treasurer.

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The recipients of the University Scholarship award, the Junior Membership award, and Life Memberships in the Society were announced by

President Kammer. Mr. C. G. Cappel, Chairman of the Nominating Committee presented the teller's report and requested certain members of the Society to escort the newly elected officers to the front. The following incoming officers were then presented to the membership:

Charles M. Kerr, President
Reinhard A. Steinmayer, First Vice-President
Leo J. Lassalle, Second Vice-President
J. K. Mayer, Secretary-Treasurer
R. E. Gosa, Director for two years
L. K. Nelson, Director for two years

Retiring President Kammer then handed the gavel to President-Elect Kerr who made a few brief remarks outlining plans for the year. Several announcements were made regarding other events on the meeting program.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Board, January 24, 1944

The meeting was called to order by President Kerr with the following members present: Kammer, Lassalle, Leake, Nairne, Nelson, Steinmayer and Mayer.

A letter from Col. V. J. Bedell addressed to the Board regarding waive of dues for members in the armed services was read. This letter is to be answered by President Kerr.

The program of the activities of the Society for the coming year was discussed. The chairmen of the various standing committees were selected and tentative personnel of these committees. The committee personnel is to be notified of appointment by the Secretary after approval is received from all chairmen.

The following District Contact Representatives were selected for 1944: 3rd District, Paul T. Seashore; 4th District, A. F. Flournoy; 5th District, J. E. Jarman; 6th District, N. E. Lant; 7th District, Theo T. Chenet; 8th District, Waldemar S. Nelson.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

ANNUAL REPORT

BY

PRESIDENT, LOUISIANA ENGINEERING SOCIETY

1943*

As you know, it is customary for the outgoing President of this Society to make an annual report of the outstanding features of the past year. From its records, I am sure that such an annual report has been prepared for a period of at least the past ten years. Whether or not this procedure dates back to the original foundation of this Society in 1898 cannot be proven by me. Such an annual report may be entirely boring to a large number of members here present. Surely there is no question but that it is a definite necessity if the membership at large is going to understand the general conditions of such a Society as this at the present time.

Before going into this report, let me first apologize for my inability to carry on as President due to my illness for approximately the first four months of this year; and secondly, let me particularly thank Mr. Charles Kerr, First Vice-President of the Society, for the active and outstanding way that he has conducted the affairs of this Society during that same period; and thirdly, let me also thank the Members of the Board who backed up Mr. Kerr wholeheartedly, and their results are clearly shown in this report.

There is no doubt but that the principal worry, which has faced the two past Presidents and the outgoing President of this Society for the past three years, has been the present war situation, its effect on the membership, and the resulting activity of the Society as a whole. Could the transfer of men into military service, the question of gasoline rationing, long hours of work facing the engineers, the transfer of engineers to other sections of the country; could these factors result in complete inactivity? Gentlemen, let me state that this principal worry has turned out to be nothing but a myth.

*Presented at the Annual Meeting of the Society, January 13, 1944 by Retiring President Kammer.

You have just heard the annual report of our Secretary-Treasurer Mr. J. K. Mayer. We have at present the largest membership that has ever existed in the history of the Society, approximately 600. Of this membership about one hundred are in active military service.

A second major worry to your President has been the increase in financial cost for conducting the affairs of such a Society. Again referring to our Secretary-Treasurer's report, we find that the Society has ended the year with an increased asset of \$528.52. Let us also admit that the membership and guests attendance at the monthly meetings of this Society has been unusually fine this year, and this has no doubt been caused chiefly by the speakers' subjects dealing to a large extent with engineering details pertaining to war conditions, war materials, and military equipment.

Let me now review for your attention the principal events which have occurred during the past year:

Early in the year the Baton Rouge Section, which as you know has become a very active Section, requested an increase in funds extended to them on the basis of the number of members represented in this Section. While the Board generally agreed that increased funds are distinctly necessary in conducting such a Section, an amendment to the constitution was in order. This amendment was finally passed, which resulted in doubling the refund to the Section from \$1.50 to \$3.00 per member.

You may recall also, during the summer period of this year, this Society took a definite part at the hearing conducted by Gen. Tyler regarding the Tidewater Ship Canal from New Orleans to the Gulf. A resolution in favor of this outlet was passed almost unanimously by this Society, and a copy of this resolution was sent to the War Department, United States Engineers, New Orleans District.

Active consideration was given to the possibility of forming another Section to the Society in Lake Charles. Stimulating this possibility was accomplished greatly by the work of our

First Vice-President Mr. Kerr, several Members of the Board, and also several Members of the Board of the Baton Rouge Section. While no section chapter has been established in the City of Lake Charles, we know that the membership in that city has increased considerably, and we feel sure that in the early part of this coming year sufficient members will be available to make possible the establishment of such a Section.

You will recall that in September an announcement was made that an addendum to the "Soil and Foundation Survey", prepared by the Highway Department of the State of Louisiana, has been accomplished, principally through the effort of the Louisiana Engineering Society. There is no question but that the preparation of this addendum is of great interest to the civil engineers of this State.

The question of maintaining the membership of men in the armed services by the reduction in dues, which had definitely been established during the previous year, was brought up from the floor by several members at a regular monthly meeting, to consider the elimination of dues entirely. The Board decided to make an active study of this possibility and to determine the best procedure to follow. The result of the report as to the outcome of this investigation showed that approximately 90% of about one hundred members in the armed services were maintaining their active membership. As a result of this outcome, the Board decided that no change in the dues set up for men in the armed services should be made.

During the latter part of the year a very important consideration came up concerning the effect of unionization of engineers throughout the country. Two special meetings of the Board of this Society were held jointly, during the month of December, with representatives of the officers of the various local sections of the founder societies. As a result of these meetings, there was no question to all parties concerned that at the present time unionization is a distinct problem facing professional engineers. The method of combating this problem has not been definitely decided, but several joint committees are to be appointed to carry on and to obtain the best solution.

While the above paragraphs survey chiefly the outstanding items of the year, there is no doubt but that the joint meeting with the local sections of other societies stimulated to a great extent the interest in such meetings. Joint meetings were held with the American Society of Mechanical Engineers in February, Illuminating Engineering Society in April, American Society of Civil Engineers in December, American Institute of Chemical Engineers in November, and the American Institute of Electrical Engineers in December, as well as the Woman's Auxiliary of the Louisiana Engineering Society for which purpose a special meeting was called during the month of August. The usual procedure of holding a joint meeting with the Baton Rouge Section was followed this year, which was presided over by President F. F. Pillet and held during the month of July. Many members of the Society traveled to Baton Rouge from New Orleans to attend what resulted in one of the finest meetings and the largest attendance ever held in Baton Rouge.

To leave the serious phase of the activities of the Society, we can state that the largest attendance on record took place at the annual banquet and dinner dance held in January of this year, when almost three hundred members and guests took an active part in this enjoyable occasion.

The golf tournament held in August proved again to be a very enjoyable stag affair, at which the attendance and activity showed no decrease.

Before closing this report, I would like to thank again Members of the Board consisting of Mr. Kerr, Mr. Steinmayer, Mr. Mayer, Mr. Cappel, Mr. Gosa, Mr. Leake, Mr. Kuhn and Mr. Nairne for their intense interest during the entire year. I am sure their experience with this Board has been as active, or possibly more so, than any in the past years. Mr. Seago, Chairman of the Technical Papers Committee, I must compliment on the excellent job which he personally has accomplished. An active part was taken by the Publicity Committee under Mr. Naquin, the Membership Committee Division "B." under Mr. McNiven, Entertainment and Outings Committee under Mr. Bell, Employment Committee under Mr. Fithian, Finance Com-

mittee under Mr. Olsen, and the other Committees whose chairmen have taken under advisement any special proposals which were advanced to them.

In closing, let me state that several major problems will be carried over into the coming year under the jurisdiction of the new President. One of these problems will again be the possibility of passing the state engineers license law before the State Senate will, no doubt, meet this year. The other problem, which has previously been mentioned, is that of unionization of engineers which is facing this country today. In serving for one more year as an ex-officio member of the Board, let me offer my services to the Louisiana Engineering Society in any way that I may assist, not only in an attempt to build up this Society, but also to build up and stabilize this grand nation of which we are all so proud today.

FINANCIAL REPORT OF THE SECRETARY-TREASURER FOR 1943**Receipts, 1943:**

Dues	\$3,566.90
Advertising	368.74
Pro-Rata from Joint Meetings	94.68
*Income from Investments	116.69
Liq. Dividends from Frozen Funds	216.78
Profit on Sale of Certificates and Buttons	6.83
Sale of Proceedings	3.40

Total Receipts	\$4,374.02
----------------------	------------

Expenses, 1943:

Cost of Proceedings	\$1,138.50
Golf Tournament, deficit	107.26
Scholarships	290.00
Printing, Postage and Stationery	433.07
Presents to Retiring President	36.35
Refreshments at Meetings	290.34
General Expense	119.91
Payments to Baton Rouge Section	191.13
Salary, Secretary-Treasurer	700.00
Salary, Maid, 422 St. Charles Hotel	30.00
Annual Meeting, 1943	475.94
Annual Meeting, 1944, (partial)	13.00
Library Expense	18.00

Total Expenses	\$3,845.50
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Total Receipts	\$4,374.02
----------------------	------------

Total Expenses	3,845.50
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Net Income	\$ 528.52
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Assets, December 31, 1943:

Cash, Whitney National Bank, Checking Account	\$1,717.82
Columbia Building & Loan Association	356.23
Commonwealth Bldg. & Loan Association	305.11
Greater New Orleans Homestead Association	1,406.06
Security Building & Loan Association	500.00
Sixth District Bldg. & Loan Association	500.00
Union Homestead Association	500.00
Series F, U. S. Bond (1942)	742.00
Series F, U. S. Bond (1943)	740.00
Savings Acct., Nat'l. Bk. of Commerce	764.54

Total Insured Investments	\$5,813.94
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Total Available Assets	\$7,531.76
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Frozen Funds:

Canal Bank & Trust Co., Book value	\$ 173.57
Interstate Bank & Trust Co., Book value	1,726.03

Total	\$1,899.60
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* Includes \$49.94 credited to accounts, but for which no checks were received.

MEMBERSHIP REPORT FOR 1943

Members Elected:

Members	50
Affiliate Members	1
Junior Members	6
*Student Members	21
Total	<u>78</u>

Changes in Grade of Membership:

From Member to Life Member	2
From Affiliate Member to Member	1
From Junior Member to Member	9
From Student Member to Junior Member	13

Members Lost:

Dropped for delinquent dues	48
Resignations	11
Deaths	<u>2</u>
Total	61

Members in the Armed Forces	112
Total Membership on December 31, 1943	595

* Total number of Student Members.

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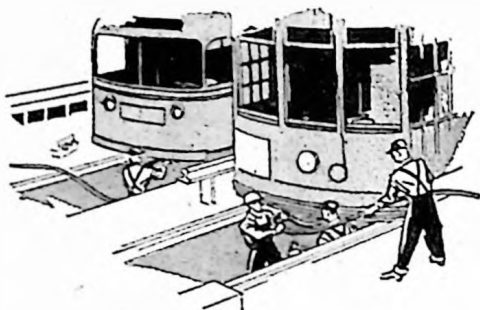
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FEBRUARY, 1944

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OF THE

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EDITORIAL NOTES AND COMMENT

Our March Meeting. Our March meeting was one of the most interesting the Society has ever held. There were five speakers on the program. Mr. M. A. Scott, Superintendent of the American Sugar Refining Co. delivered a very interesting paper; also Messrs. A. W. Chapman of Celotex Corp., P. F. Jahneke of Jahneke Service, Inc., H. A. Sawyer of Lone Star Cement Corp., and C. L. Nairne of New Orleans Public Service, Inc.

Facts and historical background of the various New Orleans enterprises were outlined by the speakers. Two of the papers are published in this issue.

Baton Rouge Meeting on June 17, 1944. Mr. H. L. Lehmann, President of the Baton Rouge Section of L.E.S. has arranged

for a joint meeting on Saturday, June 17 in Baton Rouge. At present the plans are as follows:

2:00-5:30 p. m. Golf, soft ball, horse-shoe pitching.

5:30-7:00 p. m. General inspection of highway laboratory.

7:00-8:00 p. m. Cold "snack" served in laboratory.

At 8:00 p. m. meeting will start. After introductions, President Lehmann will present "The Part the Laboratory Plays in Connection with Construction and Maintenance of Highways."

The meeting will be a joint meeting with the Baton Rouge Section, American Society of Civil Engineers and L.E.S.

New Members and Transfers, Membership Awards. We welcome the following new members into the Society. These members were elected in March, and we hope that they will take an active interest in the affairs of the Society.

For Member

Bordeaux, Hamilton Joseph, Jr. Age 28. Endorsed: J. K. Mayer, A. M. Hill, A. L. Dunlap. 1933 to 1937 studied Mechanical Engineering at Tulane University (did not graduate.) June 7, 1937 to Sept. 15, 1940, worked for Humble Oil Co. as Diesel Electric Engineer and Junior Petroleum Engineer respectively. 1940 to 1942, worked for Morgan City Machine Works as Shop Foreman; had complete charge of running shop. 1942 to date, Plant Engineer, Thibodaux Boiler Works, complete charge of engineering department. 1206 Jackson St., Thibodaux, La.

Edmondson, Howard E. Age 47. Endorsed: F. P. Fischer, C. L. Nairne, L. E. Savage. 1915-1916, Iowa State College, E.E., no degree. 1919-1920, Smith, Hinchman & Grylls, Engrs. and Contrs., Detroit, Mich., Chief Draftsman, E.E. Dept. on Dodge Bros. Power House. 1922-1928, Anchor Concrete Co., Adrian, Mich., Machine and Plant Design. 1928-1932, Celotex Corp., Marrero, La., Machine Design. At present, Celotex Corp., Marrero, La. Estimating, Field Supervision and Procurement. 6458 Colbert St., New Orleans.

Foley, Charles D. Age 30. Endorsed: A. M. Hill, A. L. Dunlap, J. K. Mayer. Graduate of L.S.U., Mech. Eng'g., B.S., M.E., June, 1939. 1939-1940, American Can Co. Mechanical Engineer, Army Transport Service, 1941-1942. Asst. Supt., Boland Machine Co., 1942-1943. At present, Prod. Engr., W.P.B. Member A.S.M.E. 7217 Green St., New Orleans, La.

Oldham, George E. Age 43. Endorsed: H. L. Lehmann, H. B. Henderlite, Norman Lant. Four years, Engineering Dept., Illinois Central Railroad. Six years, City Engineer, City of Baton Rouge. Three years, Maintenance Supt., La. Highway Dept. Five years, Sales Engineer, American Bitumuls Co. 913 Richland Ave., Baton Rouge.

Perrilliat, Claiborne. Age 40. Endorsed: C. L. Nairne, Charles Kerr, W. S. Leake. Graduate of Tulane University, B.E. in Civil Engineering, 1924. One year, Engineer for New Orleans Public Service, Inc. Two years, Geo. J. Glover Co. Seven years, R. P. Farnsworth Co., Inc. Connected with the firm of Perrilliat-Rickey Const. Co., Inc. as Secretary, Treasurer, Field Supt. and Engineer for 11 years. Licensed by Louisiana State Board of Engineering Examiners. 1928 Octavia St., New Orleans, La.

Purinton, Ivan H. Age 43. Endorsed: D. W. Stewart, G. E. May, J. M. Guillory. Asst. Engineer, New York State Highway Commission, 1919-1920, surveying, staking out roads, assistant on concrete construction. Graduate of Rensselaer Poly. Inst., Troy, N.Y., M.E. degree, 1924. Research Asst., Victor Talking Machine Co., Camden, N.J., 1924-1925, working on acoustics and radio. Field Supervisor under Consulting Engr., RCA Victor Co., New York and Chicago, 1925-32. Handling field technicians, studying product, engineering advisor to field sales representative. Air Conditioning Supervisor, Frigidaire Sales Corp., Chicago, 1932-1934. Training and supervising air conditioning salesmen, designing jobs, selling, supervising installation and testing. Operating and Research Engineer, Elect. Dept., New Orleans Pub. Serv., 1934 to date. Worked as Industrial and Commercial Contact man, as Dealer Contact Rep., as Operating Engineer, Elect. Dist. Division, now working on

operating and personnel problems. Associate Member of A.I.E.E. and I.E.S., also Engineering Consultant on Protective Lighting to National O.C.D., Washington, D.C., 8th Civilian Defense Region, Dallas, Tex., State of La. and City of New Orleans. 1323 Octavia St., New Orleans.

Ross, Joseph Ellis, Jr. Age 39. Endorsed: H. L. Lehmann, W. F. Cooper, R. L. Barnes. Instrumentman on highway construction for La. Highway Commission from 1928-1931. Resident Engineer on highway construction for La. Highway Commission from 1931-1932. Instrumentman on highway construction for La. Highway Commission from 1934-1941. Resident Engineer, Senior Grade, on highway construction for La. Dept. of Highways from 1941 to date. 307 Cypress St., West Monroe, La.

Strachan, Norman F. Age 49. Endorsed: Allen Hackett, Allen Negrotto, John O'Neill. Graduate, University of Kansas, B.S. in C.E., 1915. Misc. sub-professional experience. Three years Assistant Professor, Civil Engineering, two years Designing Engineer, three years Contractor and Supt. Const., Five years, Engineer, P.W.A., six years, Engineer, W.P.A., State Director Eng. Constr. Div., three and one-half years. Presently employed as Construction Engineer, U.S. Maritime Commission. 6029 Prytania St., New Orleans.

Thompson, George Anthony. Age 44. Endorsed: F. A. Boyle, H. L. Lehmann, Dean L. J. Lassalle. Studied engineering at L.S.U., no degree. 1924-1927, represented Norman J. Duncan, Architect of Alexandria. In full charge of Baton Rouge office. 1927-1934, represented Jones, Roesselle & Olshner, Architects of New Orleans, in full charge of Baton Rouge office. 1934-1936, District Reconditioning Supervisor, Home Owners Loan Corp. 1936-1939, designed and supervised construction of various residences, churches and commercial buildings. 1939, Licensed by La. State Board of Architectural Examiners by examination. 1939-Present, Part-time Instructor in Architectural, Mechanical and Engineering Drawing, La. State University. Also retained by Aluminum Co. of America, Blew-Knox

Construction Co., and Stone & Webster on Baton Rouge Projects. 424 State St., Baton Rouge, La.

Walker, Jesse L. Age 31. Endorsed: J. J. Saurage, H. L. Lehmann, N. E. Lant. B.A. degree in Chemistry, 1933, University of Alabama. Three years Construction Division of Miss. State Highway Dept. Five years Paving Technician, Testing Division, Miss. State Highway Dept. Two and one-half years Field Engineer, Birmingham Dist. of Portland Cement Association. 353 Stanford Ave., Baton Rouge, La.

For Affiliate Member

Regue, Harvey M. Age 28. Endorsed: J. R. Murphy, F. A. Billhardt, H. O. Marquart. 1933-1936, studying mechanical engineering toward B.S. degree at L.S.U. 1936-1937, Rodman and Inspector of Dredging, U.S.E.D. 1937-1938, Layout Eng., Trans-American Const. Co. 1938-1939, Office Engineering Aide and Const. Draftsman, Stone & Webster Eng. Corp. 1939-1941, Inspector of Dredging, U.S.E.D. 1941-1942, Draftsman, La. Highway Commission. Feb. 1942-May. 1942, Construction Draftsman, Solvay Process Co. May, 1942-Dec. 1942, Construction Engineer, Stone & Webster Eng. Corp. Dec. 1942 to date, Construction Draftsman, Aluminum Co. of America. 6503 Goodwood Ave., Baton Rouge, La.

For Junior Member

Barnes, Ben. Age 37. Endorsed: H. Waugh, H. L. Lehmann, R. B. Richardson. Rodman, Louisiana Highway Dept., 1927-29. Instrumentman, La Highway Dept., 1929-36. Resident Engineer, La. Highway Dept., 1936-44.

Kiernan, Bernard L., Jr. Lt. (j.g.). Age 25. Endorsed: Dean J. M. Robert, A. M. Hill, B. L. Kiernan, Sr. B.E. Degree in Mechanical Engineering, June, 1941, Tulane University. June to Sept., 1941, Engineer for Mundet Cork Corp., New Orleans. Sept. to Dec., 1941, Aviation Cadet, U.S. Army Air Corps. January, 1942 to present date, Asst. Machinery Supt. in Diesel Engines for U.S. Navy, as Reserve Officer. Junior Member, A.S. M.E.

For Transfer from Student Member to Junior Member

The following were graduated from Tulane University on February 25, 1944:

William Samuel Adams, B.E. in C.E.
Reginald Wortley Batty, Jr., B.E. in Ch.E.
Arthur Brooks Bush, Jr., B.E. in Ch.E.
Edwin Robert Cousins, B.E. in Ch.E.
Timothy Albert Crain, B.E. in Ch.E.
George L. Cunningham, Jr., B.E. in Ch.E.
David Donald Davis, B.E. in C.E.
Wallace B. Diboll, Jr., B.E. in M.E.
Ernest S. Gaiennie, Jr., B.E. in Ch.E.
Richard A. Hechs, B.E. in M.E.
Warren Edward Ibele, B.E. in M.E.
Owen Vincent LeBlanc, B.E. in C.E.
Robert E. LeBlanc, III, B.E. in E.E.
Allison M. Levy, B.E. in M.E.
George Long, B.E. in Ch.E.
Ward C. Purdum, B.E. in M.E.
Louis J. Rosenbohm, Jr., B.E. in C.E.
Edward L. Schneider, B.E. in Ch.E.
James King Simpson, B.E. in C.E.
Charles F. Steidtman, Jr., B.E. in E.E.
Samuel J. Stokes, B.E. in C.E.

Junior Membership Awards for 1944

Paul A. McKim, B.E. in Ch.E., Louisiana State University
George L. Cunningham, Jr., B.E. in Ch.E., Tulane University

Annual Meeting of American Oil Chemists' Society. Mr. Robert M. Walsh, Principal Agricultural Economist in the Division of Statistical and Historical Research of the United States Department of Agriculture, will be among the speakers at the 35th Annual Meeting of the American Oil Chemists' Society, May 10 to 12, at the Roosevelt Hotel, New Orleans. Mr. Walsh, who is Editor of the *Fats and Oils Situation*, will deliver a paper on the economics of fats and oils, a field in which he is a nationally recognized authority.

In addition to the general papers there will be a symposium on the physical properties of fats and oils which will include papers on X-ray and ultra-violet spectroscopy, specific and latent heats, viscosity and plasticity, and the practical application of physical methods of processing including liquid-liquid extraction and continuous solidification of lubricating greases.

