THE PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

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LOUISIANA ENGINEERING SOCIETY

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NOTE—Please advise editor of any changes in officers.

WILLIAM STONE LEAKE

PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

VOL. XXXIV FEBRUARY, 1948 NO. 1

CONTENTS

EDITORIAL NOTES AND COMMENTS

Our New President. Our Society is fortunate in having as its President an engineer who is well known and outstanding. William Stone Leake was born December 30, 1903 in Bay City, Texas. Shortly thereafter, his family moved to Beaumont, Texas where he attended public grammar and high school from the later of which he was graduated in 1920. He then attended Tulane University, from which he was awarded the degree of Bachelor of Engineering in the Mechanical and Electrical Course in 1924.

During his senior year, he was selected along with several others from his class by the General Electric Company to become a member of its student test course at Schenectady, New York. Later he took their sales training course for sales engineers from which he came to General Electric, New Orleans office, in November of 1925. He has followed this work until the present, principally in the sales of electrical apparatus to industrial plants throughout Louisiana.

He has been active in the affairs of the New Orleans Section of the American Institute of Electrical Engineers and served as chair-

man of the section in 1945-46. He is now a member of their National Membership Committee.

He has served on a number of committees of our society, being general chairman for the annual meeting in 1945.

A Message from the President. As your newly elected president, I first want to express my sincere appreciation for this honor but as the editor of these Proceedings expressed it in a recent letter requesting my message, "the office carries with it responsibilities", and this I fully realize. With capable management and the close cooperation of its members, this Society has risen to a position of importance in the community and to a constantly stronger position throughout the state as a whole. This position must not only be maintained but improved and to this task I promise you my best efforts. With the capable assistance of your other officers and board of direction. I trust that we will be able to continue the same high standards which have been established for us.

Our biggest task for the coming year will be to secure enactment of a State Licensing Law for Engineers. The groundwork for this task has already been laid by Past President Nairne and last years Legislation Committee and this same Committee will be asked to carry on throughout this coming year. This bill has been drawn and through the cooperation of the Louisiana Council of Engineers, has not only been submitted to our Membership but to all of the engineering groups which form the council. Although numerous drafts have already been made, the bill is still not necessarily in its final form and each of you are urged to give us your criticism and suggestions for its improvement. I believe that there is a unanimous opinion that we should have a State Licensing Law which will apply to all engineers and that the only difference of opinion, where such exisits, is in the exact wording of the act.

In this connection, however, past experience has proven that to secure enactment by the legislature, the bill must have practically unanimous support from all engineers. There is naturally going to be some difference of opinion as to details and wording of its many provisions. Some compromise on the part of each of you is going to be necessary and my plea to you is put aside any personal prejudices you may have and lend your support to this effort to greatly improve the status of our profession in this our state.

Your Society at this time has a membership of approximately 839, which undoubtedly represents the majority of eligible engineers in the state. At the same time, it is my opinion that there are still numerous engineers who are still not listed among our members. One of the principal endeavors of my administration will be to further increase our membership. Through the successful efforts of past administrations and members in these cities, local sections have been established in Baton Rouge and Lake Charles. Similar

local sections should be established in Shreveport, Monroe, Alexandria and Lafayette. It shall be a part of my program to establish a local section in at least one of these cities during this year.

With the establishment of a local section, there is a greatly added incentive to engineers in that locality to become members of the Society. Any local member will readily admit that one of his principal reasons for membership is his convenient ability to attend the interesting and educational lectures and talks provided at regular section meetings and the association with his friends and leaders of his profession at these meetings. State members who live some distance from the three cities where such regular meetings are held do not enjoy this benefit. This added incentive can and will be provided. Our Baton Rouge Section is an excellent example of this trend. When formed in 1939, it had a membership of 44. This has grown in eight years to 130.

The various Founders Societies, who have sections or chapters in New Orleans, have cooperated very closely with our Society and have made valuable contributions to our technical programs. It is my opinion however that the combined membership of these societies, even taking into consideration cases of dual membership in two of these, will considerably outnumber our own membership. This collection forms a very promising group of potential members and will be given careful attention by this year's membership committee.