Dr. George W. Irving, Jr., of the Southern Regional Research Laboratory, New Orleans, is Chairman of the Local Committee in Charge.

PAPERS AND DISCUSSIONS

THE MANUFACTURE OF CELOTEX*

President Kerr, and members of the Louisiana Engineering Society, I wish to express to you the sincere personal regrets of Mr. Morris that he was unable to be here this evening. He was called out of town on business and had to leave the city this afternoon. Fortunately for you, however, and for me also, Mr. Morris was able to give me a verbal outline of what he had intended to say to you this evening and I will try to present his thoughts to you, albeit they will be clothed in my own words and he should not be held responsible for them.

The business of manufacturing structural insulating material now has a history of a little over a quarter of a century. It had its conception in an attempt to find a use for the waste wood screenings that were a by-product of the paper pulp industry. When the Celotex Corporation decided to engage in the production of a material of this type, they felt that they should not limit themselves to this particular type of raw material, but rather should investigate all kinds of available fibers and determine the one best suited for the manufacture of structural insulation. As a result of this investigation, it was decided to use bagasse, or crushed sugar cane stalks, since this fiber was particularly resistant to decay, was very strong, and was available in large quantities. Thus, when the Celotex plant was established just across the Mississippi River from the Audubon Park, it became one of the first manufacturing plants established for the prime purpose of making a new raw material from a former waste agricultural by-product, a type of manufacture which in more recent years has become known as a science of "chemurgy". During the twenty-five years the Celotex Corporation has been in business it has been a consistent and heavy advertiser in trade and general publications and has done much to make the American public "insulation conscious". This advertising policy has had a marked effect not only on the growth of the insulation industry as a whole in

* Presented before the Louisiana Engineering Society, March 13, 1944, by A. Watson Chapman, Assistant Director, Technical Division, Celotex Corporation.

this country, but also, of course on the growth of the Celotex Corporation itself, which can best be indicated by saying that, during the past sugar season, of the six million tons of cane processed through the sugar mills, bagasse from more than two million tons was baled and will subsequently pass through the Celotex mills and out to the four corners of the earth in the form of fibre insulation board.

The manufacturing process may be described in relatively simple terms. The fiber is brought into the plant, cooked in huge digesters, shredded and refined, felted out on board machines, dried, cut to size and either is shipped in that form or subsequently given additional finishing processes such as smooth surfacing, prepainting, asphalt coating or impregnation, etc., depending on the end use for which the product is designed. From an engineering standpoint, perhaps the most unique feature of our plant is our huge driers. In most board plants of this general type, the board is cut into pieces as it comes from the board machines, containing about 50% moisture, and these small pieces are sent into a multiple deck drier. The pieces are then cut to size, which means that a trimming loss of from 12 to 15% results since all four edges must be cut. The Celotex Corporation avoids this trimming loss by running the wet sheet directly into the drier and drying the sheet as it moves continuously forward. We have two driers, each of which are 800 ft. long, and one drier which is 1,000 ft. long. We have at our plant the largest single pieces of building material in the world in the form of sheets 12½ feet wide and from 1200 to 1400 feet long between the point of formation and the point of cutting. We burn about five and one-half million cubic feet of natural gas per day to operate these driers and they evaporate about 750 tons of water in 24 hours, the exhaust vapors passing through the heat exchange stacks which produce hot water for use in stock make up. We have over 2,000 employees at our mill across the river, which covers 150 acres and extends for nearly a mile along the Mississippi river. Consequently our pay roll is an important economic factor in the life of the city and our purchases of materials play an important part also. I have indicated the amount of bagasse purchased, and, when I

add to the amount of gas used in the driers, the additional two million cubic feet burned per day in the production of steam in our boilers, you will agree that we are pretty good customers of the Louisiana gas fields. We ship about 25 earloads of finished products a day and to make this material, we receive about 30 earloads of fiber in the same period, so that we are pretty good customers of the railroad as well. During a month's period we purchase about 40 earloads of chemicals, 6 earloads of paint materials, 20 earloads of asphalt and about 300 tons of wrapping paper and paper cartons, It has always been a practice of the Celotex Corporation to purchase as much as possible of its material from local dealers and suppliers.

It will probably be of interest to you to know that while our plant here is the largest of our manufacturing plants, we do have manufacturing units in other localities. We have at Port Clinton, Ohio a Gypsum mine and a Gypsum plant making Gypsum wallboard and lath, plasters and agricultural insecticides. We have two mineral wool producing plants, one at Lagro, Indiana and one at Detroit. At Metuchen, New Jersey, we have a specialties plant making decking and heavy duty flooring, brick siding, cement asbestos board and cemento unit wall panels., used in war time housing projects. We have a plant in England, and through our association with the Certain Teed Corporation the facilities of their plants are available to us for the manufacture of roofing felts and all types of asphalt and mineral surfaced roofing.

As to what we are doing in the war effort, it is difficult to know these days what can be said without feeling the hot breath of an F.B.I. agent breathing down your neck. I think, however, that anyone with a little common sense would figure out how a company engaged in the manufacture of structural materials would enter into the war effort. Much of our board has gone into military constructions, first in this country and later abroad. We thought we had a wide export trade before the war, but since then we have been shipping to places we had never even heard of prior to the outbreak of hostilities. We have received letters from former employees stationed everywhere from Alaska to New Zealand and Central America to

North Africa telling us what a great pleasure it was to get out of their pup tents and into huts and dormitories built of Celotex products. We have also supplied much material for use in so called defense housing, ranging from homes for ship builders along the Gulf coast and airplane workers on the ocean sea-boards to the supplying of dormitories to house the influx of girl stenographers that flocked to wartime Washington. Another angle of our wartime business has resulted from the problem of fuel conservation.

Many remodeling jobs had to take place so that people in more rugged climates could get along with the reduced amount of fuel allotted to them under wartime restrictions. It is interesting to note that the latest ruling issued by WPB and the National Housing Authority on February 12, releasing certain amounts of critical materials for use in essential housing, included a specific statement that no such housing will be authorized unless insulation is used and it also prohibits wood sheathing for exterior walls and flat roofs. It is obvious that insulated housing not only saves fuel but also permits the use of smaller size heating equipment with subsequent saving in the critical materials used in the manufacture of the units. We have also supplied certain types of fiber board which is subsequently incorporated into items of military equipment and ordnance, but I had better say nothing further along these lines. Our various products have found a varied field as substitutes for wood and steel and a number of special items have been especially developed along these lines. They include a corrugated felt siding to replace corrugated metal panels, a granule siding which supplies insulation and an exterior surface in one unit and which has found wide use in military housing and in the numerous farm buildings made necessary by the greatly extended agricultural program, and finally, our special cemesto panel and accompanying unit shingles, the first of which gives insulation and an exterior and interior wall in one unit and the second of which comprises insulation plus granule surfaced roofing in four-foot units resulting in rapidity of application. These latter two products have been used most extensively in the unit housing for defense workers referred to previously.

We have had our war difficulties as has every manufacturing plant and have had to find substitutes for materials, for labor and for equipment, but since this is a universal problem it should not be necessary for me to go into details on that subject.

As to our post war plans, like most others we have been so busy on the day to day problems that these are in no way specific or certain. However, it seems to be the opinion of economic experts that the construction industry will be depended on to a great extent to bridge the gap between the war and post war economic situations. This is due to the fact that most of the manufacturing facilities used in producing construction materials can be turned to peace time products with little or no difficulty and a large potential market exists for new constructions, and this will require a large labor force and hence can rapidly absorb some of the surplus labor that will be available due to closing down of war plants and release of men from military service. A pre-fabricated house, so called, will undoubtedly play a part in the post war construction, but I am inclined to believe that it will result in producing pre-fabricated units rather than the complete pre-fabricated home.

I have brought with me and have available at the table here to my left copies of the latest issue of one of our trade publications, the March issue of "Celotex News". I have not brought these along to advertise Celotex but because this issue happens to contain some rather good pictures of some of the various types of war time activities about which, I have been talking. I would also call to your attention the editorial on post war housing written by Mr. B. G. Dahlberg, president of the Celotex Corporation, which I believe you will find most interesting.

I wish I could conclude this talk by inviting the members of the Louisiana Engineering Society to visit our plant, but, unfortunately, that is not possible at the present time. One of these days, however, when the great enterprise in which this country is now engaged has been brought to a successful conclusion, it will be possible to extend such an invitation, and I know that all of you will join with me in hoping that that day will come soon.

THE REFINING OF CANE SUGAR*

The Plant of the American Sugar Refining Company is situated about one-half mile below the city limits, on the east side of the river in the Parish of St. Bernard. You might be interested to know that this Parish was named St. Bernard in honor of Don Bernardo de Galvez, who was fourth Spanish Governor when the colony of Louisiana was under the domain of Spain.

It was in this Parish during the war of 1812, between the United States and Great Britain, that one of the final battles was fought on the Plains of Chalmette. It was here that our soldiers under General Jackson, with the help of the pirate, Lafitte, defeated the British soldiers under General Edward W. Pakenham. The refinery is immediately adjacent to the battle field and because of the historic association, the refinery received the name of Chalmette.

The property comprises a tract of land trapezoidal in shape of about 70 acres, having a frontage of a little over a quarter of a mile on the Mississippi River and an approximate depth of about 2900 feet. On this property have been erected numerous buildings which go to make up a sugar refinery, such as the raw sugar warehouses, wash house, char house, filter house, pan house, granulator and packing house, as well as necessary boiler and power house, machine shops and so forth. The buildings vary in height. The filter house, which is the tallest, is 13 stories high and at the time it was erected in 1909, was the tallest building in the New Orleans area. All of the buildings are of steel frame construction with brick walls and reinforced concrete floors and roofs, all buildings being carried on pile foundations and although these buildings were erected in 1909, there has been little or no settlement. This is quite remarkable in this area, when you remember that a large number of these buildings carry a heavy machinery load. It is estimated that

* Presented before the Louisiana Engineering Society, March 13, 1944, by Mr. M. D. Scott, Manager of the American Sugar Refinery.

the load in the char filter house is ten and one-half tons per pile.

The enclosed floor area in this group of buildings comprising the refinery is around thirty acres. Sugar refining does not lend itself to one-story construction, such as is used in the automobile and aircraft industries. It is much more economical to pump sugar liquors to the top of a ten or twelve story building and then let it drop by gravity from floor to floor, having it pass through the various processes as it descends.

The window area of all the buildings is extremely generous and the plant is well lighted. A little over 130,000 panes of glass were required by glaziers to fill in these openings when the plant was built. In January 1937, during a hail storm, which you probably remember, we lost 6,000 of these window panes. It took six glaziers six weeks to put them back.

The dock is over 1,000 feet in length and is sufficiently long to make it possible to unload two raw sugar cargo ships, as well as one molasses tanker at the same time. We can store in our raw sugar warehouses approximately 100,000,000 pounds of raw sugar and we can store in our refined sugar warehouses approximately 40,000,000 pounds of refined sugar. The plant has a daily melting capacity of 3,500,000 pounds.

The refining process is a purification problem from start to finish. The incoming raw sugar is mixed with syrup to form a magma, which is approximately the consistency of freshly poured concrete. This material is run through a centrifugal machine and the added syrup, as well as the syrup which was around the crystals, is spun off. The sugar remaining in the centrifugal basket is removed from basket and melted down with water. This liquor is first filtered through cloth to remove insoluble impurities and then filtered again through boneblack to remove all coloring matter. The resulting liquid, clear and colorless as pure water, is then boiled to grain in large vacuum pans. The sugar is boiled under vacuum for two reasons: 1. It is slightly more economical, and 2. Much lower temperature results when the sugar is boiled under vacuum. The boiling temperatures inside the pan will run around 150° F., while the

same solution boiled in an open kettle would run around 250. If the temperature of the sugar solution was allowed to rise to 250° F., some of the sugar would be caramelized and an off colored product would result. After the crystals have reached the proper size in the pan, this mixture of mother liquor and sugar crystals is run through another set of centrifugals. The sugar remaining after the syrup has been spun off is then dried and screened to form the granulated sugar which is packed into cartons and cotton or paper bags. For powdered sugar the dry crystals are pulverized and for tablet and cube sugar the moist crystals are pressed into the desired shapes, or as in the case of Crystal Domino Tablets made by the Adant process, molded into slabs which are sawed into strips or bars from which the tablets are clipped, giving them their distinctive sparkling appearance. Four different grades of soft sugar are also turned out, varying in color from a canary yellow to a dark brown.

In pre-war days from thirteen hundred to fourteen hundred men were employed daily at this plant, while numerous other groups of people are given employment furnishing us with empty packages, fuel and various needed chemicals.

In order that you will realize the value of the plant of The American Sugar Refining Company to the economic life of New Orleans, I would like to give you a few figures. I will keep these statistics as brief as possible because I know, as a rule, statistics are boring. During the ten years, from 1930 to 1940 inclusive, the Chalmette Refinery has melted five billion pounds of raw sugar; has paid over twenty-two million dollars in United States Customs duties and over one million and a quarter dollars in city, parish and state taxes. Four hundred and forty-six ships have docked at its wharf in this time interval, and over one hundred and thirty thousand carloads of refined products have been shipped and supplies received. Twenty-five thousand barrels of oil and over twenty-six billion cubic feet of gas were consumed in this ten-year period, and over twenty-five million dollars were paid out in wages and supplies, exclusive of raw sugar. These facts give you a pretty good idea

of the importance of this plant to the industrial life of New Orleans.

Sugar is such an essential food that very few people have any knowledge of its source and preparation, but we are often asked questions concerning it and I am sure people have asked you, generally ladies, and you have probably asked yourself, is sugar fattening? The answer is no, because sugar is generally classed as an energy food. Of course, it is realized that all foods are fattening if eaten to excess. The body requires all kinds of foods, such as proteins, fats, fruits and carbohydrates. If more food is eaten than is required, it is stored up in the body as fat. Sugar is no different in this than any other food. Naturally one pound of sugar, a high energy food, is more fattening than one pound of watermelon, which is 97% water. The late Edward Slossen, First Director of Science Service, used to say a five o'clock candy will give you a better pickup than a five o'clock highball. The soft drinks we indulge in throughout the day owe most of their pickup to the sugar they contain.

One of the important factors in any industry is the price received for its products. In the American Sugar Industry the price paid for the raw sugar is set by the Commodity Credit Corporation and the price received for the refined sugar is set by the office of Price Administration, both agencies of the Federal Government. As an example, the price the refiner has to pay for this raw sugar was set at 3.73¢ per pound on January 5th, 1942 and the price the refiner, located in the Gulf area, receives for his finished product was set at 5.45¢ per pound, less 2%, on January 9th, 1942, just about a month after Pearl Harbor. These same prices are in effect today. Out of this 5.45¢, less 2% per pound, which the refiner receives, he has to pay the Government .53¢ per pound in excise taxes. This makes the net figure for the refiner 4.81¢ per pound. Out of this difference of 1.08¢ per pound, the refiner has to pay all of his refining, warehouse, shipping and packing labor, as well as pay for his packages, general sales expense, administrative salaries and depreciation. Funds collected by the Government from the Excise Tax are used in part as benefit payments to growers

and laborers in the continental United States, as well as its island possessions, such as Puerto Rico and Hawaiian Islands. The surplus remaining after these benefit payments have been made, revert to the general funds of the Treasury Department. These powers were given to the Government under the Sugar Act of 1937, which applies to the United States producing areas.

Another expedient adopted by the Government in the control of sugar is the Zone System, which controls the area into which various refineries may ship their sugar. This applies to processors of beet sugar and refiners of raw sugar. The principal of zoning is two-fold, first, elimination of cross hauling, and second, the proper apportionment of the available supplies throughout the country. This Zoning system is flexible and is changed from time to time. For instance in September 1942, when the beet sugar supplies were large, Louisiana refiners were confined to four states, Louisiana, Mississippi, Arkansas and Alabama. In 1943, with a short beet sugar crop, this area was increased to parts of Tennessee and Kentucky, the southern half of Ohio, Indiana and all of Michigan. With the West Coast refiners and beet sugar processors, we serve also Oklahoma, Missouri, Iowa and Minnesota. You will realize that necessary adjustments to take care of changes in zones, presents a real operating problem.

Sugar is probably the only food product that is selling today at the same price that it was selling at in January 1942; in fact, the retail price today approximates the price of sugar in 1922, 1928, 1929, 1930, 1934, 1935 and 1936. Due to the fact that the machinery for the control of quotas to the producing cane and beet sugar growers had been in operation for a period before the war, it was easy for the Government to initiate the price controls mentioned above.

Our plant is busy producing sugar for Lend-Lease. All of our daily production of piece sugar, such as Cubes, Dots, Tablets and so forth, are being shipped to Russia. In addition to this, we are manufacturing weekly orders for the Army and Navy.

Our daily melt is now held down, due to the shortage of labor. Instead of having thirteen hundred or fourteen hundred em-

ployees, we now have approximately only seven hundred and seventy-five and of this number about two hundred of them are colored women doing the work formerly done by men.

After the war, numerous repairs and improvements not now possible, are contemplated. We expect at that time to be able to re-employ not only the one hundred and ninety of our employees who are now in the Armed Services when they return, but to increase our force to pre-war figures.

I ask you when you think of sugar, think of "DOMINO" manufactured by The American Sugar Refining Company in your city of New Orleans with New Orleans people.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board, February 7, 1944

The meeting was called to order by President Kerr with the following members present: Gosa, Kammer, Leake, Nairne, Mayer. Report of Mr. L. J. Cucullu, General Chairman for the 1944 Annual Meeting, was read and accepted. The Secretary was requested to express the appreciation of the Board to Mr. Cucullu for the excellent manner in which the meeting was conducted and the splendid work rendered.

President Kerr reported that he had received an invitation to attend a meeting of the Louisiana Association of Commerce Managers to be held in Baton Rouge on February 1. Since President Kerr was unable to attend, Dean Lassalle represented the Society at this meeting.

The following members were dropped for being delinquent in dues for more than one year: F. G. Erskine, H. D. Roberts and G. C. Williams.

The following Junior members transferred from the grade of Student member in June 1943 were reported as having paid no dues since then: J. S. Burwell, H. Clotworthy, Jr. and J. H. Martin, Jr.

According to the by-laws, this was taken as an automatic resignation of these members.

It was voted to waive the entrance fee for the year 1944. Mr. W. E. Koch was appointed chairman of a committee to prepare an obituary on the death of Mr. William de Young Kay. Mr. Koch is to select two other members to serve on this committee.

A Junior Membership in the Society was awarded to Mr. George L. Cunningham, Jr., a senior in the School of Chemical Engineering at Tulane University, for having the highest average in the four engineering curricula.

It was decided to hold the next meeting of the Board at 422 St. Charles Hotel preceding the March meeting of the Society. There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Society, February 14, 1944

The meeting was called to order by President Kerr with approximately 45 members and guests present. It was voted to dispense with the reading of the minutes of the last meeting. A report of the Employment Committee was read by the Secretary.

Mr. Carter Brown spoke briefly for the Committee on Postwar Planning and urged the formation of a Publicity Committee to bring this matter

before the public spirited citizens throughout the state. The question of postwar planning was briefly discussed by several members from the floor.

Professor Frazer Thomson of the Department of Mathematics, Tulane University, was introduced and presented an interesting paper on "The Science of Astronomy as Applied to Engineering." This paper dealt primarily with methods of navigation. Professor Thomson answered a number of questions at the conclusion of his paper.

The meeting adjourned to the usual refreshments.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Board, March 13, 1944

The meeting was called to order by President Kerr with the following members present: Gosa, Kammer, Leake, Nairne, Nelson and Mayer. The minutes of the last meeting were read and accepted.

President Kerr reported on some recent developments effecting the legislation committee. He also reported that a letter of appreciation had been received from Emile Sherrard, recipient of the Society Scholarship at Tulane. President Kerr further reported on the results of a meeting with the Louisiana Architects' Association regarding postwar planning.

A letter ballot was ordered for the following applicants for membership, these applicants having been recommended for the designated grades of membership by Membership Committee "B":

For Member

H. J. Boudreaux, Jr., H. E. Edmondson, C. D. Foley, G. E. Oldham, C. Perrilliat, I. H. Purinton, J. E. Ross, Jr., N. F. Strachan, G. A. Thompson, J. L. Walker.

For Affiliate Member

H. M. Begue

For Junior Member

Ben Barnes, B. L. Kiernan.

For Transfer from Student Member to Junior Member

W. S. Adams, R. W. Batty, Jr., A. B. Bush, Jr., E. R. Cousins, R. A. Crain, G. L. Cunningham, Jr., D. D. Davis, W. B. Diboll, Jr., E. S. Gaiennie, Jr., R. A. Hechs, W. E. Ibele, O. V. LeBlanc, R. E. LeBlanc, III, A. M. Levy, George Long, W. C. Purdum, L. J. Rosenbohm, Jr., E. L. Schneider, J. K. Simpson, C. E. Steidtmann, Jr., S. J. Stokes.

Junior Membership Awards for 1944

Paul A. McKim, B.E. in Ch.E., Louisiana State University; George L. Cunningham, Jr., B. E. in Ch.E., Tulane University.

The application for Mr. Arnold A. Bondi was held over in order to secure further information, the endorsements received having been incomplete.

It was voted that the full amount of \$3.00 per member and 50 cents per junior member be remitted to the Baton Rouge Section. It was also voted that the dues of student members again be reduced to \$1.00 per year.

Upon the recommendation of Dean L. J. Lassalle, Mr. Paul A. McKim, 1944 graduate in Chemical Engineering from L.S.U., was awarded the junior membership in the Society for his outstanding scholastic record and student leadership.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Society, March 13, 1944

The meeting was called to order by President Kerr with approximately 100 members and guests present. It was voted to dispense with the reading of the minutes of the last meeting. A report of the Employment Committee was read by the Secretary.

Mr. D. W. Stewart presented an obituary on the death of Mr. William de Young Kay. It was voted that this obituary be spread upon the minutes of the Society and a copy sent to the family.

President Kerr then introduced the following speakers who presented short papers outlining the operations and giving other interesting facts concerning the industries which they represented: Mr. M. A. Scott, Supt., American Sugar Refining Co., Mr. W. A. Chapman, Chem. Engr., Celotex Corporation, Mr. P. F. Jahneke, Pres., Jahneke Service, Inc., Mr. H. A. Sawyer, Vice-Pres., Lone Star Cement Corp., Mr. C. L. Nairne, Asst. to the Operating Vice-Pres., New Orleans Public Service, Inc.

The meeting adjourned with a rising vote of thanks to the several speakers.

OBITUARY OF WILLIAM DE YOUNG KAY

Although William de Young Kay was a member of the Louisiana Engineering Society for a short time only, his outstanding qualities as a man and an engineer have won him the respect and admiration of his fellow members and in his death on January 31, 1944, the Society suffers a distinct loss.

Mr. Kay was born in Memphis, Tennessee and at the time of his death was 52 years old. After preparatory training at Stevens Institute, he entered Massachusetts Institute of Technology and was graduated with the degree of Electrical Engineer.

From 1913 to 1916 he was connected with the Brooklyn Edison Company as a power engineer and was awarded the Doherty Gold Medal in 1915 by the National Electric Light Association at their annual convention.

During World War No. 1 he served as a Captain in the Chemical Warfare Service and did research work in Washington.

For many years following the war he was connected with Nathan Strauss Company as Vice-President and General Manager in which field he dealt with the manufacture of hotel equipment. Later he became a broker and was a member of the New York Stock Exchange.

While a resident of New York City he served for two years as Chairman of the Local Draft Board No. 1 and was active in many civic matters.

During the year 1942 he came to New Orleans to reside and became associated with the Lane Cotton Mills Company as Treasurer. Several new improvements at the mill were due to his foresight and planning and his previous training was invaluable to him in this line of work.

Mr. Kay was a member of the American Institute of Electrical Engineers, member of the Society of The War of 1812 and many other organizations.

He is survived by widow, the former Miss Alice Odenheimer of New Orleans, two children, Ellen and Paul, and his mother, Mrs. William Kay of New York City.

Mr. Kay will be missed by his fellow members, not only for his intellectual qualities, but also because of the integrity of his character. Therefore, because of the loss which the members feel, he it resolved that the Louisiana Engineering Society record its sense of loss and that the Society tender its sympathy to Mr. Kay's bereaved family.

Respectfully submitted,
R. F. MULLER
D. W. STEWART
W. E. KOCH, *Chairman*

Minutes of the Meeting, Baton Rouge Section, March 21, 1944

The first quarterly meeting of the Baton Rouge Section of the Louisiana Engineering Society was held at the Assembly Hall of the Gulf States Utilities Company on March 21, 1944, at 7:30 p.m. with the following officers: H. L. Lehmann, President; Hamilton Johnson, 1st Vice-President; J. T. O'Brien, 2nd Vice-President; and P. J. Guelfi, Secretary-Treasurer and fifty-two members and guests in attendance. The president called the meeting to order and asked for the reading of the minutes but as it was voted that the reading of the minutes be dispensed with the minutes were not read. The president then called for reports from the Technical Papers Committee, Membership Committee, Entertainment Committee, Publicity Committee and also a financial report from the secretary-treasurer. He then outlined the tentative plans for the June Meeting to which the A.S.C.E. has asked to be invited and to which the New Orleans Section of the Louisiana Engineering Society will be asked. At this point a new feature was introduced in the form of a registration book in which the members and guests at each meeting are to sign their names and other pertinent information such as business connections, address and telephone number. The business portion of the meeting was completed as the president asked for any unfinished business and for any new business. Mr. Whipple took the floor to explain that because of the necessary procedure required and because membership ballots are issued quarterly, it required some four or five months to complete entrance to the Society.

Mr. C. M. Beamer, head of the Alcohol Division of Standard Oil Company of Louisiana, then delivered the principle address of the evening on synthetic Ethyl alcohol. Mr. Beamer gave a very interesting talk, well illustrated with charts and graphs. He traced the beginning of the synthetic alcohol industry from the time of World War I when it was urgently needed for the production of acetone through the following years when its production was uneconomic and practically dropped until the late 30's and early 40's when the process was improved and the facilities greatly expanded to meet the needs of war production for the great conflict now raging. Following Mr. Beamer's talk, the meeting was adjourned and light refreshments were served.

P. J. GUELFİ,
Secretary-Treasurer

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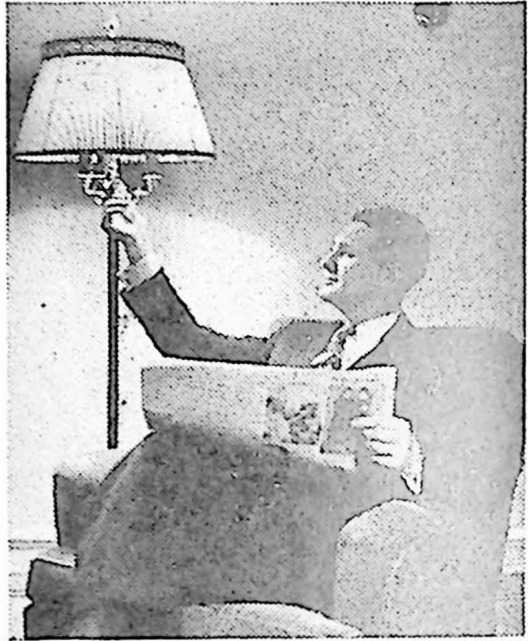
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PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

APRIL, 1944

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PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

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JUNE, 1944

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EDITORIAL NOTES AND COMMENT

Once Again. During May a bill for licensing professional engineers was again introduced in the state legislature. At this time of going to press, the fate of the bill is unknown. It is hoped that the proposed law to license all professional engineers will be passed. Our state is among the few remaining (two or three) which does not possess such a law. Many of our members have given generously of their time and efforts in an endeavor to have this bill passed during previous sessions. Our present committee is also doing everything possible to assist in its passage. Much credit is due all who have worked for the bill. It is hoped that at last it will become a reality.

Our June Meeting. Plans for the June meeting in Baton Rouge call for a combined session with the Baton Rouge Section and the American Society of Civil Engineers. Both recreation and an interesting inspection trip and technical program have been provided. President H. L. Lehmann and his committee have set up a program that is attractive to both Baton Rouge members and to others outside of that city.

Did You Write? In the February issue some comments were printed on the Kilgore bill, which is designed to regiment engineers and scientists. The names and addresses of the Senators and Congressmen from our State were given. Did you write? Those who did are told in reply that the bill is NOT DEAD. Write now! Don't wake up some morning and read that your new "boss" is a lawyer or the head of a bond firm, and don't think for one moment that it can't happen. It's up to you. The professional engineer has suffered through certain provisions in the Wagner Act. Our Canadian engineers were on the job; it didn't happen to them when a similar law was passed in Canada. If each of our six hundred members would write, you may be sure the representatives from Louisiana would take notice.

Our Civil Service. Every member of our Society should be keenly interested in the manner in which our local and state civil service functions. It is particularly important to professional engineers, as it opens to them a career of public service which may be entered on the basis of merit rather than thru political favoritism. It deserves your active support, not just through the audible or mental statement that, "it's a good thing", but through your talking to friends and acquaintances about its merits and desirability.

Members of the Society have been called in by our local group to assist in giving aptitude tests for certain lines of work. It is a privilege to serve in any capacity which will result in the gradual betterment and more efficient operation of public offices. Certainly all branches of the engineering profession should be interested in an organization which is en-

deavoring to use human talents efficiently and to save taxpayers money at the same time.

Our July Meeting. On July 17 there will be a joint meeting with the American Society of Civil Engineers. Col. W. M. Cary will speak on "The Engineer and Post War Planning".

Father was quizzing daughter about the young man who had taken a shine to her.

"Is he a good worker? Does he take hold of things that interest him?"

"Does he? Say, Pop, you should be behind the sofa some night."

PAPERS AND DISCUSSIONS

THE ROLE OF LIGHTING IN ACCIDENT PREVENTION

H. L. LOGAN*
Member AIEE

According to Rear Admiral W. H. P. Blandy, speaking to the National Safety Council in Chicago, Ill., on October 27, 1942, "Since Pearl Harbor, almost as many people have been accidentally killed in the United States, including 42,600 war workers, as have been killed by German bombing in England *in three years!*

"Since Pearl Harbor, *more* Americans have been *permanently* disabled by accidents on the home front than the total of military forces wounded, captured, and killed in action.

"Since Pearl Harbor, accidents have cost us more than 3,000,000,000 man-hours."

To this toll must be added an economic loss of at least \$3,750,000,000, according to the National Safety Council. The accident toll is so huge that it is a major handicap to winning the war.

ACCIDENTS ARE PREVENTABLE

Once upon a time accidents were accepted as an inescapable feature of industry. We now know that accidents can be prevented, and as our supply of workers is limited we cannot afford to lose them through accidents. Wars may not be won by armies that follow the slogan, "safety first," but they may be lost by managements and workers that do not.

Much is known now about the technique of accident prevention. A profession has grown up that makes this subject its exclusive field—the profession of "safety engineering." Its members have

*Presented at the regular meeting of the Society, May 8, 1944. This presentation based on article appearing in *Electrical Engineering*, April, 1943. H. L. Logan is managing engineer in the Controlens division of the Holophane Company, Inc., New York, N. Y.

many years of successful practice behind them, but right now they are faced with a new combination of circumstances. We have become a 24-hour nation—the greater part of our expanded production occurs under artificial lighting; the production rate has tripled or quadrupled; plant areas and facilities are occupied by two, three, and four times the number of workers for which they were planned; many workers are new and inexperienced, others are old, some are females, most work long hours—so that the trend of the accident curve has been reversed, and it is rising.

LIGHTING AND ACCIDENTS

Now that every preventive measure is “worth its weight in tanks and guns,” national attention has been focused on the accident menace, and many means are being sought to hold it in check. If these various means assured complete success, there would be no need to add to the library that is already available on the subject of accident prevention. The justification for these remarks lies in the fact that *all* of the causes of the accident rate are not under satisfactory control and specifically, that one of these causes—the close dependence of accidents on sight, and so on light—is not understood sufficiently. There will be little new in the evidence presented here, but this evidence shows relationships in its collected form that were not easy to see as long as it remained scattered.

There is, of course, a general vague belief that lighting is somehow tied up with a certain percentage of accidents, but a pious belief in a connection between light and safety is of little practical help. Much wider and clearer knowledge of the use of good lighting in protecting workers is needed to stimulate its use as a safeguard.

The black-out has brought home to large numbers of people their almost complete dependence on visibility for safety. They have discovered that they can hardly move ten paces in a complete black-out without running the risk of at least a minor accident. The English people cite the black-out as the most dismaying feature of the war. In areas where it is most severe, pedestrian fatalities have risen 400 per cent over prewar figures, despite a drastic reduction in traffic.¹

The personal experience of everyone supports the statement that an accident is probable in the sudden absence of sight or light. Light, therefore, replaces the *probability* of accidents with mere possibilities, and reflection makes clear that these possibilities may be further reduced by the kind of lighting that provides certainty of seeing.

VISIBILITY AND TRAFFIC ACCIDENTS

The clearest specific connection between uncertain seeing caused by poor visibility and accidents has been shown in accident studies. L. J. Schrenk² reports that automobile traffic fatalities at night in the city of Detroit, Mich., became seven times the daytime fatalities from 1934 to 1936, when street lighting was reduced owing to the depression. These fatalities dropped to 1.4 times the daytime rate in 1937, when the street lighting was restored.

A study of traffic accidents† in 46 cities the first year, 227 cities the second year, and 60 cities the third year of a 3-year investigation showed that fatalities owing to a lighting cause were from 46 to 50 per cent of the total nighttime fatalities. Nonfatal accidents showed the same proportions.³

G. D. Newton,³ Travellers Insurance Company, Hartford, Conn., made an investigation† on a national scale of the number of fatalities occurring during the four evening rush hours, 5 p. m. to 9 p. m., and those occurring during the morning rush hours, 6 a. m. to 10 a. m. The evening fatalities were 281 per cent of the morning fatalities.

A comparison of police records,⁴ 5 a. m. to 7 a. m., winter and summer (dark in winter, light in summer), and always a period of relatively light traffic, shows winter fatalities 218 per cent of summer fatalities.⁵

It appears that decreased visibility on the highways increases the number of fatalities that would occur otherwise from two to seven times. It is significant to note that recent dim-out and

[†]The reader is referred to the sources of these statements for details of the investigators' reasons for arriving at the conclusion that the difference in visibility was the principal cause of the increase in fatalities.

black-out experience here and abroad abundantly reinforces these figures.

This "law," that the provision of proper visibility automatically reduces night traffic accidents from 50 to 88 per cent, is of great importance to industrialists when coupled with the fragmentary, but confirming, data from industrial tests.

So close and constant is the relationship between visibility and traffic accidents that when during the depression many municipalities economized on their street lighting, night accidents climbed *in all cases*. Conversely, when former lighting levels were restored, the accident rates dropped. Traffic experts now have proved that the rate of night accidents can be dropped to the rate of day accidents by the adequate use of artificial lighting.²

VISIBILITY AND INDUSTRIAL ACCIDENTS

Insurance experts⁴ after long experience with industrial accidents, charge 15 per cent to poor illumination. Dr. Frank Allport, of the American Society of Safety Engineers, stated some years ago that improper illumination is the basic cause of 25 per cent of industrial accidents. Doctor J. R. Wittekind, chairman of the industrial relations committee of the American Optometric Association, says poor vision (defective eyes and poor lighting) are responsible for 20 per cent of the accidents.

These are just the opinions of experts, based on their own particular experiences, and can be said to cover the group of accidents indisputably caused by poor lighting. They would disappear automatically upon the adoption of proper seeing conditions.

Between this 15 to 25 per cent group and accidents in which vision plays no part, is an indeterminate group in which lights and vision enter in various degrees to cause accidents. Better seeing conditions would not eliminate, but would reduce this group.

One of the obstacles the investigator meets in his efforts to arrive at definite figures in this matter is caused by the unfamiliarity of safety people with visibility phenomena, and their inability to recognize light as a cause in individual cases. Sight and light lie unsuspected under mountains of reports.

There is space in this article to treat only the broad aspects of the light-accident problem, and so individual cases illustrating the way in which poor visibility causes accidents must, of necessity, be omitted. A study of the papers in the bibliography is suggested in this connection.

Lighting literature includes various instances where the accident rate dropped in a department, or even in an entire plant, when the lighting conditions were improved. In one case the average illumination in the punch press department of a company was raised from 2 foot-candles to 19 foot-candles at work level. The frequency of accidents dropped 54 per cent.⁵ This is in line with the rate of drop observed in traffic accidents when visibility is improved.

In another plant a rise to 30 foot-candles from 8 foot-candles caused a drop of 11 per cent in the accident rate. This is reasonable, as this plant had enough general light to provide fair seeing conditions at the original level, and did not, therefore, have so severe an accident rate as the case mentioned previously. By adopting 8 foot-candles originally this plant had saved itself from many of the accidents. The rise to 30 foot-candles simply eliminated the remainder of the "light-vision" accidents that could still occur at the 8 foot-candle level.

R. E. Simpson of the Travelers Insurance Company cites the most striking case. A factory employing 1,000 workers had an annual accident rate of 425. A new lighting system was fol-

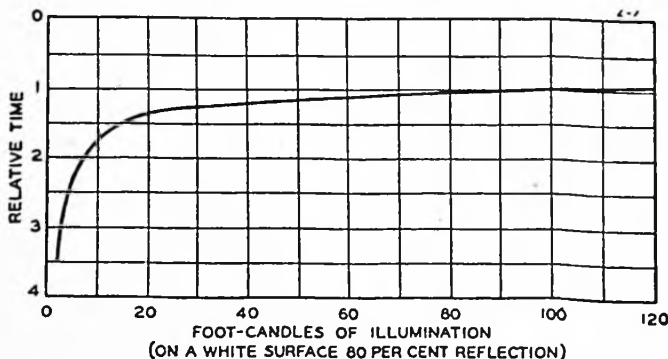


Figure 1. Time and light required for perception

lowed by a drop to 170. In this report the lighting levels were unfortunately not given. An interesting feature of this report is that compensation payments dropped from \$59,500 to \$23,800 annually, which was a saving of nine times the cost of the improved lighting.⁹

The suggestion may be made that when an industrial plant manager decides to improve the illumination, he may make other improvements as part of the same general program aimed at accident reduction, and that these other conditions may be partly responsible for the ensuing drop in accidents. The experience of the author in connection with over a thousand relighting jobs is that relighting is seldom accompanied by any other change that would affect production, with the exception of changes the lighting engineer may suggest as part of his program for improving visibility, such as painting, changing some machine locations, and tilting surfaces carrying materials undergoing inspection for easier access. In most cases, therefore, the drop in accidents is properly chargeable to the lighting improvement.

The general answer to the question, "What is the relationship between illumination levels and the accident rate?" has been before students of the matter for quite a while, but seems to have been overlooked.

Everyone will agree that if deprived of sight or light and still forced to go on about our business we would be certain to have accidents. In other words the relation of visibility to accidents then would be 100 per cent.

Depression experience with reduced street lighting and blackout experience during the war show that accidents average seven times the rate that occurs in the same localities in daylight. That is, under such conditions the accident rate has dropped from the 100 per cent rate with complete lack of visibility to $87\frac{1}{2}$ per cent with slight visibility.

We have here the beginning of a curve showing the relation between lighting levels and accidents, which starts at one end with darkness and all accidents that occur (100 per cent) attributable to lack of light, with the next point on the curve being the amount of illumination somewhere between starlight and

moonlight, and an accident rate of seven times the day rate of $87\frac{1}{2}$ per cent.

Now it seems obvious that no amount of light can protect against accidents in which the events move *faster than the speed of vision*, so that the other end of our light-accident curve must be the brightness level at which the speed of vision reaches a maximum. In other words, light as a cause of uncertain seeing can only be a factor in accidents between total darkness and that level of illumination at which speed of seeing ceases to increase. At this point we run into a slight complication. The speed of seeing depends directly on the general or average brightness of the field of view. This average brightness depends, in turn, upon the amount of the illumination present; but, in an interior with dark finishes and dark wood materials, the illumination would have to be much more to produce the same speed of seeing that the same illumination could cause in an interior with light finishes.

So the end point of our curve is theoretically placed at that brightness level at which the speed of vision reaches a maximum.

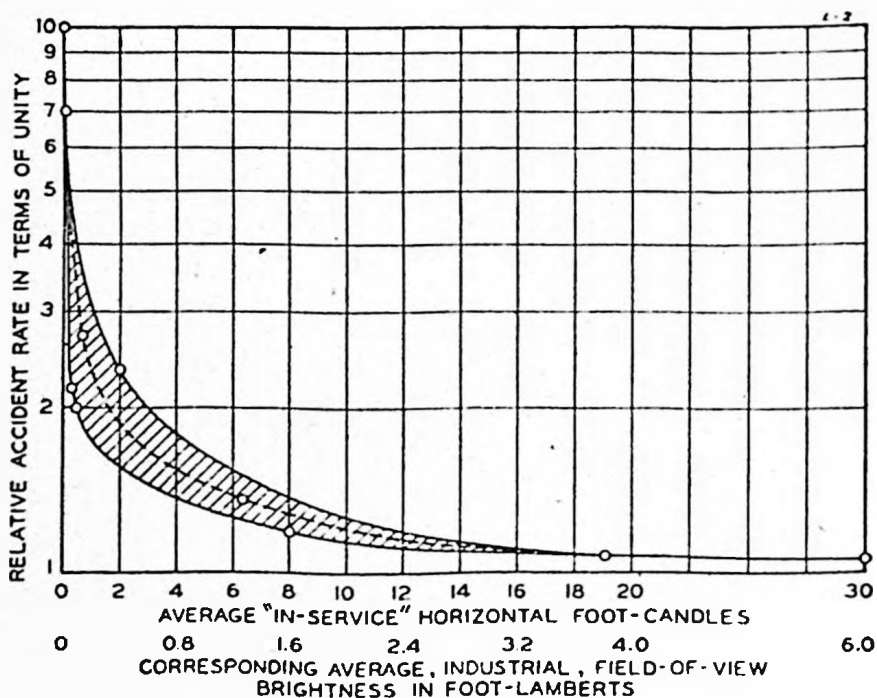


Figure 2. Relation of lighting to the industrial accident rate
Unity represents all accidents having a nonvisual cause

Practically, this is of small importance as the speed of vision curve has a knee, beyond which it nearly flattens. Past a brightness of 70 foot-lamberts (90 foot-candles on white; see Figure 1), the gain in speed is slight for the rest of the way. Tentatively, therefore, we can end our curve at 70 foot-lamberts.

Knowing the start of the curve, plus its general downward direction (from traffic statistics), and its probable end, only the in-between shape remains to be filled in. Intermediate points can be plotted from the data in this article in the references. The resulting diagram is shown in Figure 2. It stops at 6 foot-lamberts (30 foot-candles in typical industrial interior), instead of 70 foot-lamberts (350 foot-candles in industrial interiors), as it drops only to the base line (unity) in a distance of 11 times the width of the diagram, beyond the 6-foot-lambert point.

Lighting engineers will note the inverted resemblance of the median line of this diagram to the speed of vision curve. The speed of vision increases rapidly at low levels of brightness. Conversely the rate of accidents decreases rapidly at low levels of brightness. The decrease in accident rate at higher levels slows down just as does the speed of vision.

In basing this diagram on foot-lamberts, the author has made the assumption that the industrial cases reported by investi-

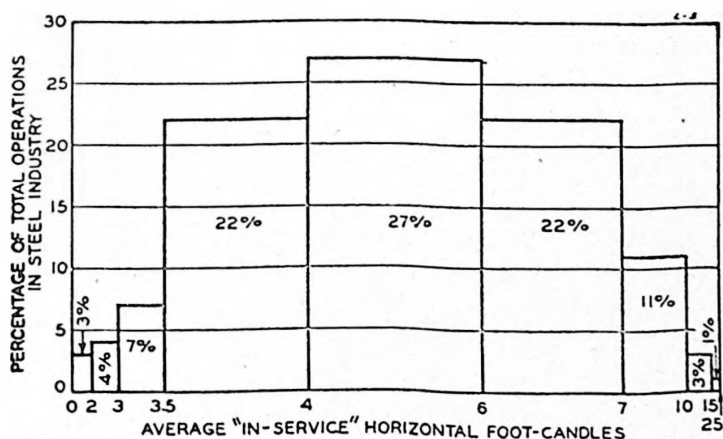


Figure 3. Percentage distribution of illumination levels in the steel industry

gators concerned plants that had average industrial interior light reflection conditions. The author has determined from a sampling of industrial plants that the average brightness is 20 per cent of the average horizontal illumination (the cases varied from 7 to 30 per cent). This assumption does not affect the shape of the diagram, but only the location of the foot-lamberts reading along the bottom line.

A casual reader may be tempted to judge from the diagram that accidents owing to lighting are only serious at low levels of illumination, but this would be a misreading of the facts. The accident rate is more severe at low levels than at high levels but it is sufficiently serious throughout most of the range in which lighting is a factor, to warrant attention.