Up to this point, I have touched upon what I might call the two principal aims of my administration from the standpoint of growth and progress of the society. It shall also be our aim to maintain the same high standards which have been set for the technical programs at our meetings, the financial condition of the society, its cooperation in civic affairs, its entertainments, outings and general spirit of fellowship.

A society is only as strong as its members. This is your society. Please give us the benefit of your suggestions and criticisms and we cannot fail to have a successful year in 1948.

New Members. The following new members were elected to membership in the Society during December, 1947. We welcome them to the organization, and it is hoped that they will take an active interest in the affairs of the organization.

For Member

ELBERT H. BARENTINE, DeRidder; age 34. Endorsed: Soule Butler, Leo Odom, S. C. Smith. 18 years in surveying, construction, drafting, design. U.S.N.C.B., 3 years. Registered Surveyor, Louisiana.

ROBERT H. BARTHOLOMEW, Norco; age 28. Endorsed: G. E. Bertram, W. A Erickson, B. J. Lehmann. Lehigh University, B.S.Ch.E., 1942. Shell Oil Co., 1942-date, Mgr. Topping Dept.

RAY WESLEY BURGESS, Maplewood; age 26. Endorsed: A. J. Matherne, Wm. Whipple, W. P. Wallace. L.S.U., B.S.M.E. Stone & Webster Eng. Co., Inspector, 1942-46. Barnard & Burk, Consulting Engrs., 1946. Stone & Webster, Field Engr., Aug. 1946-present.

ANDREW L. CAMERON, Norco; age 41. Endorsed: G. E. Bertram, W. A. Erickson, B. J. Lehmann. Auburn U., B.S.E.E., Southern Bell Tel. Co., Eng. Dept., 4 years. Shell Oil Co., Eng. Dept., 9 yrs. U.S. Army Signal Corps, 4½ yrs.

JULES A. CARVILLE, JR., Norco; age 36. Endorsed: G. E. Bertram, W. A. Erickson, B. J. Lehmann. L.S.U., B.S.E.E. Shell Oil Co., Engineering Dept., 15 years.

RUSSELL S. CLARK, Lake Charles; age 55. Endorsed: B. P. Babin, F. T Clarke, R. J. Kuhn, F. C. Gault. Penn. State College, B.S.M.E., 1917. U.S. Navy, 1917-19. Marine Engineering, 1919-23. Otis Steel Co., Cleveland. Steam Engineer, 1923-28. W. D. Spengler, Construction Engineer, 1928-30 Pittsburgh Plate Glass Co., Supt. of Power, 1930-46. Southern Alkali Corp., Lake Charles, Plant Engineer, 1946-date.

LUIGI FRANCILLO, New Orleans; age 38. Endorsed: A. W. Betz, A. J. Harris, L. E. Savage. B.S.M.E. 1935. Miss. Shipping Co., marine engr., 1935-42. U.S. Army, charge design of vessels of U.S.A.T., 1942-45. Boland Machine & Mfg. Co., Inc., Engr.-Estimator, 1945-date.

LEWIS, G. GAY, New Orleans; age 28. Endorsed: B. H. Bell, C. M. Cockrell, R. F. Muller. Georgia Tech, B.S.E.E., 1940. Allis-Chalmer Mfg. Co., Milwaukee, Wis., 1940-43. U.S. Navy, 1943-45. Allis-Chalmers, Sales Engineer, 1946-present.

JAMES A. HUFFORD, Oakdale; age 29. Endorsed: E. H. Goodloe, W. R Mack, B. H. Wade. Purdue U., B.S.C.E., 1939. W. A. Hufford, Contractor, Frankfort, Ind., Engineer, 1939-40. Ind. State Highway Commission, 1940. U.S. Army, Parachute Field Artilery, Major, 1941-46. Nickel Plate Road, Asst. Engineer, 1946-47. La. Dept. Highways, Jr. Project Engr., 1947-date. Licensed C.E., La.