However, this does not raise the question of just how serious "lighting" accidents are, in general, in industry. To answer this question we must know how lighting and the corresponding brightness levels are distributed throughout industry. We need this knowledge. The writer has had access to such figures for the steel industry. They are plotted in Figure 3, and show for example, that 27 per cent of the operations in the steel industry are performed at illumination levels of from four to six foot-candles, in-service illumination. (This may seem low to the average illuminating engineer, but it is a 100 per cent advance over the comparative figures of nine years ago.) These figures represent lighting installations designed to give from 8 to 15 foot-candles. The difference between the measured and the designed illumination levels is owing to the effects of poor maintenance plus deterioration of the lighting systems. The relative brightnesses are of the order of 20 per cent of these figures.

Looking farther we find that 71 per cent of all steel operations occur at in-service levels of from 3.5 to 7 foot-candles; so it is clear that actual practice, in this industry, at least, is down on the part of the curve in Figure 2 where the accidents caused by lighting conditions are probably from 32 to 60 per cent of the accidents from all other causes. These are serious probabilities.

Pursuing the analysis, a curve can be derived from Figure 2 that will show accidents caused by poor visibility, as a percentage

of total accidents, throughout the range of the effect of light. This is given in Figure 4 for the most important part of the range. By a comparison of the data in Figures 3 and 4, the probable net percentage of accidents that had a lighting cause, in the steel industry, in 1942, can be computed (see Table I).

Table 1. Percentage of Light-Caused Accidents in Steel Industry

Percentage Taken from Lighting Levels of Figure 3		Corresponding Percentage Acci- dent Rate from Figure 4	Resulting Percentage of Total Accidents
Foot-Candles	Percentage		
0 - 2	3	46	1.38
2 - 3	4	42.5	1.7
3.5- 4	22	37	8.15
4 - 6	27	31	8.4
6 - 7	22	25.5	5.6
7 -10	11	20	2.2
10 -15	3	12.5	0.4
15 -25	1	7.5	0.07
Total			28.9

This percentage, that is, the portion of the total accidents in the steel industry, occurring under artificial lighting, that can be probably attributed to uncertain seeing conditions during 1942 is around 29 per cent. This is surely a serious probability, and as we can expect to find a higher figure in industries that are not so well lighted as the steel industry in 1942, the size of the task that confronts the illuminating engineer begins to loom in its true dimensions.

There is another important aspect to this matter. There were 1,600,000 "loss-of-time" accidents to workers, at work, in 1941, according to the National Safety Council. It is customary to record "loss-of-time" accidents on the basis of whether the worker has to go home (or to the hospital) or not. If his injury is such that he can stay at his post, whether he can do effective work or not, it is not customary to list the accident as a "loss-of-time" accident. Neither are accidents to machines, which also interrupt production, listed as "loss-of-time" accidents. Therefore, when we read that 3,000,000,000 man-hours were lost in

the 11 months following Pearl Harbor, we are reading only part of the story.

Uncertain seeing conditions are just as effective a cause of "non-loss-of-time" accidents as of admitted "loss-of-time" accidents. It is a fair prophecy that the provision of certain-seeing conditions throughout industry would save at least 200,000,000 man-hours per year, to say nothing of 4,000 worker's lives and 29,000 cripples, 25 per cent of the recorded 'at-work' loss.

In conclusion the author wishes to emphasize that the deductions, diagrams, and curves in this article are only educated guesses (with the exception of the speed of vision curve), but he believes that future statistics will confirm them, and hopes that this study will inspire others to produce the necessary information.

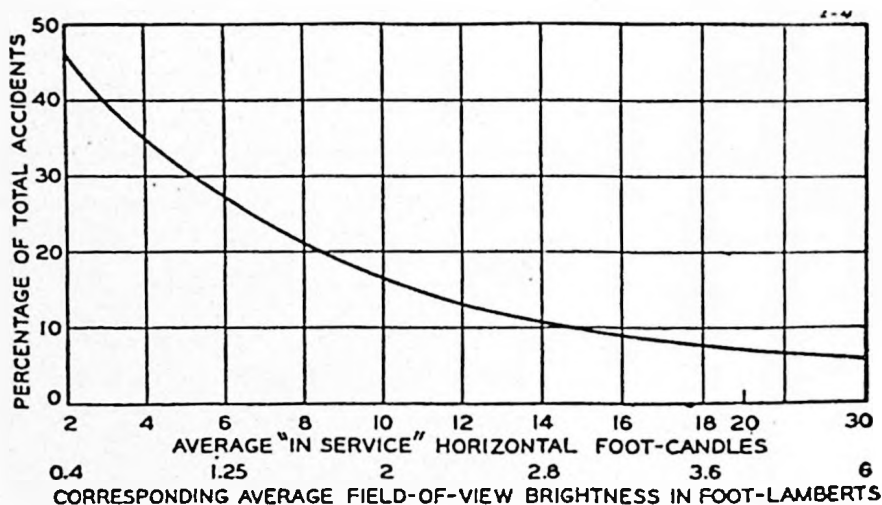


Figure 4. Accidents attributable to lighting causes shown as a percentage of total accidents over the range in which lighting conditions are a cause

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MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board, April 10, 1944

The meeting was called to order by President Kerr with the following members present: Gosa, Kammer, Lassalle, Leake, Nairne, Steinmayer and Mayer. The minutes of the last meeting were read and accepted. The resignation of Mr. Jack Gerster was accepted with regret.

The formation of Student Branches of the Society at Tulane and L.S.U. was discussed. The Board favored the formation of such groups and referred the matter to the Student and Junior Activities Committee for further study.

Dean Lassalle reported on the meeting in Baton Rouge relative to the organization of a State Association of Commerce. Mr. Kerr also read a letter from the New Orleans Association of Commerce in reference to this matter, and was directed by the Board to answer same.

Dean Lassalle read a letter received from the New Orleans Association of Commerce regarding the endorsement of a resolution to be introduced in the State Legislature concerning the limiting of income taxes. It was decided that this matter was not within the province of the Society.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with the New Orleans Section, ASME, April 10, 1944

The meeting was called to order by President Kerr with approximately 130 members and guests present. It was voted to dispense with the reading of the minutes. Report of the Employment Committee was read by the Secretary. President Kerr introduced the newly elected members of the Society. The meeting was then turned over to Chairman L. J. Cucullu, New Orleans Section, A.S.M.E., who conducted a brief business meeting of the Section.

Mr. Cucullu then introduced the speaker of the evening, Mr. A. E. Caudle, Engineer, Blower and Compressor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wisc., who presented a most interesting paper on "Gas Turbine Developments." Mr. Caudle answered a number of questions from the floor at the conclusion of his paper.

Mr. Cucullu expressed to Mr. Caudle the thanks of the New Orleans Section, A.S.M.E. and returned the meeting to President Kerr who added the thanks of the Louisiana Engineering Society. The meeting adjourned with a rising vote of thanks to the speaker.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Special Meeting of the Board, May 2, 1944

The meeting was called to order by President Kerr with the following members present: Kammer, Leake, Nairne, Steinmayer and Mayer. The following members of the Louisiana Institute of Registered Civil Engineers were present by invitation, T. B. Beemel, N. L. Marks, Jr., R. P. Rordam, and L. J. Wyier, Professor W. F. Scofield was also present by invitation.

Mr. Kerr explained that the purpose of the meeting was to discuss certain controversial features of the general engineering license law about to be introduced into the coming session of the Legislature. The following modifications were proposed by the L.I.R.C.E. Group:

1. The definite statement of the branches of engineering in the clauses defining "Professional Engineer" and Professional Engineering."
2. The elimination of the experience requirement for engineers and land surveyors having been graduated from a school or college approved by the State Board of Engineering Examiners as of satisfactory standing.
3. Changing paragraph 2 of section 21 to make it mandatory for the Board through its members, officers, council and agents to assist in the trial of any cases involving alleged violations of the act.

After some discussion of the matter, the Board voted that the proposed act be amended to include these changes and that steps be taken to have it introduced into the coming session of the Legislature.

Professor Scofield, Assistant Secretary, Louisiana State Board of Engineering Examiners, presented a letter calling the attention of the Board of Direction to the fact that the Governor has not yet appointed a member to the State Board to fill the vacancy existing from the expiration of the term of Col. E. S. Bres. In as much as Act 242 of 1920 states that appointments to the State Board shall be made by the Governor from a list of practicing civil engineers selected by the Louisiana Engineering Society, the following names were selected: David W. Godat, F. N. Billingsley, Leo M. Odom, and Marcel Garsaud.

The Secretary was directed to submit this list to the Governor.

Upon invitation of the Baton Rouge Section, it was decided that the regular June meeting of the Society be held in Baton Rouge on June 17.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

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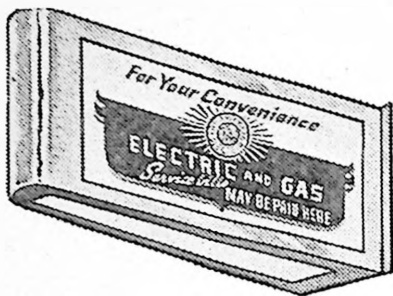
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PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

JUNE, 1944

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AUGUST, 1944

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EDITORIAL NOTES AND COMMENT

A Correction. In the June issue of the "PROCEEDINGS" an omission was made in connection with the account and paper of the May meeting. This session was a joint meeting with the New Orleans Chapter, Illuminating Engineering Society and I.E.S. The speaker, Mr. H. L. Logan, was obtained through the efforts of the N. O. Chapter of I.E.S. It should also be stated that Mr. Logan is a member of I.E.S., and that much material for his paper was from publications edited by I.E.S. The Society was indeed privileged to hear such an interesting and informative speaker; also joint meetings afford a pleasant opportunity of greeting fellow engineers in other organizations. The editor regrets this omission.

New Members. Following is a list of members recently elected to the Society. We welcome them, look forward to greeting them at the meetings, and trust that they will take an active interest in the affairs of THEIR Society.

FOR MEMBER

Abrahamson, Nils Carl Crister. Age 47. Endorsed: N. E. Lant, L. S. Lenoir, R. H. Vaughan. Swedish Naval Academy, Sept. 1914-May 1917. Stockholms Tecniska Hogskolan, Sept. 1917-May 1919. April 1928-Nov. 1929, Office Engineer, Standard Fruit Co., Puerto Cabazas, Nicaragua. Work consisted of structural designs and general engineering work. Dec 1929-July 1930, Chief of Party, Stone and Webster Construction Co., Baton Rouge. Aug 1931-May 1933, and Aug. 1934 to present, Instrumentman, Dept of Highways, principally bridge construction. La. State License of Surveying. 645 Datzel St., Shreveport, La.

Blackstone, F. B. Age 36. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo. Hammett, A. J. Naquin. Degrees: B.S. in M.E., Rice Institute, Houston, Tex., 1929; Mechanical Engineer, Rice Institute, 1932. Draftsman, Junior Engineer, Freeport Sulphur Co., 1929-31. Designing Engineer, Power Plant, Freeport Sulphur Co., 1932-35. Supt. of Power Plant (responsible charge) 1935-date. Member, A.S.M.E. Box 26, Port Sulphur, La.

Brezner, Barnet. Age 45. Endorsed: W. S. Nelson, Charles Myers, Tom C. David. B.S. in C.E., University of Michigan, June, 1921. June 1922-Mar. 1930, Estimator and superintendent for general contractors in State of Michigan. Oct. 1931-Aug. 1934, construction engineer for Public Buildings Administration on post office construction in Illinois and Texas. May 1935-Dec. 1939, traveling engineer for the Public Works Administration in the State of Texas and Louisiana. Jan. 1940-date, General Contractor. Associate Member, Society of Sigma Xi, 1921, Registered Civil Engineer in La. and Mich. Box 654, Alexandria, La.

Burk, Jack S. Age 28. Endorsed: C. C. Barnard, J. K. Mayer, Walter Scales, Claiborne Perrilliat. Graduate of Tulane University, B.S. in Civil Engineering, 1938. 1938-1941, Architectural Engineer, William R. Burk, Architect. 1941-Jan. 1944, Associate Member of Firm, Bernard, Godat & Heft. In complete and responsible charge of all design work handled therein. Jan. 1944 to Present, full partner of firm, Barnard & Burk. Registered and licensed Civil Engineer, State of La. 312 Triad Bldg., Baton Rouge, La.

Carr, Harrison Fitzhugh. Age 58. Endorsed: J. H. Collins, C. L. Nairne, James Janssen. Graduate in C.E., Virginia Military Inst., 1906. Post graduate work in C.E. with International Correspondence School, 1906-08. Rodman, leverman and transmission man with Virginia, Carolina & Southwestern Railroad Company building from Elkhorn, Ky. to Spartanburg, S. C. 1908-1910, Engineer for the Prairie Oil and Gas Co., Independence, Kan. 1910-18, Chief Engineer for Prairie Oil and Gas Co. 1918-19, First Lt., U.S. Engineers, World War I. 1919-26, Oil and gas well drilling contractor. 1926-32, Resident Engineer with Ford, Bacon & Davis in charge of construction of pipe line and compressor station from Baton Rouge to New Orleans. 1932-43, District Manager for the Baton Rouge District of United Gas Pipe Line Co. 1943-date, District Manager for United Gas Pipe Line Company and Union Producing Co. Professional licenses: Louisiana State Board of Engineering Examiners to practice Civil Engineering in the State of La. and affiliated states. 19 Neron Pl., New Orleans 18, La.

Crusel, Cornelius C. Age 44. Endorsed: Geo. R. Hammett, W. S. Leake, B. S. Nelson. C.E. Degree, 1922, Cornell University. 1922-24, Standard Oil Co. of La., casinghead gasoline plant control work. 1924-25, New Orleans Sewerage & Water Board, Construction of purification plant expansion in charge of reinforced concrete construction. 1925-44, A. M. Lockett & Co., Application Engineer, both civil and mechanical work. Registered as Civil Engineer in La. since 1928. 1418 Seventh St., New Orleans 15.

Edmonds, John R. Age 29. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo Hammett. B.S. Degree, Electrical Engineering, Texas A. & M., 1937. General Electric testman, 1937-38, Texas Power & Light Co., 4 mos., 1938, Freeport Sulphur Co., 1938-date, Supervisor of Shops. Associate Member. A.I.E.E. Box 42, Port Sulphur, La.

Gillen, Ernest McKay. Age 38. Endorsed: H. L. Lehmann, L. S. Lenoir, R. H. Vaughan. 1923-24, attended L.S.U. and La. State Normal, working on Engineering Degree. 1925-29, Rodman and Instrumentman, Highway Dept. 1929-date, Resident Engineer on construction of highways, Dept of Highways. 444 Prospect St., Shreveport, La.

Good, Louis K. Age 43. Endorsed: Alvin Fromherz, O. K. Olsen, Charles Kerr. 1923, B.E. in C.E., Tulane University. 1923-24, Structural Draftsman, Lukens Steel (now J. & L. Corp.) 8 months. 1924-25, Timekeeper for Underwood Contracting Corp., Monroe, La.; then Ass't Treasurer and estimating for same in Miami, Fla., 1925-26; Estimator same in New Orleans, 1927. 1927-date, R. P. Farnsworth & Co., Inc. now Director and Manager. 2817 Jefferson Ave., New Orleans 15, La.

Graham, Richard Norwood. Age 41. Endorsed: J. A. Haase, William Whipple, Aldoe Orr, Jr. B.S. Degree, C.E. from Clemson College, C. C., 1922. Twenty-one years' experience, principally with U.S. Engineer Departments. Duties ranging from instrumentman and draftsman to Chief of Field parties and office engineers. Some experience on Hydro-electric plant and highway. Since June, 1943, with U.S. Maritime Commission as Asst. Marine Engineer. Duties: Reviewing costs of change orders. 233 Walnut St., New Orleans 18, La.

Grosz, Melvin H. Age 28. Endorsed: J. T. O'Brien, H. W. Waterfall, Hamilton Johnson. 1939, B.S. in Mechanical Engineering, L.S.U. 1942, M.S., L.S.U. Sept., 1939-Aug., 1941, Inspector, Standard Oil Co. of La. Aug., 1941-Dec., 1942, Process Engineer. Dec., 1942-Present, Mechanical Coordinator for Plancor Area of Standard Oil Co. of La. 2152 Ferndale Ave., Baton Rouge, La.

Gustafson, A. A. Age 44. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo. Hammett. Degree, University of Minn. Mining Engineer, 1922. 1922-25, Mining Engineer, Whitmarsh Mng. Co., Crosby, Minn, iron mining. 1925-33, Mining Engineer, Pickands, Mather Co., Ironton, Minn, iron mining. 1933-34, Engineer, U.S. Forest Service, Ely, Minn. 1934-44, Mining Engineer, Shipping Supt., Exploration Supt., Freeport Sulphur Co., Texas, Nevada, Louisiana, Member, A.I.M.E. Box 24, Port Sulphur, La.

Hebert, Marvin I. Age 36. Endorsed: L. D. McCorquodale, E. H. Goodloe, A. D. Jackson. Graduate, Lake Charles High School, I.C.S. Course—Survey & Mapping, 1927. Engineering Ass't. to City Engineer, Lake Charles, La. (Rodman, Levelman, Concrete Inspector, Street Paving & Drainage); 1928-30, Draftsman, Stone & Webster Corp., Louisiana & Texas (Transmission Line Location and Construction); 1931-32 in business, Conroe, Tex., in charge of property surveys and maps; 1933, Engineer in charge for Contractor, Panama Canal Zone (Concrete and Dirt Work); 1934-41, Draftsman, Road Design Department, Louisiana Highway Commission, Baton Rouge, La.; 1942, Draftsman and Designer, Geo. P. Rice, Architect Engineer, La., Miss. and Ark. (Roads, Railroads and Drainage); 1943-date, Engineer in charge of checking Pipe Layout, The M. W. Kellogg Co., Cities Service Refinery, Lake Charles, La. 653 Sixth St., Lake Charles, La.

Larkin, William M. Age 35. Endorsed: P. J. Guelfi, L. W. Harrell, L. J. Lassalle. B.A. Degree (major in E.E.) L.S.U. Completed three extension courses in E.E. from Texas A.&M. 1941-43, Lighting Engineer, Gulf States Utilities, Beaumont, Texas. 1943-date, Power Engineer, Gulf States Utilities, Baton Rouge. Associate Member I.E.S. 3106 Highland Rd., Baton Rouge, La.

Lee, Clarence O. Age 43. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo Hammett. Mining Engineering Degree, School of Mines, University of Minn, 1924. 1924-26, Bridge Inspector, Minn. Highway Dept. 1926-28, Field Engineer, Freeport Sulphur Co. 1928-30, Production Supt., Freeport Sulphur Co.

1930-35, Tech. Ass't. to General Supt., Freeport Sulphur Co. 1935-42, General Supt., Freeport Sulphur Co. 1942-date, Technical Ass't. to General Manager, Freeport Sulphur Co. Member A.I.M.M.E. 48 Versailles Blvd., New Orleans 15, La.

McIver, DeWitt T. Age 46. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo Hammett, A. M. Hill. October 1917 to Jan. 1922 (excepting nine months spent in military service): General engineering including sulphur production, sulphur shipping, power plant operation and lab. work with Texas Gulf Sulphur Co. Jan. 1922 to Aug. 1922, Continental Oil Co. 1923 to date, Freeport Sulphur Co. 1923-28, Ass't. Supt. of Production. 1928-1930, Supt. of Land and Exploration. 1930-39, Ass't. Gen. Mgr. 1939-1941, Ass't. to Pres. 1941-date, General Manager. Member, A.I.M.E. c/o Freeport Sulphur Co., 1804 American Bank Bldg., New Orleans 12, La.

Mitchell, H. Lane. Age 47. Endorsed: E. M. Freeman, A. Wylie McDougall, R. S. Cooper. 1919-27, Private Practice and with Gulf Oil Company: General Engineering and Survey Work; pipelines, pump stations, river crossings, etc; construction supervision of same. 1927-34, private practice: General surveying, land surveys, oil well locations, pipelines, highways, railroad surveys. 1934-date: Commissioner of Streets and Parks Dept. City of Shreveport, La. Licensed: State of La. Surveyor. Shreveport, La.

Munsell, Robert S. Age 32. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo Hammett, A. M. Hill. Mining course, Colo. School of Mines, E.M., 1935. U.S. Bureau Reclamation, Water Diversion, ten months, charge of party. Independent Mine Operator, Colorado, 1937-38. Mining Engineer, E. L. Cord, Operations, Nevada, mining operations and prospect development, 1939-40. Mining Engineer, Freeport Sulphur Co., prospect foreman, Nevada, Sulphur Production, La. 1941-date. Box 716, Port Sulphur, La.

Nickelson, James H. Age 37. Endorsed: E. H. Goodloe, Theo T. Chenet, H. L. Lehmann. Worked for the Dept of Highways since Aug. 1928, which consisted of Rodman from 1928-

1930. From 1930-35, Inspector on various types of bridges. 1935-40, Instrumentman in charge of Party on paving construction and bridge work. 1940-date, Res. Engr. on construction of paved roads and structures, with grading and incidentals connected. In charge of all office work on one or more specific projects and responsible for all materials submitted to the testing lab. General drawings which show details of construction. P. O. Box 1482, Lake Charles, La.

Price, Kenneth T. Age 41. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo. Hammett. B.S. Degree in C.E., University of Texas, 1926. Employed continuously since June 1925 by Freeport Sulphur Co. in production, prospecting, engineering and administrative functions. Member A.I.M.E. Port Sulphur, La.

Ratcliff, Appleton B., Jr. Age 33. Endorsed: Harry Waugh, A. J. Landry, E. A. Davis. Two yrs., Marion Institute, Marion, Ala.; course in Surveying and Mapping, I.C.S. Schools. 1929-1933, Surveyman, U.S. Engineers, Surveying and levee construction. 1933-35, Road and Map draftsman, La. Highway Comm. 1940-present, Dept. of Highways. Civil Service Rating. Highway Engineer (1), Proposals and other pertinent engineering data. 824 Costello Lane, Baton Rouge 8, La.

Rogers Charles M. Age 50. Endorsed: A. B. Paterson, C. L. Nairne, K. P. Kammer. Twenty odd years in the design, construction and operation of all types and sizes of powerplants. 2838 St. Charles Ave., New Orleans 15, La.

Salassi, Henry Day. Age 38. Endorsed: A. J. Landry, J. J. Saurage, H. L. Lehmann. 1932-33, Instrumentman and Asst. Res. Eng., La. Dept. of Highways. 1934-36, Chief of Party and Res. Eng., La. Dept. of Highways. 1936-37, Supervisor, State-wide Highway Planning Survey. 1937, Senior Draftsman, La. Dept. of Highways, Baton Rouge, La. (Road Design). May, 1941-Feb. 1942, Chief of Roads and Drainage on construction, Keesler Field, Biloxi, Miss. Feb. 1942-Jan. 1943, Layout Engineer, M. W. Kellogg Co., Baton Rouge, La. Jan. 1943- Feb. 1944, Operations, Aluminum Ore Co., Baton Rouge, La. Feb.

1944-present, Road Drafting Squad Leader, La. Dept. of Highways, Baton Rouge. 1070 Glenmore Ave., Baton Rouge, La.

Shaw, George Edouard. Age 35. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo. Hammett. U. of Texas, M.E., 1928; Magnolia Petroleum Co., pipeline maintenance engineer, Aug. 1928-Feb. 1929; Airports Engineer & Construction Co., subsid. Southern Air Transport Div. of American Airways, construction engineer, Feb. 1929-Dec. 1930; Standard Oil Co. of N.J., mechanical engineer, South American contract, Dec. 1930-Dec. 1933; Oliver United Filters, Inc., mechanical engineer, asst. to head of Development Dept. & complete charge of Petroleum Div., specializing in design and construction of filtration equipment and plants, Jan. 1934-Feb. 1940; The Dicalite Company, filtration engineer & Dist. Mgr., Feb. 1940-June 1943; Certified by State of La. to teach refinery mathematics 1941; Freeport Sulphur Co., filtration engineer supervising development, installation, and operation of filtration processes, mechanical engineer supervising new construction and maintenance for Production Dept., June 1942 to present. Member of National Assoc. of Corrosion Engineers. P. O. Box 46, Port Sulphur, La.

Stirling, Feltus B. Age 36. Endorsed: P. J. Guelfi, C. M. Scott, A. M. Melancon. 1929-31, Gulf States Utilities Co., Lake Charles, Student Engineer, Asst. Res. Engineer and Asst. Supt. Elec Dept. Continuous employment since Sept. 1933, Gulf States Utilities Co., Baton Rouge, Switchboard Operator, Meterman and Asst. Dist. Rep. 1933-37; Engineer in Electrical Distribution Dept. since 1937. 2005 Ferndale Ave., Baton Rouge 15, La.

Watson, M. P. Age 28. Endorsed: J. H. Collins, C. L. Nairne, James Janssen. 1936, B.S. Degree in M.&E. Eng'g., Louisiana Polytechnic Inst. Post Graduate Work in Electronics, L.P.I. Aug. 1936-July 1937, United States Engineer Dept., Vicksburg, Miss. as Junior Engineers Aide. July 1937-Oct. 1942, United Gas Pipe Line Co., Engineering Dept. Oct. 16, 1942 to date, District Engineer, Baton Rouge District, United Gas Pipeline Co. Member: A.S.M.E., A.I.E.E., Society

of American Military Engineers. 15 Davis Blvd., New Orleans 20, La.

Zumwalt, Thomas Howard. Age 37. Endorsed: R. A. Steinmayer, R. P. Lockett, Geo. Hammett. With Robert J. Cummins, Houston, Texas, seven years, detailing, designing and inspecting warves, warehouses, industrial buildings, office buildings, theatres, hotels, etc. 1926-33 with Freeport Sulphur Co., 1933-date, detailing, designing and inspecting piling and concrete foundations, excavations, levees, dredging fills, bulkheads, steel and timber framing, etc. Also general maintenance, including planning, estimating, selection of materials, budgeting specifications, and labor distribution. Registered Prof. Eng'g., Texas, by examination. Port Sulphur, La.

Baton Rouge Meeting. The meeting which is held annually in Baton Rouge took place on June 17. An outing was the order of the day in the afternoon; in the evening a buffet supper was served in the laboratory. Mr. Lehmann, President of the Baton Rouge Section, presented an interesting paper on the testing and research work being done by the highway department. Those present had an opportunity to inspect the laboratory equipment. The whole affair was a very pleasant occasion. About 110 members and guests were present.

Joint Meeting with the American Society of Civil Engineers. Our June meeting was held jointly with the N. O. Section of A.S.C.E. Mr. David W. Godat presided for the A.S.C.E., being its president. It seemed like "old times" as just a few years ago Mr. Godat was president of L.E.S. Details of the meeting are presented elsewhere. Attendance was excellent.

Post-War Planning. At our June meeting Col. Walter N. Carey, Chief Engineer, Federal Works Agency, presented a word picture of Louisiana's progress in Post-War Planning, based on information received in his Washington office. His comments provoked much discussion; it proved to be a very interesting and lively meeting. One point was brought out, and cannot be too strongly emphasized; namely, that a plan should not be considered a bona fide "post-war project" unless

it has reached the stage where bids could be requested. This means that actual workable specifications should be drawn up, blue prints prepared. Anything short of this should be considered only wishful thinking. Adequate post-war planning is indeed vital to the engineering profession. Mr. John Riess is Chairman of the Society's POST-WAR PLANNING COMMITTEE. Other members are O. K. Olsen, Vice-Chairman, H. E. Crump, E. A. McLellan, J. M. Todd, A. M. Melancon.

Our Annual Outing and Smoker. On July 13 the Society held its annual outing at the Metairie Golf Club. The weather was ideal and the usual games of golf and horseshoe pitching were on. An unusually large number were present. In accordance with tradition, Ole K. Olsen was passing out free vitamins (from cold oak kegs), which added much to the enjoyment of the affair.

In the evening, about one hundred and twenty members and guests sat down to a very enjoyable meal, followed by awards of prizes and a floor show.

The committee deserves much credit for the arrangements, as such things are not easily accomplished in these times of shortages.

MALE WATER SHEEP

The editors of *Power Magazine* recently received from a Latin-American subscriber a letter written in the language of the subscriber's country. The communication had been translated for the editors, but had apparently suffered from a literal translation of the part which read:

"I am needing a male water sheep. Please tell me where I could find one."

After much head scratching, one of the editors suddenly realized that the thing made sense after all. The inquirer wanted a hydraulic ram!

What kind of a breakfast was eaten by the little man who wasn't there? Ghost toasties and evaporated milk.

PAPERS AND DISCUSSIONS

THE FUNCTION OF THE TESTING AND RESEARCH LABORATORY IN RELATION TO CONSTRUCTION AND MAINTENANCE OF HIGHWAYS

H. L. LEHMANN*

I welcome the opportunity to tell you somewhat briefly, the part the laboratory plays in the construction and maintenance of highways. The laboratory of any organization is somewhat in the background; ours is not to construct, but, to more or less "police" and "anticipate"! hence, the title of Testing and Research.

Let me give you a little historical background, to lead up to our present day operations. The Louisiana Highway Commission was created by Act No. 95 of the Legislature, approved November 18, 1921. Prior to April 1, 1925, commercial laboratories were employed to test highway materials, and field inspections of materials (especially gravel) were made by various representatives of the Construction Section of the Highway Department. The first laboratory was established in March 1925, under the supervision of Prof. J. H. Bateman at the Louisiana State University and quartered in a portion of the Mechanical Engineering Building, occupying approximately 3,000 square feet. The personnel consisted of approximately six employees including the stenographer and janitor. It was operated jointly by the Highway Department and the University by an arrangement whereby the Highway paid for the salaries of the personnel and the University furnished the equipment. The laboratory was used by the University for instruction, teaching strength of materials and testing construe-

* Member of the Society and President of the Baton Rouge Section; Testing and Research Engineer, Louisiana Department of Highways. Presented at the Baton Rouge meeting.

tion materials. The laboratory consisted of two units, Physical and Bituminous. Some chemical tests were made.

In 1927, the laboratory was moved to a portion of another building on the Louisiana State University campus—known than as Highway Engineering Building, occupying approximately 8,000 square feet, and working under the same plans.

In 1929, a large construction program was started and the laboratory personnel was greatly increased. The total at its peak was approximately 150, including about forty student assistants. At that time the laboratory began to be operated entirely by the Highway Department. It was in that year that the chemical section of the laboratory was established, followed by the addition of the soil section in 1935. In spite of the very cramped conditions, a considerable amount of work was done—especially during the heavy construction program.

The personnel dwindled to approximately fifteen employees in 1933 and gradually increased to fifty-eight full-time employees at the end of 1941.

In 1939 the number of students at L.S.U. had increased to such an extent that the university was in need of the space occupied by the Laboratory. It was a question of either constructing an additional building by the University or by the Highway Department, and to our great joy, it was done by the latter. On June 15, 1939 the first tests were made in the new building here on Florida St. while the department still operated the cement laboratory at the University. The latter was continued only until we could complete regulating the temperature and moisture control of the new damp room adjoining the physcial laboratory. The present building provides approximately 22,000 square feet, and furnishes more comfortable quarters.

With the establishment of State Civil Service in Louisiana, plans were started to expand our research activities, but hardly had we begun to lay plans when the war came along and with it the beginning of our personnel losses. We had purchased and were using an accelerated testing machine for paints, asphalts, woods and similar materials. Some of this work had been done when the Navy learned that we had this piece of equipment. They requested that we release it to them.

Therefore, our actual research towards definite information of this type has been temporarily postponed.

The Testing and Research laboratory is very closely related to and dove-tails in with Design, Construction and Maintenance. It is one of seven sections of the Engineering Division of the Highway Department—operating directly under the supervision of the Chief Engineer. The greater portion of the testing is of materials submitted by the Resident Engineer assigned to construction projects, the District Engineers through their various unit foremen, and by representatives of the laboratory making field inspections and subgrade surveys.

A comparatively small percentage of samples are submitted by material producers and manufacturers who are prospective suppliers to contractors or to the State Highway Department.

Let's take a typical project, new or partly new location, and it is planned to build new bridges, concrete culverts and finally a concrete pavement. After the Traffic and Planning Section has secured and tabulated the statistical data from which the general location and geometric design are established, this data is turned over to the Design Section and the tentative plans are prepared. A set of such plans are furnished the laboratory, reviewed, and an outline is prepared to make the subgrade survey. Deep bridge foundation borings are made, either with motorized drill or wash boring equipment for bridges, deep hand borings from 25 to 35 feet deep for culverts, and from 8 to 15 feet deep for embankment and borrow pits. After testing, the material is classified and blueprints are prepared showing log, which includes color, type, consistency and very often, moisture content and any foreign material, logs, rocks etc. The log of boring and test reports of the soil serve to evaluate the material, either as to foundation or for construction. Recommendations are furnished the Design Sections with supporting data. This is sometimes further discussed at a conference of all sections responsible for the preparation of the plans, presided over by the Chief Engineer.

Following the subgrade survey, little is heard of the project until notice of advertisement is sent to the laboratory, except on materials of an unusual nature intended to be used and not

covered by standard requirements. We are called upon to furnish specifications of those materials not covered, requiring chemical analysis, physical characteristics and tests. Producers or Contractors may request approval of certain materials intended for use on the project. In the latter case, it is necessary to check with the Project Control Section, the Contract Engineer to verify requirements since we do not get a copy until the contract is awarded. When the contract is awarded, an official copy is sent to the laboratory for reference. This is carefully reviewed and any work or materials required which are of an unusual nature are specially noted and the field inspectors and laboratory assistants are so advised.

Before beginning actual construction, borrow pits furnished by Contractors are sampled, tested, and recommendations are made. If furnished by the state, this information is secured before letting contract and is shown on plans. During construction, a representative of the soils laboratory makes periodic inspections of the fills, checks with and advises the Resident Engineers during process of construction as to the selection of materials, and instructs or checks with the inspectors on the job regarding the amount of compaction being obtained.

While the borrow pits are being tested, other materials intended for use in the project are being inspected. A representative from the laboratory (known as a Field Inspector) is sent to the concrete pipe manufacturer and all concrete pipe is tested at the manufacturers' plant. One joint for each size (taken at random and representing not over one hundred joints) is checked for construction dimensions, length, diameter, thickness of wall and compressive strength. If the pipe is of reinforced concrete the steel is measured for size and quantity. Portions of the concrete pipe are brought to the laboratory for absorption tests.

Lumber and piling are inspected by trained timber inspectors whose duties consist entirely of inspecting the material in the untreated or green stage, inspecting the treatment, advising the amount of steaming necessary to sufficiently reduce the moisture prior to treatment, checking gauges for treating

conditions, temperatures of preservative, vacuum and pressure and quantity of preservative absorbed, and inspecting material after it is pulled from the treating cylinder—this to make sure that the material has not been damaged during process of treatment.

Bituminous Inspectors are sent from the laboratory to asphalt plants processing bituminous mixtures for shipment to Contractors, or on State Purchase Orders. This is done to check the materials, and furnish mix designs, as well as check the manufacturing process. Periodically they follow the material to the project to observe its behavior for any probable adjustments in design.

An inspector is sent to steel mills to check structural steel fabrication and to foundries to check and test various castings and machine parts before the material is shipped to the project.

As materials are received on the construction job, the Resident Engineer submits representative samples for test. In some instances, the materials are sampled at the source, if practical or economical to the Department. Portland Cement, in most cases, is sampled at the mill by a commercial laboratory since the volume does not justify placing an inspector at the mill, and sampling at the source expedites releases. However, no testing is done by commercial laboratories except in rare cases.

Upon completion of tests, the Resident Engineers are immediately advised since the use of all materials are withheld pending approval. If the release is urgent, it is done by telephone or telegraph, later confirmed with report and, in some cases, accompanied by letter of recommendation or explanation.

When concreting operations are started, mix designs are furnished by the laboratory. Whenever it is possible, the Laboratory Field Inspector is on the job with the Resident Engineer to check the mix and other items entering into the construction of the project. These inspections are made periodically by a representative of the laboratory, to check all items entering into the construction of a project and to insure

that it is either tested or inspected and have approval before its use is permitted.

Materials ordinarily tested or inspected other than soils, lumber, piling, structural steel, portland cement, and castings as above mentioned are gravel, sand, water, reinforcing steel, bronze plates, paint, clay pipe, nails, bolts, wire fencing bituminous materials, center stripe (metal or bituminous) metal pipe, expansion joints, fertilizer curing materials, burlap compound and in fact—just about any material entering into the construction of the project.

Finally, before the project is accepted, the concrete pavement is drilled and tested for thickness and compressive strength. Other than making notes of some particular phase of the construction for reference or observation, the contract is filed and considered complete. This outline gives you a picture of the control the laboratory has over materials on a typical concrete paving project. Other types of projects let to contract are handled in the same manner.

Inspection and tests of materials purchased by the state are conducted exactly as above outlined except that samples are submitted by the District Engineers through their various Unit Foremen or Stock Clerks. In addition to the above materials inspected or tested for a typical construction project, there are other materials inspected and tested for the department, such as gasoline, diesel fuel oil, lubricating oil, grease, rope, wire cable, reflector buttons, material for fabricating traffic signs, equipment paints and license plates. All automotive lighting equipment is submitted to the laboratory by the manufacturer for approval and standard specifications are prepared to cover same.

While the purpose of the laboratory is primarily to serve the Highway Department, there are times when we are requested to do work for other governmental agencies, Federal, State or Parish. When our facilities are available, this courtesy is extended. If the nature of the work does not involve the expenditure of too large a sum, it is usually done without cost; otherwise the agency requesting assistance is billed at actual cost, plus ten percent for supervision and reporting.

Along with our regular routine, exploration of sand and gravel deposits is carried on with the idea of looking for new sources of supply. The areas are drilled with hand augers, samples brought to the laboratory and tested. Results are logged and the area mapped. The Highway District Engineers in whose districts the material is found are so advised.

Periodic inspections are made of construction projects, involving concrete or bituminous pavements and the behavior noted. The data attained is used in future designs. This may include conditions of pavement, pavement joints, shoulders, subgrade, surface sodding, painting, or any part of the construction.

It sometimes develops that embankment construction (because of certain conditions) prove unsatisfactory and result in embankment subsidence and lateral movement. Investigations are carried out beginning with the source of the material, drilling affected areas to determine the extent of the failure, and from test of the materials and log of borings, analyze same, so that the information can be used to prevent a recurrence. This has been experienced on several projects constructed prior to our knowledge of soil mechanics.

The Department of Highways, through the Testing and Research Section, is a member of the American Society of Testing Materials and The Highway Research Board and the speaker, a member of the American Association of State Highway Officials, Materials Committee.

In conclusion, I would like to state that my dealings throughout these years with my superiors and with the other Engineers, Section Heads, District Engineers, and Division Heads have been very, very pleasant.

At this time, I would like to introduce my three principal assistants who are largely responsible for the very harmonious manner in which our section has operated.

Mr. J. J. Saurage, Laboratory Testing Engineer, who supervises and plans all the routine laboratory work and is in charge during my absence.

Mr. L. W. Harrell, Field Testing Engineer, who supervises and plans the work of the field inspectors from the laboratory and conducts field research.

Mr. L. W. Hough, Soils Engineer, who supervises the operation of the soils unit, routine, research and surveys.

Gentlemen, I appreciate your patience and want to thank you for the attention given me in listening to a matter very close to my heart.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

MEMOIR

JOHN FRANCIS COLEMAN

(1866-1944)

The death of J. F. Coleman, on Saturday, June 3, 1944 in New Orleans, brought sorrow to his large circle of friends in this Society and among his large acquaintance in the professional field where he was recognized as a great engineer, a splendid and useful citizen and a faithful and helpful friend. He won the admiration and respect of all classes of citizens with whom he came in contact by his courteous and affable manner.

Born in Mississippi in November 1866, he received his education in the old Boys' High School in New Orleans and married in November 1890. Mrs. Coleman died on January 24th, 1944. From this union a son, Eugene Hunter Coleman, the only issue, graduated as an engineer, was associated with his father and was a member of the Society at the time of his death in the year 1935.

Surviving Mr. Coleman are: a sister, Miss Annie Coleman of New Orleans; two nieces, Mrs. R. C. Dean of Wheeling, West Virginia and Mrs. J. S. Shaw of Portsmouth, Virginia; and a daughter-in-law, Mrs. Eugene Hunter Coleman of New Orleans.

The professional career of our friend exemplifies a typical case of what we might call the American way of life. Beginning at the bottom of the ladder; a man full of energy, willingness to work, honesty, perseverance and respect for the rights of others, J. F. Coleman rose to eminence and distinction in his chosen profession through no other help than his own ability and personality.

Before Coleman was eighteen years old, he started as a rodman on a railroad in Guatemala. In less than six years he had so progressed in his chosen work that he became an assistant engineer for the Texas and Pacific Railroad and, in less than nine years, he became Division Engineer for the New Orleans Terminal Company.

In 1896, he became Principal Assistant City Engineer of New Orleans. During his four years' tenure, the City started an additional drainage work and other municipal improvements, including street paving, and Mr. Coleman contributed in a very large proportion to these works in both design and execution.

In 1900, he formed the consulting firm of Coleman, Maloehee and Villere. This firm was elected Engineers for the Board of Commissioners of the Port of New Orleans and Mr. Coleman's design for wharves and sheds has remained the standard for this Port and many others for which he later became Consulting Engineer. The firm was dissolved in the latter part of 1903 and

during that time, successfully designed and executed important commissions in civil, mechanical and electrical engineering works in Louisiana and Mississippi.

Mr. Coleman continued in the consulting field the rest of his life. Among the larger projects undertaken were: Location and Construction of the New Orleans and Great Northern Railway; similar work for the Lafayette to Baton Rouge branch of the Southern Pacific Railway; construction of saw mill, log trains and industrial village for the Great Southern Lumber Company at Bogalusa, Louisiana; design and construction of wharf and mechanical equipment for American Sugar Refining Company at New Orleans; opening and Development of Southern Mineral Company at Winnfield, Louisiana; sewer system and storm protection for Port Arthur, Texas; consultant for about thirty years to the Board of Commissioners of the Port of New Orleans, during which time he was commissioned to visit ports in Europe, The United States and Canada. His connection with the New Orleans Port Commission brought him great prominence in this type of work and he was consulted by many Harbor Boards, among which may be listed Houston, Corpus Christi, Beaumont and Freeport in Texas; Lake Charles, Louisiana; Mobile, Ala; Jacksonville, Fla; Charleston, South Carolina and Richmond, Virginia.

During that period, Mr. Coleman had as one of his associates our well beloved member, Samuel Young, who passed on before him.

Always conscious of his obligations, when World War I was declared against Germany in 1917, Mr. Coleman closed his office in New Orleans and became General Manager of the Chickasaw Shipbuilding Company (subsidiary of U.S. Steel Corp.) near Mobile, Alabama; selecting the site for that shipyard, supervising the construction of ship building facilities and ships, together with a village to house the personnel of some 5,000 population. This village was complete with all public utilities including sewers, waterworks, electric lights, telephone and street railway connections to Mobile.

With the signing of the Armistice, he resigned his position as General Manager, returning to New Orleans in January 1919 to resume the practice of Consulting Engineering. It was during that period that he organized the J. F. Coleman Engineering Company and associated his son, Hunter Coleman, and was commissioned to make hydraulic studies and recommendations relating to certain rivers in the South, such as the Mississippi River at Memphis to prevent damage to bridges there; study of Pearl River, near Columbia, Mississippi, to prevent it from changing its course; also, damage prevention to bridges by the Mobile and Tensaw Rivers near Mobile and similar commissions on streams of less importance.

At a later date, Mr. H. M. Gallagher became associated with the J. F. Coleman Engineering Company, an association which continued to date.

Mr. Coleman was placed in charge of the liquidation of the International Shipbuilding Company at Pascagoula when this plant was declared surplus after the Armistice.

In 1928 and 1929, he was retained as Consultant by the U. S. Engineers with respect to foundations for the concrete structure now known as the Bonnet Carre Spillway on the Mississippi River—about thirty miles above the city of New Orleans. Following this, he was named by the U. S. District Court as the Engineer member of a committee of three to hear testimony and formulate recommendations as to the amount of damages sustained by the State Highway Department, the Railroads and other public utilities, as a result of the construction of the aforesaid spillway and floodway. The recommendations of this committee were sustained by the Court.

He was also a Consultant for the foundations of the Freeport Sulphur Company at Port Sulphur and Grande Eeaille, Louisiana; one of the most, if not the most, difficult foundation problem ever successfully solved in the State.

In August 1932, President Hoover set up the Self-Liquidating Branch of the Reconstruction Finance Corporation and named as its Engineers' Advisory Board, five prominent Civil Engineers, one of them being J. F. Coleman. This Board functioned until August 1933, advising the Directors of the Reconstruction Finance Corporation regarding the adequacy of the engineering features of some six hundred and sixty-seven applications made for self-liquidating loans having a total value of more than four hundred million dollars. These applications came from every part of the United States, one of these being our own fourteen million dollar Mississippi River Bridge at New Orleans. Upon conclusion of the work assigned to this Engineers' Advisory Board, he resumed practice of his profession.

During the period between 1933 and 1941, Mr. Coleman had charge of the following important work: As Executive Vice-President of the Jefferson Lake Oil Company; for nearly two years he was in full charge of the Company's operations and, in addition, he directed explorations for new sulphur deposits. In association with Modjeska and Masters of Harrisburg, Pennsylvania, he acted as consulting engineer to the N.O.T.&M.R.R. (Gulf Coast Lines) on the extension of a railroad bridge over the Atchafalaya River at Krotz Springs, Louisiana, and to the Texas and New Orleans R. R. (Southern Pacific Lines) in connection with the design and construction of a double-track, swing-span railroad bridge over Charenton Canal; a single track railroad bridge over Wax Lake Outlet, both near Franklin, Louisiana; and the raising of the Morgan City, Louisiana, Railroad Bridge over the Atchafalaya River.