MAXWELL A. LEA, Baton Rouge; age 33. Endorsed: J. C. Hill, J. Lester White, L. J. Lassalle. L.S.U., B.S.M.E., 1937. E. I. DuPont de Nemours, Construction Engr., 1937-41. U.S. Army Corps of Engrs., Mtce. Officer and Company Commander, 1942-46. Ethyl Corp., Power Area Supervisor, 1946-present.

H. A. LeBLANC, JR., Norco; age 34. Endorsed: G. E. Bertram, W. A. Erickson, B. J. Lehmann. L.S.U., B.S.Ch.E., 1935. Godchaux Sugars, Research Engineer, 1935-36. Shell Oil Co., Inc., 1936-present, head Inspection Dept.

AUGUST JOHN LEHMAN, Port Sulphur; age 42. Endorsed: F. B. Blackstone, R. H. Earl, W. S. Nelson. Texas A.&M., B.S.E.E., 1929. General Electric Co., Schenectady, N. Y., 1929-30. Freeport Sulphur Co., Asst. Supt. Mtce. &Eng., 1930-date. Member A.I.E.E., I.A.E.I. Registered Professional Engr., Texas.

ROBERT L. MORRIS, III, New Orleans; age 30. Endorsed: Sydney Ellis, Jr., R. M. Seago, D. W. Stewart. Tulane U., B.E.Ch.E., 1939. E. I. duPont de Nemours, Spruance Plant, Richmond, Va., 1939-42 U.S. Army Engr. Corps., Combat unit commander, 1942-46. Vanderbilt University, 1 yr. graduate work. Reilly-Benton Co., New Orleans, Production Engr., present.

SEWALL J. OERTLING, Norco; age 36. Endorsed: G. E. Bertram, W. A. Erickson, B. J. Lehmann. Loyola University, N. O., B.S. in Chemistry. Shell Oil Co., Inc., 1934 to present, now Senior Technologist.

OTIS W. PAGE, New Orleans; age 42. Endorsed: L. V. Cressy, G. C. Kerr, W. P. Oster. Virginia Polytechnic Institute, B.S.M.E. 1927. Newport News Shipbuilding & Dry Dock Co., eng. design, 1927-38. U.S. Maritime Commission, 1938-42; Gulf Coast Regional Construction Office, Chief Engr., 1942-47. Now practicing privately as Marine & Industrial Consulting Engr.

GEORGE A. PRICE, JR., New Orleans; age 36. Endorsed: A. L. Mabry, R. M. Shaw, J. P. Fernandez. Univ. of Florida, B.S.E.E., 1935. U.S. Engineer Dept., N.O. Dist, Hydrologic Engr. 1938-43. U.S. Signal Service, Radar Engr., 1943-47. U.S. Engr. Dept. N.O. District, Hydraulic Engr., present. Member Institute of Radio Engineers.

LOUIS L. ROBEIN, SR., Destrehan; age 60. Endorsed: R. L. Argus, G .E. Bertram, B. J. Lehmann. Pratt Institute, Brooklyn, N.Y., graduate in Chemistry, 1903. Babcock & Wilcox, Asst. Chemist, 1908-12. Standard Oil of N.J., 1912-14. Union Petroleum Co., Westwego, 1914-19. Pan American Petroleum Corp., Stillman, Chemist, Research, Asst. Supt. and Supt., 1919-47.

RICHARD ALONZO SMITH, Ruston; age 30. Endorsed. H. B. Batchelor, Wm. E. Owen, Roy, T. Sessums. La. Polytechnic Institute, B.S.C.E., 1940. U.S. Army Engrs., Civil Engr., 1941-42. U.S. Navy, 1942-47, including post graduate work in Naval Eng. at Univ. of Michigan. La. Polytechnic Institute ,Asst. Prof. of Civil Eng., present. Licensed C.E., Virginia. Associate Member, A.S.C.E.

HORACE A. THOMPSON, JR., New Orleans; age 30. Endorsed: A. W. Betz, H. J. Molaison, C. S. Williamson, Jr. Tulane University, B.E.Ch.E., 1938. Standard Oil Co. of N.J., Engineer, 1938-41. U.S. Marine Corps Officer, 1941-45. Mechanical Equipment Co., Sales Engineer, 1945-46. Thompson Equipment Co., Owner, Nov. 1946-present.