In August 1938, Mr. Coleman was asked to return to Washington as an Engineering Advisor to the Reconstruction Finance Corporation and he remained in that capacity until his death. In July 1940, he was appointed Assistant Chief Engineer of the Defense Plant Corporation with a program which at this time includes more than 2,200 projects costing a total of more than ten billion dollars—some of these projects costing more than \$150,000,000, many involving every conceivable type of facility.

Reports from the Chiefs of the Defense Plant Corporation advise that Mr. Coleman's judgment on engineering and general business subjects was so greatly respected by the Reconstruction Finance Corporation, that the Defense Plant Corporation officials were practically ready to follow his recommendations with-

out question or further confirmation. It is generally believed by his associates that it will be exceedingly difficult to fill Mr. Coleman's place because of his calm-fair judgment, ability, experience, honesty and outstanding character.

At the time of his death, he was Charter Member and Honorary Member and Past President of the Louisiana Engineering Society; Past President American Institute Consulting Engineers; Past President and Honorary Member American Society of Civil Engineers; Past President American Engineering Council; Director American Shore and Beach Preservation Association; Member American Railway Association; Member of Louisiana Lodge No. 102 F and A Masons and Past Master. In June 1935, Tulane University of Louisiana conferred upon our deceased member, the degree of Doctor of Engineering.

To the Engineering Profession, to the Citizenry of these United States and especially to those of this Society who knew him, the death of Frank Coleman comes as a great personal loss. Therefore, the Louisiana Engineering Society wishes to record in these minutes the above sentiments and extend to Miss Annie Coleman, Mrs. R. G. Dean, Mrs. J. S. Shaw and Mrs. E. Hunter Coleman, the Society's deepest sympathy.

H. M. GALLAGHER
F. P. HAMILTON
HENRY J. MALOCHEE

**Minutes of the Meeting of the Baton Rouge Section, L.E.S.
2nd Quarterly Meeting, June 17, 1944
Testing and Research Laboratory
Louisiana State Highway Department
Baton Rouge, Louisiana**

The meeting was a joint session held in conjunction with the La. Section A.S.C.E., and the parent organization, the L.E.S. There were 110 members and guests in attendance, divided as follows: 20 from New Orleans, 78 from Baton Rouge, 12 from other points of the state.

Those in attendance enjoyed a full afternoon and evening of activity starting at 1:00 p. m. with golfing, horse shoe pitching and softball, followed by tours, beginning at 5:30 p. m. through the laboratory where the operation of various pieces of equipment and tests were explained, after which at 7:00 p. m. a buffet supper was served.

Mr. Lehmann, President of the Baton Rouge Section, called the business portion of the meeting to order at 8:00 p. m. His opening remarks were in welcome to the out-of-town members and guests, following which he called for the introduction of guests.

The meeting was then turned over to Mr. C. G. Cappel, 1st Vice-President of the Louisiana Section of the A.S.C.E. Mr. Cappel expressed appreciation on behalf of the A.S.C.E. members for the treatment accorded them and their enjoyment of the day's activities. The reading of the minutes of the previous meeting having been dispensed with and there being no other business, he turned the meeting back to Mr. Lehmann.

The meeting was then turned over to Mr. C. M. Kerr, President of the parent L.E.S. Mr. Kerr spoke a few words of thanks and expressed the hope that members of the Baton Rouge Section might be able to attend the Annual Golf Tournament and Banquet to be held in New Orleans on July 13th. He announced a change from the regular Monday in July to the 3rd Monday when the L.E.S. will meet in joint session with the Louisiana Section of the A.S.C.E. Since the reading of the minutes was dispensed with and since there was no further business to be attended to, Mr. Kerr turned the meeting back to Mr. Lehmann.

Mr. Lehmann called for the reading of the minutes but it was voted that this be dispensed with. He then thanked the members of the Testing Laboratory organization who had so freely given of their time and energy in putting on the meeting. At this point it was voted that a letter of thanks be written by the Secretary-Treasurer to Mr. O. G. Kirby and his Company, for the refreshments provided by them during the afternoon. A financial report was called for and it was given by the Secretary-Treasurer. No other business was brought before the meeting.

President Lehmann, Testing and Research Engineer for the State Department of Highways, then began his talk entitled, "The Part the Laboratory Plays in Connection with the Construction and Maintenance of Highways." In his very interesting and informative talk, Mr. Lehmann traced the growth of the Testing and Research Laboratory from its establishment by an Act of the Legislature in 1921. The speaker brought out how the laboratory functioned to thoroughly test the soils and formations along the routes of proposed highways and practically all materials used by the Highway Department. Several drawings were displayed which indicated the wide scope of the tests before, during and after road construction. Mr. Lehmann answered a number of questions at the conclusion of his talk.

Following a rising vote of thanks to those who had worked on the arrangements, the meeting was adjourned.

P. J. GUELFY
Secretary-Treasurer

Minutes of the Meeting of the Board, June 6, 1944

The meeting was called to order by President Kerr with the following members present: Kammer, Nairne, Nelson, and Mayer. Mr. L. L. Newman was present by invitation. The minutes of the last meeting were read and accepted.

President Kerr reported on the present status of the Engineering License Act now in the State Legislature. Mr. Newman offered to relay this information to the members of the New Orleans Section, A.I.E.E.

Letters from Louisiana Section, American Chemical Society; Professor C. W. Rieker and Mrs. W. DeY. Kay were read by the Secretary. The resignation of Captain F. D. Atkinson, Dayton, Ohio, was accepted with regret.

The following committee was appointed to prepare an obituary on Mr. J. F. Coleman, Past-President, Charter and Honorary Member of the Society: H. J. Malochee, H. M. Gallagher, F. P. Hamilton.

The following members were dropped from the membership rolls for non-payment of dues since January 1, 1943: H. S. Allen, C. C. Brown, A. D. Day, J. L. Drake, J. T. Floyd, B. E. Galloway, Wm. Hardie, A. D. Jackson, J. P. Lessley, R. A. Herrod, John McInerney, Bretch Taulbee, A. A. Wehrman, Wm. Urban, Jr.

A letter ballot was ordered for the following applicants for membership in the Society; the applications having been approved by Membership Committee "B": For Member, N. C. C. Abrahamson, F. B. Blackstone, Barnett Brezner, J. S. Burk, H. F. Carr, C. C. Crusel, J. R. Edmonds, E. McK. Gillen, L. K. Good, R. N. Graham, M. H. Grosz, A. A. Gustafson, H. Y. Hebert, W. M. Larkin, C. O. Lee, DeW. T. Melver, H. Lane Mitchell, R. S. Munsell, J. H. Nickelson, K. T. Price, A. B. Ratcliff, Jr., C. M. Rogers, H. D. Salassi, G. E. Shaw, F. B. Stirling, M. P. Watson, T. H. Zumwalt.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with the New Orleans Chapter, Illuminating Engineering Society, May 8, 1944

The meeting was called to order by President Kerr with approximately seventy members and guests present. It was voted to dispense with the reading of the previous minutes.

President Kerr introduced Mr. A. J. Naquin, President, Delta Society of Safety Engineers who in turn introduced several officers of his group who were in attendance. It was announced that the next meeting of the Society would be held in Baton Rouge on Saturday, June 17, and that a golf match would precede the meeting.

The meeting was turned over to Chairman C. S. Green of the New Orleans Chapter, I.E.S. who called upon Mr. Ed Meacham to introduce the speaker of the evening. Mr. Meacham introduced Mr. Henry L. Logan, Engineering Consultant of the Holaphane Company, Inc., New York, who presented an interesting and enlightening illustrated paper on "Light and Safety." Mr. Logan answered a number of questions from the floor at the conclusion of his paper. Mr. Green extended the thanks of the I.E.S. to Mr. Logan and returned the meeting to President Kerr who thanked the New Orleans Section, I.E.S. for such an interesting program. The meeting adjourned with a rising vote of thanks to the speaker.

Secretary-Treasurer.
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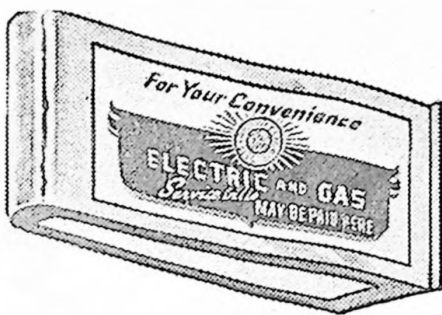
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OF THE

LOUISIANA ENGINEERING SOCIETY

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EDITORIAL NOTES AND COMMENT

Our Annual Meeting. Once more plans are being drawn up for our annual meeting in January, 1945.

The committee is under the able guidance of Chairman W. Stone Leake, with Michael C. Abraham as the vice chairman. The complete list is as follows: -

COMMITTEE PERSONNEL FOR THE 1945 ANNUAL MEETING

W. Stone Leake, General Chairman; Michael C. Abraham, General Vice-Chairman; John K. Mayer, Secretary; Charles M. Kerr, Chairman, Ex-Officio.

Banquet Committee: David Moodie, Chrm.; J. V. Dugan, Jr., V-Chrm.; W. E. Blessey, J. J. Bulliung, C. J. Kelly, E. L. Mire, H. J. Molaison, W. H. Williams, Jr.

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Contact With Woman's Auxiliary: J. A. NeNiven, Chrm.; A. M. Fromherz, V-Chrm.

Surplus War Material. The question of the disposal of the surplus war material is a vital one. Engineers should be particularly concerned, since much of this surplus is of a nature directly connected with engineering. It would be well for the profession to follow this situation, and write to their senators and congressmen if necessary. The supplies were bought with your money, you should have a voice in the manner of their disposal.

Joint Meetings. Both August and September meetings were held jointly with other groups. Both were well attended, with interesting papers on each occasion. These joint meetings emphasize the possibility of one national organization, with enormous legislative powers. Representation for engineers could be effectively handled by a full time Washington staff. No professional engineer would seek legislation involving "favoritism", yet some laws recently enacted and pending show the profession "asleep at the switch."

August Meeting. On August 14 our Society met with the Louisiana Post, American Society of Military Engineers. Mr. Carroll J. Peirce, Jr., formerly an engineer with the Sewerage

and Water Board and now manager of the Structure and Aerodynamics Divisions of Goodyear Aircraft Corporation addressed the gathering. . With the aid of slides, Mr. Peirce gave an interesting discussion of the subject of "High Speed Aerodynamics."

Following his presentation, several interesting war action films were shown.

Mr. Peirce's paper is abstracted in this issue.

Lt. Col. G. H. Hudson presided for the Society of Military Engineers; Mr. C. M. Kerr for the Louisiana Engineering Society.

September Meeting. The American Society of Heating and Ventilating Engineers, Delta Chapter met with us on September 13. Dr. Winslow, first vice-president of A.S.H.V.E. and Professor of Public Health at Yale University gave an interesting discussion of the subject, "The Air Cooled Human Body." Numerous slides emphasized certain research data in connection with temperature control of the body. A resume is printed in this issue.

The meeting was presided over jointly by Mr. L. V. Cressy, President of Delta Chapter, A.S.H.V.E. and Mr. C. M. Kerr, President of the Louisiana Engineering Society.

State Board of Engineering Examiners. Recently Mr. J. T. Bullen resigned as president of the board, as he plans to reside in another state. He has given many years of faithful service to this important board. Professor Donald Derickson has been elected for a six year term as president. He was formerly vice-president. Mr. F. N. Billingsley was recently made a member of the board.

PAPERS AND DISCUSSIONS

THE AIR COOLED HUMAN BODY

DR. C. E. A. WINSLOW*

(Dr. Winslow spoke extemporaneously; the following are some points covered in his interesting address.)

One of the unusual features of the American Society of Heating and Ventilating Engineers is that 40% of its dues are allocated to research work in air conditioning, etc.

The process of living requires food, which is oxidized and liberates heat, this heat liberation being called metabolism. This rate varies for different individuals, hence on the same amount of food, some are fat and some are lean.

The amount of heat required by the body varies with the physical exertion of the subject, and is also dependent upon surroundings. As an example, 100 calories per hour may be the requirement of a person quietly reading, whereas the same individual may require 300 calories if exercising vigorously.

Numerous experiments have been performed to determine the subject's reaction under varying surrounding conditions of temperature and humidity. Special rooms have been constructed with heated or cooled walls for this work. Various data from these cases have been worked up in the form of charts and curves.

In order to combat unusually high or unusually low temperatures, the body has certain regulating devices. In general, the body is better able to adjust itself to high temperatures than to low temperatures.

When unusually low temperatures are encountered the body reacts by reducing heat loss through radiation. This loss is reduced by restricting the flow of blood near the surface of

*Prof. of Public Health, Yale University; director of John B. Pierce Laboratory of Hygiene; 1st Vice-President A.S.H.V.E. Presented at joint meeting of Louisiana Engineering Society and Delta Chap. ASHVE.

the body. In most cases, however, this cannot completely control the temperature and radiation, hence clothing is necessary. Under extreme cold, even heavy clothing is insufficient, then the reaction become slower due to abnormal heat loss from the body. Arctic explorers have witnessed cases of stupor and lack of will power, when men after exposure to extreme cold will "give up" and refuse to move further.

Experiments have been conducted to show the effect of local application of heat. In one instance, after a subject had had an ice bag placed on the back of his neck for 15 minutes, the temperature of his little finger began to drop. This reduction in temperature continued for some time, reaching a final temperature some 20 degrees below normal body temperature.

Under conditions of high surrounding temperature or vigorous exercise the body calls for more heat liberation in order to keep the temperature closely adjusted to 98.8 degrees. This demand for "cooling" is met by increased sweat flow. Sweating is effective because of the evaporation of moisture. Each pound of moisture evaporated from the surface has a cooling effect of about 1,000 Btu. When large beads of sweat occur, it is an indication that the sweat glands are then working beyond their effective capacity. It has been found that troops trained in desert warfare may double their original "sweating capacity."

If proper regulation does not result from the evaporation of surface moisture, then fever results. An abnormally high body temperature will of course, result in death.

Surveys show that in order to clear up the slums and sub-standard housing in the nation, new homes should be constructed at the rate of one-and-one-half million per year. If the tempo of production and development can carry over into the postwar period, and this necessary construction be accomplished, then our nation should be happier, healthier and more prosperous than ever before.

HIGH SPEED AERODYNAMICS

By CARROLL J. PEIRCE, JR.*

We will discuss, tonight, the high speed aerodynamic effect known as compressibility.

The speed of aircraft which has been gradually increasing during the past 10 or 15 years has been greatly increased during the past two or three years because of the war. At speeds of 200 or 300 M.P.H. the fact that air is a compressible gas has no effect on airplane performance. However, with the advent of speeds of 400 M.P.H. and more which we now have, the compressible characteristic of air assumes a position of great importance.

There are two types of fluids with which we have to deal, the perfect fluid and the real fluid, air being a real fluid. Both fluids have weight, the perfect fluid has no viscosity and is incompressible while the real fluid has viscosity and is definitely compressible. It might be of interest to mention that the mathematicians of the past several centuries were concerned with perfect fluids and the assumptions of no viscosity and incompressibility enable them to solve many problems. The introduction of the viscosity and compressibility effects generally makes the problems too difficult to handle mathematically.

It has been found that the criterion which governs the compressibility effects encountered at high speed is the ratio of the speed of the object moving through the air to the speed of sound in the surrounding air. This ratio of velocities is called the Mach Number.

The significance of the Mach Number lies in the fact that we run into compressibility effects when Mach Number gets near 1. We would expect some effects for 400 MPH and 600 MPH and we find that the bullet motion is associated with considerable compressibility effect. We shall now discuss one of these effects, namely, shock waves.

*Member of Louisiana Engineering Society, and Manager, Structures and Aerodynamics, Goodyear Aircraft Corp., Akron, Ohio. Presented on August 19, 1944, before a joint meeting of Louisiana Post, American Society of Military Engineers, and the Louisiana Engineering Society.

Compressibility shock waves, as they are called, were first encountered in bullets which were the first objects to travel at speeds corresponding to Mach Numbers greater than 1. One of the principle problems of the science of ballistics, which concerns motion of bullets and projectiles, is to select the shape which will have the lowest possible drag force when travelling at high speeds. This has been a difficult problem and the present day solution seems to be a smooth pointed nose bullet although many other shapes have been tried. The drag force on a bullet plays the most important part in determining the flight path or trajectory. The formula for computation of bullet drag is similar to the one for the drag of an airfoil, with the exception that for the bullet we use projected frontal area, while for the airfoil we use projected horizontal area.

We have noted that at the speed of sound where $M=1$, the drag coefficient increases suddenly due to formation of shock waves. Photographs of these shock waves set up around the pointed nose bullet have been made. Black lines are the shock waves, they are regions of a very sudden change in both velocity and pressure in the air.

There are two shock waves formed, one at the nose and the other at the tail. The shock waves are conical in shape.

A photograph of shock waves around a square nose bullet, will show that there are three shock waves, one at the nose, one in the center and one at the rear of the bullet. The more extensive shock wave pattern accounts for the larger drag of the square ended bullet.

We have been using the term "shock wave" as denoting the compressibility effects which account for the increase in the drag at high speeds. Let us now try to see more precisely what a shock wave is. It is an experimental fact that air does not seem to want to travel at speeds greater than the speed of sound, which at sea level is 760 MPH. As a matter of fact, air travelling just at the speed of sound is an unstable condition, and there is a definite tendency of this instability to so operate that suddenly the velocity drops to less than the speed of sound with a corresponding increase in the pressure of the air. Let us look at the conditions around a shock wave. When we have

air moving with a velocity equal to the velocity of sound, that is M-1, suddenly at some plane in a narrow distance, the velocity decreases to a speed less than the speed of sound and there is a sudden rise in pressure. The exact action within the shock wave is not clearly understood. Large energy changes occur within the region of the shock and some of the energy is dissipated in the form of heat. Photographs have been made of shock waves on the upper surface of an airfoil. The Mach Number here is .6668. Shock waves generally occur over the top of an airfoil because the air is travelling faster over the upper surface and reaches the speed of sound although the airfoil speed may be only $\frac{1}{2}$ to $\frac{2}{3}$ the speed of sound. When this occurs, M-1 and the shock waves forms on the upper surface.

The optical properties of air are affected at the shock and the shock shows up as a dark line. A photograph of chordwise pressure distribution over the same airfoil, previously used, shows the pressure over the top is a fairly smooth curve. Under this condition the Mach Number is .191 or signifies a low speed. Pressures over the top surface are negative pressures or suctions indicating that the air is traveling faster than it is in front of the air foil, since by Bernoulli's Theorem, if the pressure decreases or becomes negative, the velocity increases. At the peak point of the negative pressure distribution, the air is travelling fastest and the shock generally occurs near this region.

The same airfoil at the same angle of attack, but with a Mach Number of .664. Shows the formation of the shock wave which is clearly indicated by the sudden change in the pressure over the upper surface. In the region of the shock the velocity has suddenly decreased and the pressure has suddenly increased since the suction has decreased.

Whenever shock occurs, drag increases and the lift decreases both of which are undesirable effects. Compressibility effects were first encountered in aeronautics in connection with propellers. The speed of the air striking the propeller blade is a combination of the forward speed of the propeller through the air and the rotational speed of the propeller. When this

combined speed reaches the speed of sound, the Mach Number of the flow becomes 1 and shock waves start to form on the propeller, forming first at the tip and spreading in toward the center. When the shock forms the drag of the propeller increases and the thrust decreases with the result that the propeller efficiency shows a large decrease. The problem in propeller design is to select an airfoil shape for the propeller blade which will delay the formation of the shock until very high speeds are reached. Some typical propeller blades have symmetrical sections and in several the maximum thickness is located back quite far from the leading edge. It has been found that this shape airfoil tends to delay the formation of the compressibility shock wave. We have said that when the shock wave forms the lift decreases and the drag increases. We would expect the efficiency of the propeller to decrease when the shock occurs and it does.

Most of the recent information on propeller efficiency is restricted. Note the efficiency of a propeller is about 82% up to 550 M.P.H.; is 83% up to 400 M.P.H. but thereafter it drops considerably becoming 70% at 450 M.P.H., 60% at 465 M.P.H. and 40% at 475 M. P. H. This decrease in efficiency is caused by compressibility losses due to shock waves forming at the propeller tip and spreading in along the propeller. Even though the forward speed is less than speed of sound which is 740 M.P.H. at 20,000 ft., altitude, the combined forward and rotational speeds are greater than speed of sound and shock waves are formed on the propeller.

In the airfoils that we have discussed previously there were large negative pressure peaks or suction on the top near the leading edge. At such points the air is moving fastest for since the pressure has decreased the velocity must increase by Bernoulli's law. If an airfoil could be designed so as to avoid the pressure peaks near the leading edge the air flow over the upper surface would be slower and the speed of sound at any point on the upper surface would not be reached until the airfoil speed was very high. Such an airfoil would have a shock wave only at a high Mach Number and is called a laminar flow airfoil. An NACA symmetrical airfoil has a 10% thickness

ration and at zero lift attitude, maximum thickness about 30% back from the leading edge. The negative pressure peak is the leading edge. This causes shock to form as the speed increases. The pressure distribution over a laminar flow airfoil is different. There is no sharp peak at the front, the maximum thickness of the airfoil is near its center and a gradual peak occurs near the trailing edge. This airfoil can travel at a much faster speed than the previous one before the air reaches the velocity of sound and a shock wave occurs. This is the reason why the latest planes use laminar flow airfoils.

Compressibility has an appreciable effect on the pitot static tube, a device used on airplanes to read the airspeed. There are two tubes, one called the dynamic or impact tube which measures both the static pressure and the velocity head of the air. The other tube measures merely the static pressure of the air. The tubes are connected to some pressure measuring device either a manometer or mechanical pressure gage. The device reads the difference of the two pressures and can be calibrated to read velocity directly. At low speeds the air acts as though it were an incompressible fluid but at high speed, say about 300 M.P.H. compressibility must be taken into account. Compressibility increases the reading of the pitot static indicator, increasing about 20% at the speed of sound, or 1120 feet per second.

The Mach Number of an airplane or of an airfoil at which the shock occurs is called the critical Mach Number. An approximate theory was published by Jacobs of the NACA in 1935 which gave a formula for calculating the critical Mach Number based on pressure measurements made on the airfoil or other stream lined object at low speed. An improved theory was developed by Von Karman and Tsien in 1941.

We have mentioned a number of phases of the problem of compressibility and we will conclude by pointing out that one of the major problems of the airplane designer is to select an aerodynamic shape for the propeller, airplane wings, fuselage, and tail which will delay the formation of the compressibility burble until the highest possible speeds are reached.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board, July 5, 1944

The meeting was called to order by President Kerr with the following members present: Gosa, Kammer, Nairne, Steinmayer and Mayer. The coming Golf Tournament of the Society to be held here July 13 was discussed and it was voted to underwrite this outing to the extent of \$100.00.

President Kerr announced that the meetings have been arranged for the balance of the year. A letter from the Treasury Department as read by the Secretary stating that after reviewing the evidence submitted by the Society in claiming exemption from federal income tax it was the opinion from taxation under provision of Section 101 (7) of the Internal Revenue Code.

The results of the June membership ballot showed that all applicants carried thereon were elected to membership. There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with Louisiana Section, American Society of Civil Engineers, July 17, 1944

The meeting was called to order by President Kerr with approximately 60 members and guests present. It was voted to dispense with the reading of the minutes of the previous meeting. The Memoirs of J. F. Coleman, Past-President and Honorary Member of the Society, were read by the Secretary. President Kerr expressed the appreciation of the Society to the committee which so successfully handled the recent Golf Tournament. President Kerr also reported on the unsuccessful attempt to pass the General Professional Engineering License Law at the last session of the State Legislature. A letter from Mr. W. E. Parker, State Director of Personnel Department of State Civil Service, was read expressing the appreciation of the Civil Service Department for the cooperation rendered by the Society.

President Kerr then introduced President D. W. Godat, Louisiana Section, A.S.C.E., who presided during a brief business session of that Society. President Godat then introduced the speaker of the evening, Colonel W. N. Cary, Chief Engineer, Federal Works Agency, Washington, D. C., who presented a very stimulating paper on "Plan Jobs for Relief Program." There was a considerable amount of discussion from the floor at the conclusion of the paper. After a rising vote of thanks to the speaker, President Godat returned the meeting to President Kerr who again thanked Colonel Carey and adjourned the meeting.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Board, August 14, 1944

The meeting was called to order by President Kerr with the following members present: Gosa, Kammer, Leak, Nairne, Nelson and Mayer. The minutes of the last meeting were read and accepted after certain corrections.

A report on the Golf Tournament showed a net deficit of \$105.44. The report was accepted and the Board expressed its appreciation to the committee arranging this affair.

The resignation of Lt. Comdr. T. C. Bruns was accepted with regret as of December 31, 1943, since an earlier resignation had apparently gone astray in the mails.

It was reported that there now exists a vacancy on the La. State Board of Engineering Examiners due to the fact that Mr. J. T. Bullen has moved to Oklahoma. It was voted to submit the names of Messrs. D. W. Godat and F. N. Billingsley to the Governor for consideration in appointing a new member to the Board.

Mr. James P. Henderson was appointed chairman of a committee to draw up resolutions on the death of Mr. Royal A. Polhamus. Mr. Henderson was requested to select several other members to assist him on this committee.

As requested by Mr. H. M. Gallagher, it was decided to print 20 extra copies of the Proceedings containing the Memoirs of Mr. J. F. Coleman for distribution to Mr. Coleman's friends in Washington.

A letter from Mr. C. H. Louree regarding the proposed airplane hanger design was read. It was decided that the matter presented was not within the province of the Louisiana Engineering Society.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with the Society of American Military Engineers, La. Post, August 14, 1944

The meeting was called to order by President Kerr with approximately 150 members and guests present. It was voted to dispense with the minutes of the previous meeting. Their being no business to transact President Kerr turned the meeting over to Lt. Col. G. H. Hudson, President of the Louisiana Post, S.A.M.E., who conducted a brief business meeting of that group.

Colonel Hudson then introduced the speaker of the evening, Mr. Carroll J. Peirce, Manager, Structures and Aerodynamics, Goodyear Aircraft Corp., Akron, Ohio, who presented a very interesting and informative paper on "High Speed Aerodynamics." Mr. Peirce answered a number of questions from the floor at the close of his paper. Three short motion picture films released by the British Information Service were then shown.

Colonel Hudson thanked Mr. Peirce for presenting the interesting paper and turned the meeting back to President Kerr. The meeting then adjourned with a rising vote of thanks to the speaker of the evening.

J. K. MAYER,
Secretary-Treasurer.

Minutes of Special Meeting of the Board, August 22, 1944

The meeting was called to order by President Kerr with the following members present: Gosa, Kammer, Nairne and Mayer.

It was brought to the attention of the Board that the term of Professor Donald Derickson had recently expired as member of the La. State Board of Engineering Examiners. The Board voted unanimously to recommend to the Governor that Professor Derickson be re-appointed to the Board.

President Kerr reported that the next meeting of the Society would be held jointly with the Delta Chapter, American Society of Heating and Ventilating Engineers, and is scheduled for Wednesday, September 13, due to the fact that the speaker cannot be in town on the second Monday of the month. It was voted that the meeting be held as scheduled.

The board then selected Chairmen and Vice-Chairmen of the various committees to arrange the annual meeting of the Society to be held in January 1945.

There being no further business, the meeting adjourned.

The resignation of Ensign T. A. Crain was accepted with regret.

J. K. MAYER,
Secretary-Treasurer.

**Minutes of the Joint Meeting of the Society with the
Delta Chapter, American Society of Heating &
Ventilating Engineers, September 13, 1944**

The meeting was called to order by President Kerr with approximately 120 members and guests present. President Kerr introduced Mr. Thomas O'Connor, President, Louisiana Chapter No. 2, National Association of Practical Refrigerating Engineers, and welcomed the large group of members of this organization who were present by special invitation.

It was voted to dispense with the reading of the minutes of the previous meeting. The obituary of our late member, Royal A. Polhamus, written by a committee composed of James P. Henderson, Chairman; A. M. Lockett and B. S. Nelson was read by the Secretary. It was voted that this obituary be spread upon the minutes and that a copy be sent the family.

President Kerr announced that committees have been appointed and that plans are being formulated for the Annual Meeting of the Society in January. He also announced that the October meeting would be in the form of a forum with speakers from four of our leading industries.

President Kerr turned the meeting over to President L. V. Cressy of the Delta Chapter, A.S.H. & V.E., who presided over a short business session of that group. Mr. W. P. Oster was then called upon to introduce Dr. C. E. A. Winslow, 1st. Vice-President, A.S.H. & V.E.; Professor of Public Health, Yale University, and Director of the John B. Pierce Laboratory of Hygiene who presented an interesting illustrated paper on "The Air-Cooled Human Body".

President Cressy thanked the speaker and returned the meeting to President Kerr. The meeting adjourned with a rising vote of thanks to Dr. Winslow.

J. K. MAYER,
Secretary-Treasurer.

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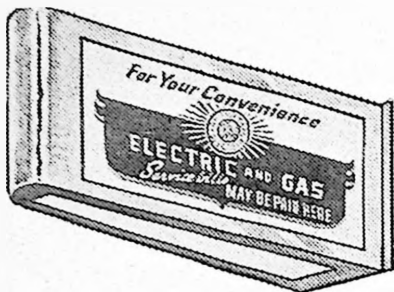
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This Journal reaches the officials with whom rests the responsibility for the bulk of the municipal, state and industrial works in Louisiana and the surrounding territory. Its advertising pages afford you an effective and dignified means of cultivating a wider acquaintance among prospective buyers.

PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

VOL. XXX.

DECEMBER, 1944

No. 6

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EDITORIAL NOTES AND COMMENT

A Four Star Program. Our meeting in October brought before the Society four speakers, representing four important industries in this area. Those present enjoyed a most interesting evening. Two papers are published in this issue; two others were not available and a brief resume is given.

Our Annual Meeting. In spite of war time difficulties the Society membership is scheduled to take part in a varied technical program. The dates are January 11, 12, 13, 1945. Our General Chairman is Stone Leake. Technical Papers Chairman Zervigon has submitted an outline of the technical portion of the session. The usual features of the Dixon Hall meeting, with banquet and dance winding up the convention are planned.

Annual Meeting Technical Program

January 11, 12, and 13, 1945

FRIDAY, 9:30 A. M., JANUARY 12, 1945

Section A

Speaker: R. L. Templin, Chief Engineer of Tests and Assistant Director of Research of Aluminum Research Laboratory, New Kensington, Pa.

Title: "Aluminum as a Structural Material"

Section B

Speaker: William B. Goodman, Illinois Institute of Technology (Formerly with Trane Company)

Title: "Dehumidifying of Air with Coils"

Section A

10:45 a. m.

Speaker: Brigadier General Max C. Tyler, U. S. Army, Corps of Engineers, President of the Mississippi River Commission.

Title: "The Mississippi River Commission"

Section B

Speaker: A. H. Heitzler, Assistant Chief Engineer, Cities Service Refining Corporation, Lake Charles, La.

Title: "Power, Steam Generation and Distribution Systems, Cities Service Refinery, Lake Charles, Louisiana"

SATURDAY, JANUARY 13, 1945, 9:30 A. M.

Section A

Speaker: Paul R. Sidler, Engineer, Brown Boveri Company, New York.

Title: "Gas Turbine Development"

Section B

Speaker: Charles McKee, President of the Gulf States Plywood Corporation, New Orleans, La.

Title: "New Plywood Types and Their Present and Postwar Applications"

JANUARY 13, 1945

10:30 A. M.

Student paper presented by the winner of the student competition of Thursday, January 11th.

11:15 A. M.

Speaker: D. O. Langstaff, Director of Aviation Activities, City of New Orleans.

Title: "Aviation Developments in New Orleans and Particularly The Moisant Airport"

New Members. In this issue is presented another list of recent additions to our membership. Does that remind you that one of your associates should join?

Blaize, Sylvester Clarence, Age: 45. Endorsed: G. C. Rack-erby, J. C. Baehr, C. M. Kerr. 1925 B.S. in Civil Engr., La. State University. 1917, Rodman, L. & N. RR. Continuously employed on railroad, highway, general construction, private engineering and as a student to 1929. Since 1929 in employ of U.S. Engr. Dept. on River and Harbor and Flood Control work progressively from Junior Engr. to Civil Engr. At present Office Engr., Operations Division. 402 Millaudon St., New Orleans.

Estopinal, Fernando, Jr., Age: 46. Endorsed: C. M. Kerr, R. B. Kohnke, J. C. Baehr. Tulane University, Class 1919, No degree. Began work in 1919 as Instrumentman on construction of Inner Harbor Navigation Canal. 1920 to 1928, Field Engr., La. Board of State Engrs. Since 1928 in employ of U.S. Engr. Dept. on River and Harbor, Flood Control and Military Construction, progressively from Asst. Engr. to Senior Engr. At present assigned as Head Miscellaneous Construction Section. 8130 Zimple St., New Orleans.

Hannaman, Fred Anthony, Jr., Age: 30. Endorsed: H. J. Malochee, G. R. Hammett, J. T. O'Brien. 6½ yrs. Mechanical Design Engineer, Standard Oil Co. of La. 2½ yrs. Mechanical Coordinator, Chemical Production Division, Standard Oil Co. of La. 1721 Cedardale Ave., Baton Rouge, La.

Ibach, Clarence Augustus, Age: 34. Endorsed: G. W. Witmer, F. A. Wilson, Jr., J. R. Murphy. 1930 Graduated in Power Plant Engr., Williamson Trade School. Completed correspondence course in combustion (Hays). Since 1930 employed by Gulf States Utilities Co. in the following capacities; 3 yrs. Student Engineer, 7 years., Fuel Operator, Asst. Fireman, Turbine Operator, Auxiliary Operator, Switchboard Operator, and Head Fireman. 4 yrs., Asst. Test Engr. (in responsible charge of all test work in power station during absence of the Test Engr.) 2225 Choctaw Road, Baton Rouge, La.

Lyons, Byron Phelps, Age: 52. Endorsed: H. L. Lehmann, N. E. Lant, A. G. Munding. 1920-22, Resident Engr., Hwy. & Bridge Constr., Calif. Hwy. Comm. 1922-24, Engr.-surveys, investigations, estimations and organization of Red Rock Creek Irrigation Dist., P. J. Hooper, Susanville, Cal. 1924-25, Resident Engr., Const. of section Yosemite Valley RR, including heavy rock construction, steel trestle and tunnel, Jerome Newman, San Francisco, Cal. 1926-40, Res. Engr. & Bridge Constr. Engr., La. Hwy. Comm. 1940-41, Owner, B. P. Lyons Co., Baton Rouge, La. March 1941 to Oct. 1941, Purchasing Agent during construction of Harding Air Field, Barber Bros., Baton Rouge, La. Nov. 1941-43, Supt., Construction on section of Plantation Pipe Line, R. R. Littrell, Contractor, Opelousas, La. 1942-Apr. 1943, Area Engr., Chemical Plant construction, E. I. duPont de Nemours Co., Baton Rouge, La. May 1943-Sept. 1943, Asst. Material Controller, Tanker Construction, Alabama Dry Dock & Shipbuilding Co., Mobile, Ala. 1943-44, Chief, Housing Section, La. Dept. of Public Works, Baton Rouge, La. Mar. 1944-date, Dist. Engr. La. Dept. of Public Works, Baton Rouge, La. Licensed Civil Engr. in La. 614 Drohr Ave., Baton Rouge, La.

Monroe, John Edward, Jr., Age: 29. Endorsed: R. A. Steinmayer, J. M. Robert, A. L. Dunlap, C. S. Williamson. 1937, B.E., in Chem. Engr. and B.S. in Chemistry, Tulane University. Employed as Chemical Engr. with Freeport Sulphur Co. from June 1937 to Oct. 1938 and from March 1942 to present. P. O. Box 657, Port Sulphur, La.

For Affiliate Member

Brodnax, Ernest N., Age 41. Endorsed: L. D. McCorquodale, E. H. Goodloe, T. T. Chenet, W. J. Hughes, 1932, I.C.S. course in Hwy. Engr. 1933, Surveyor, C.C.C. roads. 1934, Instrumentman, sewer layout and construction, City of Bastrop, La. 1935-39, Instrumentman, La. Dept. of Hwys., responsible charge of project layout and certain engineering inspection. 1940 to date, Locating Engr., Lr. Dept. of Hwys., responsible charge of survey party in highway location and design standards. 203 W. Walnut St., Bastrop, La.

For Junior Member

Flewellen, Eugene Holand, Jr., Age 24. Endorsed: D. T. McIver, A. A. Gustafson, F. B. Blackstone. June 1940, B. S. in Chem. Engr. "with distinction", Rice Institute, Houston, Tex. June 1940 to date, Chemical Engineer, Freeport Sulphur Co., Port Sulphur, La., now acting in capacity of assistant superintendent of power plant. Member, Tau Beta Pi. P. O. Box 27, Port Sulphur, La.

Joint Meeting in November. In November our Society met jointly with the American Society of Civil Engineers and American Society of Mechanical Engineers. The speaker was Dr. Stephen Timoshenko who spoke on fatigue of metals. Numerous slides were shown in connection with his discussion. His whole presentation was most interesting. Numerous questions were asked from the floor, following his talk.

PAPERS AND DISCUSSIONS

THE MANUFACTURE OF INDUSTRIAL ALCOHOL

By W. W. CARRE, JR. *

When our Company was formed in 1906, it was primarily interested in the production of industrial ethyl alcohol and was at that time called the U. S. Industrial Alcohol Company. However, with the passing of time, more and more allied chemicals were produced so that in 1942 it was considered appropriate to change the name of our Company to U. S. Industrial Chemicals, Incorporated, since alcohol was no longer our principal product.

As you all know, beverage alcohol dates back to antiquity with savage tribes and ancient peoples carrying out their particular fermentation of grains; of fruits to produce beverages similar to our beer or wine. Distillation of such beverages to produce brandy and ethyl alcohol is mentioned by Aristotle in the fourth century but the nature of fermentation was not ascertained until after the invention of the microscope and the observation of yeast cells 200 years ago.

Industrial ethyl alcohol had its beginning in England where, in 1855, the tax free law was passed making it practical to use alcohol for industrial purposes. This law permitted denaturation of alcohol and withdrawal tax free for industrial use.

In order to understand the reason for the selection of New Orleans as the location of industrial alcohol plants, something of the nature of the raw material must be known. Industrial ethyl alcohol may be produced from any starchy material such as corn, wheat, oats, potatoes, from any cellulose type material such as wood and sulfite liquors, by synthetic means from natural gases and petroleum oils or from sugar bearing materials such as cane, fruits, molasses, etc. In this country up until the second world war, molasses was the principal raw

*Plant Superintendent. Presented at the regular meeting of the Society, October 9, 1944.

material used in the production of industrial alcohol. Molasses is produced in Louisiana but is of a particularly high grade and is used primarily for human consumption and for admixture with cattle feed. Other nearby sources are Cuba, Santa Domingo and Puerto Rico, named in the order of importance. Hawaii and the Phillipines supply molasses to the West Coast plant but they are relatively very small. Since Cuba offers the lowest cost molasses and the greatest quantity, it was logical to locate industrial alcohol plants at New Orleans which could be reached by tank steamers plying between New Orleans, Cuba, Santa Domingo and Puerto Rico. In addition to the ease of transporting raw materials to New Orleans, there is an abundant supply of well water and river water for processing and cooling condensers. Also, the river offers an ideal means for disposal of waste materials and water.

The plant that we are now operating, located at Broadway and Coliseum Streets, was started in November, 1903 and operated under the name of the International Distilling Company under a charter granted by the State of Louisiana. Among the objects and purposes of this charter are recited the following:

“To operate stills and distilleries in this City and to distill, rectify and compound all alcoholic malt and spirituous liquors.”

Operations were actually started in June, 1904 and for the first six months the average production was only approximately 2300 gallons per day. Despite the fact that European countries had long since recognized the vast importance of alcohol as a chemical, it was not until 1906 that our Government enacted legislation to foster and encourage the use of industrial ethyl alcohol. On June 7, 1906, Congress passed what has since become known as the Denatured Alcohol Act and under its provisions, alcohol could be withdrawn from Bonded Warehouses without payment of tax for use in the arts and industries for fuel, light and power, provided said alcohol was denatured under Government supervision by the addition of wood alcohol or other denaturing materials which would render it unfit for beverage or medicinal purposes. To avail

itself of the privileges granted under this Act, the U. S. Industrial Alcohol Company was incorporated in October, 1906 and this Company purchased the plant formerly operated by the International Distilling Company and immediately erected the first denatured alcohol warehouse in the State of Louisiana.

At that time the restrictions covering the use of denatured alcohol were still rather strict so that the growth of the industry was very gradual and not very impressive until World War No. 1 developed a crying need for industrial alcohol to be used in the manufacture of munitions, aeroplane dopes and other vital products. Our Company, through subsidiary companies, manufactured various pieces of equipment such as lamps, heating stoves, laundry irons, etc. to encourage the use of denatured alcohol but despite this effort, the quantity of alcohol used industrially was a nominal figure prior to World War I. As a matter of fact, there was actually a decrease in consumption prior to World War No. 1 due to the fact that in rural communities electricity was distributed and competed with alcohol as a fuel. There have been many amendments to the original Act of June, 1906 which have made it possible to use tax free industrial ethyl alcohol very widely and at the present time there are many denatured alcohol formulas authorized for industrial use. For example: we have a formula denatured with nicotine solution which is authorized for use in curing tobacco. Another is denatured with ether and this formula is used for the production of anesthetic ether. There are many others which may be used for producing dentifrices, cosmetics, etc. This matter of making industrial ethyl alcohol available without tax has been highly important. The industry could not exist today if the beverage tax were paid on alcohol. The tax now amounts to \$17.10 per gallon of 95% commercial alcohol which is approximately 35 times the cost of the alcohol itself. Thus, one tank car of pure ethyl alcohol would cost \$137,000.00 in taxes alone.

So far, I have spoken only of industrial ethyl alcohol. Recently, at the New Orleans Plant, we have gone into the manufacture of allied chemicals. In 1938 we started to produce dry ice which, as you know, is a by-product made from carbon

dioxide which is liberated during the fermentation. In 1941 the production of butyl alcohol and acetone by fermentation of molasses was started at this plant and the production of butyl acetate was started the same year.

As to the processes, my description must necessarily be brief although if there is sufficient time, during the period allotted for questions, I will be glad to attempt to elaborate on any point of interest. We will discuss first the production of ethyl alcohol from molasses. The molasses as received is a very viscuous material containing approximately 50 to 70% sugar in solution. This material cannot be fermented as is but must be diluted with water in the ratio of approximately one volume of molasses to 4 volumes of water. The fermentation is accomplished by yeast with which we are all familiar, but in the industrial alcohol industry, this yeast must be a pure culture carefully selected and capable of fermenting sugar efficiently and rapidly; thus a large part of our research work has been directed toward the location of the most efficient yeast. After the proper yeast has been developed by the Research Laboratory, it is carefully preserved in a pure state in the control laboratory and is built up in volume throughout five stages until it reaches a volume of approximately 5,000 gallons of liquid yeast which is used to inoculate a large fermenting tank containing about 125,000 gallons of molasses-water mixture and to the molasses-water mixture is added sulfuric acid and suitable nutrients to maintain the proper pH and nutrient factors for the growth and efficient operation of the yeast. There are probably many complex steps in the conversion of sugar to alcohol but there are two main steps—first, the sucrose is converted to invert sugar by the action of invertase which is enzyme contained in the yeast. Once this conversion is accomplished, the second phase is that the yeast is capable of converting the invert sugar to ethyl alcohol and carbon dioxide. Ethyl alcohol and carbon dioxide are produced in the approximate ratio of 1:1 weight. The period of fermentation varies with the type of molasses and maybe as short as 36 hours or as long as 72 hours. At the end of the fermentation, the resultant liquid called "beer" contains approximately 8½% alcohol by volume.

The next step is the distillation of this beer into its crude component parts. Crude alcohol is vaporized in large copper continuous stills by the action of steam and is condensed and flowed into temporary storage tanks. The resultant crude ethyl alcohol contains many impurities such as acetaldehyde, various esters, fusel oil and organic acids and if this form is not fit for industrial use, the next step is to purify this material by distilling it in continuous re-distillation units in which the pure ethyl alcohol is separated from the impurities. Such a continuous still will yield at the maximum an alcohol solution containing 96% alcohol and 4% water by volume. At this point an equilibrium exists and in order to produce anhydrous or absolute alcohol, it is necessary to upset this equilibrium by the use of a dehydrating agent such as gypsum or lime or by the addition of a 3rd component liquid such as benzene. Our Company uses the latter processes to produce absolute alcohol on a large industrial scale. As late as 20 years ago absolute alcohol was a laboratory curiosity but today is used widely in processes that will not tolerate water. Each step in the production of ethyl alcohol is closely guarded by representatives of the Treasury Department and we are subjected to as close scrutiny as beverage alcohol producers so as to avoid any loss of tax to the Government.

During the World War 1, the need for Acetone was very acute and a fermentation process was developed whereby acetone was made by fermentation of grain and butyl alcohol was a by-product. At the end of that War, there were vast stocks of butyl alcohol available since a market for this material had not been developed. This fact stimulated research to determine how butyl alcohol could be used industrially and there have been so many uses found for it that it is now more valuable than acetone. We produce butyl alcohol by fermentation of molasses in a manner similar to that described for ethyl alcohol, the principle difference being that instead of using yeast, butyl alcohol bacteria is used which produces butyl alcohol and acetone in the ratio of approximately 2:1 and the by-product gases are hydrogen and carbon dioxide. The process is much more difficult than that of ethyl alcohol since the butyl alcohol bacteria is much less stable than yeast and much

more subject to interference by foreign bacteria. The equipment used for the production of butyl alcohol and acetone is quite similar to that used for ethyl alcohol and, as a matter of fact, in our plant the fermentation apparatus is interchangeable. The distillation of the butyl alcohol beer is accomplished in copper stills, first distillation yielding a crude mixture of the solvents. These must be later refined on redistillation units, the final products being chemically pure acetone and chemically pure anhydrous butyl alcohol. With the production of butyl alcohol at this plant, it was natural to follow up with the production of butyl acetate which is made by the simple esterification of butyl alcohol with acetic acid. At the present time we purchase the acetic acid but it, too, can be made from ethyl alcohol by fermentation or synthetically.

The production of dry ice is a relatively simple process involving purification of the carbon dioxide collected from the fermenters, then compressing to approximately 1500 lbs./sq. in. at which point it liquifies, then expanding to atmospheric pressure under which conditions it forms a solid called CO_2 snow. This snow is compressed in hydraulic presses yielding a block of dry ice approximately 12 in. cube weighting 50 lbs.

From what I have said, you have some idea of the history of our plant in New Orleans and the scope of our present activity. As is the case with most chemical plants, we have a relatively small group of people producing large volumes of chemicals. At the present time we employ approximately 190 people in our New Orleans Plant whereas at the peak of World War No. 1 production we employ only 70.

As is the case in most industries today, we are studying the possibility of future developments and are laying very careful plans for post-war activity. In addition to our local plant, our Company operates two plants at Baltimore, Md., a plant at Newark, N. J., Yonkers, N. Y., and Anaheim, California. These are the alcohol and allied chemical producing plants. Recently we have entered another field—namely, the synthetic resins and now have plants for the production of these materials at Newark, N. J., and Pensacola, Florida. Our Research and Development set-up consists of a general research

laboratory at Stanford, Conn., with two development laboratories at Baltimore, Md., and a development laboratory for resins at Newark, N. J. Each plant, of course, is equipped with a control laboratory in which some minor research and development work is taking place continually. The growth of our Company as a whole has been vitally tied in with the operations in New Orleans, and it is hoped that in the future we will continue to grow in size and scope and that our local plant will always be intimately connected with the City of New Orleans and its people.

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THE MANUFACTURE OF ROOFING

Mr. William Lehmkuhl, Plant Manager of the Flintkote Company gave an interesting resume of the beginning of this important industry. He traced the expansion of the present plant in New Orleans from its early stages to the present day. Various steps in the manufacture of the roofing were described in detail.

THE MANUFACTURE OF SUGAR

Godchaux Sugars, Inc.

W. E. McFARLAND *

In 1868, Leon Godchaux, father of the brothers who now head Godchaux Sugars, Inc., started out in the sugar business as a cane grower and a processor of sugar.

The present company is engaged in all phases of the cane sugar business, from the growing of cane to the delivery of refined sugar, syrups and molasses to its various distributors. It is one of the largest producers of cane sugar in the United States. In addition to the growing of sugar cane and the processing of it into refined sugar and Turbinado sugar at its Reserve Refinery and Raceland Factory, the Company also operates by-product plants at Reserve and Raceland during the grinding operations for the manufacture of "Servall" products from bagasse.

The Reserve Refinery, located at Reserve, Louisiana, has a melting capacity of over two million pounds of sugar per 24 hours. Reserve also has a raw sugar house, which operates in conjunction with the refinery, with a grinding capacity of 3,000 tons of cane per 24 hours. The refinery, which operates the year around, has approximately 1100 employees.

The Raceland Factory, which produces Turbinado sugar, has a grinding capacity of 3,500 tons of cane per 24 hours. It employs approximately 450 people during the grinding season.

The Company operates three groups of Plantations—one group is located at Reserve, one at Raceland and one at Napoleonville, Louisiana. In all over 30,000 acres of land are owned by the Company. Approximately 14,000 acres are under cultivation. About 800 employees are steadily engaged in the Company's agricultural operations, including those employed at raw sugar factories during the idle season. During the harvesting and processing season of three months, approximately 1700 additional employees are seasonally engaged in the

*Plant Manager, Reserve Factory. Presented at the regular meeting of the Society on October 9, 1944.

agricultural and raw sugar operations. Including those employed steadily at Reserve Refinery, as well as those steadily seasonally employed in agricultural and raw sugar house operations, the total number of employees at certain periods of the year reaches as high as 3,300. From this it will be realized that the payroll of the above employees is an economic factor in the life of the communities where the properties are located.

It may be of interest to know that during the grinding season, between Reserve and Raceland we grind the equivalent of 260 standard gauge cars of sugar cane per 24 hours. Of course, the cane is brought in by standard gauge railroad, narrow gauge railroad and trucks. During this grinding period the two plants consume from thirteen to fourteen million cubic feet of gas per 24 hours. The gas is used as fuel under the boilers for generating steam for plant operations.

It is also of interest to note that over 700 shippers supply cane to our two factories. During the refining season at Reserve we refine over five hundred million pounds of sugar a year. This will amount to approximately 4,500 cars of raw sugar per year. When you realize that approximately the same number of cars of refined products are shipped out of Reserve Refinery during the year, you will see that we are a big customer for the railroad companies.

During the refining season we consume between six and seven million cubic feet of gas per 24 hours. Therefore, you will realize that we are also a big customer for the gas company. It also must be realized that several hundred carloads of material, such as bags and containers, muriatic acid, phosphoric acid, lime, caustic soda, bone char, etc., are used yearly in the operation of the refinery.

The Company operates two by-products plants during the grinding season, which convert bagasse into a product known as "Servall." Prior to the development of this product bagasse was either sold to the Celotex Company or was burned under the boilers as fuel. Servall is a product which is used for horticultural purposes, poultry litter, animal bedding and in the

manufacture of feed for animals. A certain portion is also used in the manufacture of explosives.

I believe that the above will give you a general description of the activities engaged in by our Company. I will now give you information as to the processes which are used in the manufacture of sugar from cane, as well as the refining of it.

With the old varieties of sugar cane the percentage of fibre varied from nine to 11 per cent. The mills, gears, bed plates, etc., were constructed of cast iron. This was strong enough to mill cane having low fibre, as in the old varieties. With the new varieties which we have at the present time, the fibre varies from $12\frac{1}{2}$ to 17 per cent. These canes are very hard and difficult to mill. Due to this difficulty we have changed the mills, gearing, etc., from cast iron to cast steel in order to reduce breakage of the milling units, which causes a delay in the harvesting of the cane crop. We have also installed revolving cane knives, which cut up the cane, and shredders which tear or shred the cane prior to going into the mill, where the juice is expressed. We have two tandems at Reserve, consisting of revolving knives, shredders, single crusher and three mills. The cane after going through the knives and shredder is fed to the crusher and thence through the mills, where the juice is extracted. The refuse fibrous material, known as bagasse, goes over to our by-products plant and is manufactured into Serv-all.

The juice as expressed from the mills contains impurities and dirt, which have to be removed before sugar can be made. In order to remove the impurities, milk of lime is added to the juice until the pH has been raised to approximately 8. The juice is then pumped through juice heaters where the temperature of the juice is raised to between 212 and 215 Fahrenheit. The juice then goes to the continuous clarifiers, where the dirt, impurities, etc. are precipitated and settle to the bottom of the clarifier. This precipitate which settles out is known as "mud" and is pumped out of the clarifier by means of diaphragm pumps. The clear clarified juice overflows from the clarifier into a scale where the juice is weighed automatically.

The juice is then pumped to a quadruple evaporator where it is concentrated into a heavy syrup containing approximately 65 per cent soluble solids. This syrup is then stored in storage tanks and is later boiled into raw sugar in the vacuum pans.

The mud from the clarifier used to be handled by pumping the mud through plate and frame presses. This required as many as fifteen plate and frame presses, and also required considerable labor to handle this station. We have replaced the plate and frame presses with a single Oliver-Campbell Cachaza Filter. This filter is a vacuum type filter and its operation is continuous. The advent of the Cachaza filter in Louisiana has been a very important step in the manufacture of sugar from sugar cane.

This gives you a short resume of the operations in that part of the plant which grinds sugar cane and clarifies the juice so that it can be boiled into raw sugar. In addition to grinding sugar cane during the grinding season we also melt outside raw sugars from Cuba, Porto Rico and Louisiana.

In the refining of sugar all of the subsequent operations are used in order to separate the sucrose from the impurities which come in with the raw sugar.

Raw sugar will have from 96 to 97½ percent sucrose, with the remaining portion being water and impurities. The raw sugar crystal is surrounded by a film of molasses which contains practically all of the impurities. The first step in refining is to try to separate these impurities from the sugar crystal. This is done by what we term the "affining" of sugar.

The raw sugar is mixed with a heavy saturated low purity syrup. This mixture is known as a "magma." It should have the consistency of dough. The affination syrup softens the adhering molasses film around the crystal as well as making the entire mass mobile. When this magma is spun in a centrifugal and the sugar washed with hot water we are able to remove practically all of the molasses film from the sugar crystal. In order to improve the working of the centrifugal station in the affination house we have installed heating coils in the mixer to heat the magma up to a predetermined temperature. By heating the magma we are able to cut down the

viscosity of the surrounding syrup so that when the material is purged in a centrifugal we will get a cleaner separation. By using centrifugals turning 1500 RPM a better separation of impurities from the sugar is made.

Even after going through the affination house there are certain impurities in the melt sugar liquor which have to be removed.

In clarification the liquor is treated with phosphoric acid and lime and then thoroughly aerated with air. The liquor is then heated and is pumped to the Williamson Clarifier. The floc which is formed due to phosphoric acid and lime clarification is carried upward in the clarifier by the minute air bubbles which are in the liquor as a result of aeration. This floc entangles any suspended matter and the entire mass of impurities is brought to the surface of the clarifier. The clean liquor is drawn out continuously from the bottom.

After the liquor leaves the clarification department it is pumped to the char house. In the char house the liquor percolates through large cisterns filled with bone char. Bone char is charred animal bones crushed to a certain grist. This material has the property to further purify and decolorize the sugar solution as it percolates through the char filters. This sugar solution comes out of the char filters water-white. This liquor is then pumped to the pan floor where sugar is boiled in the vacuum pans. This solution is boiled under vacuum so as not to cause caramelization and color, since we are able to use a low temperature for boiling sugar solution when it is boiled under vacuum.

The material which is finally discharged from the vacuum pans consists of a mixture of sugar crystals and the mother liquor. It is necessary to separate the mother liquor from the crystals and to wash the surrounding syrup off of the sugar crystals by means of centrifugals.

After the sugar leaves the centrifugals it is conveyed to the granulators, or driers, where the sugar is thoroughly dried. The sugar is then conveyed over vibrating screens to separate or to classify the sugar into its various grades. From the vibrating screens it is conveyed to the packing department

where it is packed by the use of automatic scales into various units of cotton and paper bags.

We are unable to recover all of the sucrose as sugar in the pan department by one boiling. It is necessary to take the syrup from the first boil and reboil it in vacuum pans to recover more sugar. This is repeated until we reach a point where we are unable to make granulated sugar out of the syrup. The remaining syrup is then clarified and pumped to the char house for further char filtration and purification, and thence back to the pan floor where it is boiled into various grades of soft sugar. We finally reach a point where further crystallization is not profitable. This material is known as blackstrap molasses and is the final product of the refining process.

You will recall that we brought the material coming from the cane house up through the vacuum pans. This raw sugar, made from cane material is melted and is mixed along with the incoming washed sugar liquor from the affination house. The process from then on is the same as I have given above.

In connection with the refinery operations we operate our own water purification plant, which supplies purified water not only for the entire plant, but furnishes water to the town of Reserve as well. We use Mississippi River water, which is chemically treated, settled, sand filtered and chlorinated for our filtered water supply.

We also operate our boiler plant and generate all of the electricity which is required for our plant's operation. In connection with the boiler plant, we believe you would be interested to know that we have 100,000 lbs. steam per hour, boiler, operating at 465 lbs. pressure gauge, 100 deg. superheat. We use the 465 lbs. steam to operate a topping turbine which runs the 1500 KW generator. This turbine exhausts at 130 lbs. pressure into our low pressure boiler system which generates steam at 130 lbs. pressure. This 130 lbs. steam is used for process steam and for operating other turbo-generators, etc. throughout the plant. The turbo-generators which operate at 130 lbs. steam pressure exhaust at 10 lbs. pressure. The 10 lbs. exhaust steam is also used for process steam in the refinery.

We believe that it will be of interest to you to know something of the mechanization which is taking place in the fields for the cultivation and harvesting of sugar cane.

Where formerly it required hand labor to hoe cane to keep the grass down, this is now being done by what is known as a flame cultivator. This cultivator uses a very high temperature flame to burn the grass and weeds on the row, thereby eliminating the use of hand hoeing.

Rubber-tired tractors have practically replaced mules on the farms. Rubber-tired trailers have replaced wagons and old type cane carts. Instead of cutting cane by hand, cane is now being cut by mechanical cane harvesters. A mechanical loader which takes the cut cane from the field and loads it into the rubber-tired tractor drawn trailers has replaced hand loading. Drag lines are used for ditching and constructing drainage canals, where formerly hand labor was used.

From the above, as to the properties and operations of Godchaux Sugars, Inc., I am sure that you will see that this Company plays a very important part in the economic structure of our state, not only from the point of view of supplying thousands of people with a livelihood, but also from the point of view of taxes which this company pays to the State and Federal Governments.

Whenever you see the name "Godchaux" on a bag of sugar, you know that it is from a concern which not only refines sugar, but produces sugar cane from which sugar is made.

I wish to take this opportunity to invite the members of the Louisiana Engineering Society to visit the plantation and Reserve Refinery during the grinding season so that you may see all of the operations involved in making sugar from the harvesting of the cane to the filling of bags with refined sugar.

PRESENT ACTIVITIES AND POST WAR PLANS

Mr. Robert W. Elsasser, Vice-President and General Manager of Pendleton Shipyards Co., spoke extemporaneously on the plant's present activities. Particularly interesting was his review of the method of financing the company.

He directed the attention of the audience to the various facilities at the yards in the line of docks, etc., which would enable them to carry on a post war marine repair business. He cited as a frequent cause of high cost of marine repairs their seasonal character. If a plant could carry on some regular business, say steel fabrication, along with marine repair, a large force of skilled workers would at all times be available. Schedules could be so arranged that men could be shifted from factory fabrication to repair work, thus reducing the cost of the repair work. His picture of post war possibilities was very optimistic.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Baton Rouge Section, Louisiana Engineering Society, 3rd Quarterly Meeting—September 18, 1944

The meeting was called to order by President Lehmann, who then asked for the introduction of guests. He spoke briefly on the origin of the Baton Rouge section of the Society which is now five years old.

Reading of the minutes was then called for, after the reading of which they were adopted as read. Reports were then heard from the various Chairmen of the Technical Papers, Membership, Entertainment and Publicity Committees and also from the Treasurer.

President Lehmann then announced the appointment of a Nominating Committee, consisting of: N. E. Lant, F. F. Pillet and W. W. Tenant. A slate of candidates for Baton Rouge section, Society officers is to be presented to the section at its next meeting, when election of officers will be held.

There being no further business to come before the meeting, President Lehmann introduced the speaker, Mr. W. E. Moore of the Sheffield Steel Company. Mr. Moore gave an interesting talk on steel mills in general and the new mill at Houston, Texas in particular. He gave the reasons for its location at that point and explained the economic advantages to a territory in having such an establishment. The items manufactured were listed and then a film was shown depicting in detail the various processes of production from the ore to the finished nails, rods, wire, plates, etc.

The meeting, with forty-eight in attendance, was then adjourned and a delightful buffet supper of fried chicken was served.

P. J. GUELF, I,
Secretary-Treasurer.

Minutes of Board Meeting of Louisiana Engineering Society October 9, 1944

Meeting was called to order by President Kerr with the following members present: Gosa, Kammer, Nairne, Steinmayer, and Mayer.

Minutes of the last meeting were read and accepted.

President Kerr reported on the program of several committees for the annual meeting of the Society. The following Nominating Committee was selected by the Board and appointed by President Kerr: K. P. Kammer, Chairman, F. N. Billingsley, and B. H. Grehan.

A letter from Dean J. M. Robert, Tulane University, was read, stating that Mr. B. S. Brupbacher, Jr., a Senior in Mechanical Engineer-

ing, was entitled to receive the Louisiana Engineering Society's Junior Membership Award. The Board voted that Mr. Brupbacher be awarded a one year's Junior Membership in the Society without dues.

Mr. N. L. Marks, Jr., was appointed Chairman of a Committee to prepare an obituary on the death of Frank H. Waddill, and he was requested to select other members to serve with him on the Committee.

The resignation of Mr. B. H. Dupuy, to become effective December 31, 1944, was accepted with regret.

It was brought to the attention of the Board that a portion of the Library of the late Mr. J. F. Coleman has been presented to the Society. Due to the fact that at the present time there is no space for additional books in the Library, the Board decided that these books should be stored until they can be properly housed.

It was decided not to renew the subscription to "Life" magazine for the Library.

One application for membership was referred back to the Membership Committee for definite recommendation.

President Kerr announced that he had been appointed to the Advisory Committee of the National Fuel Efficiency Program and that he had been requested to suggest names of men to serve as Regional Engineers on this program. Names of several members are to be suggested.

There being no further business the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of Meeting of Louisiana Engineering Society, October 9, 1944

The meeting was called to order by President Kerr with approximately 100 members and guests present.

It was voted to dispense with the reading of the minutes of the previous meeting.

Letters from Mrs. Annie Coleman and Mr. F. X. Gillio were read by the Secretary.

President Kerr reported on the progress of plans for the annual meeting of the Society, to be held on January 11, 12, and 13.

President Kerr announced the appointment of a Nominating Committee of K. P. Kammer, Chairman, assisted by F. N. Billingsley and B. H. Grehan.

The following speakers were then introduced in turn by President Kerr:

Mr. W. W. Carre, Superintendent of the United States Industrial Chemicals Company.

Mr. Robert W. Elsasser, Vice-President and General Manager Pendleton Shipyards Company, Inc.

Mr. W. E. McFarland, Superintendent, Godechaux Sugars, Inc.

Mr. William M. Lehmkuhl, Plant Manager, Flintkote Co.

Each speaker presented a brief talk on the operations performed by his company and the part played by the company in the war effort. The speakers answered several questions from the floor at the conclusion of their talks.

President Kerr expressed the thanks of the Society and the meeting adjourned with a rising vote of thanks to the speakers.

J. K. MAYER,
Secretary-Treasurer.

**Minutes of the Joint Meeting of the Society With the New Orleans
Section A.S.M.E. and the Louisiana Section A.S.C.E.,
November 13, 1944**

The meeting was called to order by President Kerr with approximately 250 members and guests present. It was voted to dispense with the reading of the minutes of the previous meeting.

President Kerr remarked on the progress being made by the various committees appointed for arranging the annual meeting of the Society to be held on January 11, 12 and 13.

The Obituary of Frank H. Waddill, Life Member, written by a Committee composed of N. L. Marks, Chairman, C. M. Kerr and D. W. Godat, was read by the Secretary. It was voted that this Obituary be spread upon the Minutes of the Society and printed in the "Proceedings."

President Kerr requested Dean Lassalle to introduce several members of the faculty of the College of Engineering, Louisiana State University, who were in attendance.

President Kerr then introduced the speaker of the evening, Dr. Stephen P. Timoshenko, who delivered a most interesting and informative illustrated paper on "Stress Concentration and Fatigue Failures." Dr. Timoshenko answered a number of questions from the floor at the conclusion of his paper.

President Kerr thanked the speaker in the name of the Louisiana Engineering Society, the A.S.M.E. and the A.S.C.E.

The meeting adjourned with a rising vote of thanks to Dr. Timoshenko.

J. K. MAYER,
Secretary-Treasurer.

Obituary of

FRANK HUGH WADDILL

The passing of Frank Hugh Waddill at Baton Rouge, Louisiana, on September 19, 1944 brought grief and a sense of great personal loss to the engineers and surveyors who for many years had treasured his friendship and admired his outstanding ability.

Mr. Waddill was born in East Baton Rouge Parish on July 22, 1866. He was a descendant of revolutionary war stock from Virginia and his early youth was the period of dearth and want that followed in the wake of the Civil War. He worked his way through and was graduated from the Louisiana State University in 1888 with the degree of Bachelor of Civil Engineering. He taught mathematics at Louisiana State University for two years, then came to New Orleans to become associated with the outstanding surveyors of that day. In 1905 he married Miss Camelia de Bat and together they were pioneers in the movement for the preservation of the quaint and historical land marks in and around this City.

Mr. Waddill conceived the necessity of the continuation of Claiborne Avenue as a main artery which could be made to meet old Mobile Street of the City of Carrollton. He adopted the practice of showing this street in the proper alignment on all maps and surveys made by him of the un-subdivided tracts then existing. Thus, simply by the power of suggestion, when the time arrived for subdivision, every owner, with only one exception, fell in line and dedicated Claiborne Avenue, such that today we have in this highly useful artery the longest and only continuous street shy of jogs and detours extending from the upper to the lower limits of the City.

Mr. Waddill was a strong advocate of a deep sea channel to the Gulf and he mapped several feasible routes.

He was a member of the committee which sponsored Act 200 of 1914, regulating the practice of civil engineering and served for twenty-five (25) years as a member of the State Board of Engineering Examiners. He actively fought any effort he considered would encroach upon the domain of the civil engineers. In 1938 he organized the Louisiana Institute of Civil Engineers to oppose any move in that direction at each session of the Legislature.

Mr. Waddill was elected to the membership of this Society in 1910 and became a life member in 1940.

Mr. Waddill will be missed particularly by the young engineer for throughout his life he gave many hours of his valuable time, instructing the young men in the fundamentals of the profession. His spirit of cooperation, however, will continue to be a dynamic force.

N. L. MARKS
CHARLES M. KERR
D. W. GODAT