JAMES DAVID TUFTS, Destrehan; age 54. Endorsed: R. L. Argus, A. W. Betz, B. J. Lehmann. International Correspondence School, Mechanical Eng. Tulane University, Naval Architecture and Marine Eng. (night courses). Pan American Petroleum Corp., 1932-present, now Asst. Supt.

JOHN EDSON WALLACE, Bogalusa; age 37. Endorsed: M. R. Guell, C. H. Hundemer, C. J. Mayeux, L.S.U., C.E. course, 3 yrs. B.A. in Education, L.S.U., 1933, M.A., 1942 United Fruit Co., Lima, Honduras, Junior Engr., 1933-36. Kentwood High School, Math Teacher, 1936-42. Gaylord Container Corp., Field Engr., 1942-present.

JOHN H. F. WEBERT, New Orleans; age 56. Endorsed: C. G. Cappell, Claiborne Perrilliat, A. M. Scott. American Sugar Refinery, Eng. & Mtce. Dept., 1907-23. Lukens Steel Co. and Jones & Laughlin Steel Corp., supervisory capacity in structural engineering, 1923 to date.

For Affiliate Member

CLIFFORD A. KING, New Orleans; age 49. Endorsed: Ole K. Olsen, Claiborne Perrilliat, L. C. H. McLean. 24 years of contracting and selling building materials in New Orleans.

For Reinstatement to Membership

J. THAD FLOYD, JR., New Orleans; age 36. Endorsed: B. H. Grehan, Claiborne Perrilliat, A. R. Wingate. Ingalls Iron Works, Sales Engineer, 1927-36; District Manager, 1936-42. Clifford A. King, Associate, 1942-43. U.S. Army, Ship Maintenance and Repair Officer, 1943-46. Metal Building Products Co., Partner, 1946-date. Licensed Engineer, La.

ALBERT J. MEYERS, Norco; age 39. Endorsed: G. E. Bertram, W. A. Erickson, B. J. Lehmann. Tulane University, B. E. in C.E., 1930. Shell Oil Co., Industrial Engineer, Utilities Engr., 1934-present. Member La. Conference on Water Supply & Sewerage.

GEORGE P. ROBBINS, JR., New Orleans; age 46. Endorsed: C. L. Nairne, W. Stone Leake, A. W. Betz. Tulane University, B.E. in M & E, 1923. General Electric Co., Schenectady, 1 yr. Allis-Chalmers, Dallas, Sales Engr., 3 yrs. Robbins & Robbins, New Orleans, Mfg. Agent & Engineer, Partner, 20 yrs.

For Junior Member

JOHN WESLEY ALLEE, New Orleans; age 24. Endorsed: W. E. Blessey, F. H. Fox, F. W. Macdonald. Tulane University, B.E. in C.E., 1927. U.S. Corps of Engineers, N.O. Dist., June-Sept., 1947. Tulane University, Instructor, School of C.E., Sept. 1947 to date.

CLYDE CUCULLU, New Orleans; age 25. Endorsed: A. J. Brodtmann, L. J. Cucullu, A. L. Dunlap. Tulane Unviersity, B.E. in E.E. Westinghouse Electric Corp., E. Pittsburgh, Pa., 1943-46. N.O. Public Service Inc., Property Accounting Engr., Jan. 1947 to date.

ARNOLD LESLIE FARMER, New Orleans; age 26. Endorsed: A. J. Brodtmann, L. J. Cucullu, L. J. Lassalle. L.S.U., B.S.E.E., 1943. Higgins Aircraft Corp., Draftsman "A", 1943-44. U.S. Navy, Radio Technician, 1944-46. N.O. Public Service Inc., Engineer, 1946-date. Member A.I.E.E.

JOSEPH O. HACHET, JR., La Place; age 27. Endorsed: G. E. Bertram, W. A. Erickson, B. J. Lehmann. L.S.U., B.S.E.E., 1941. U.S. Navy, Radio-radar, 1941-45. Shell Oil Co., Junior Engr., 1945-date.

LOUIS L. ROBEIN, JR., Destrehan; age 26. Endorsed: G. E. Bertram, W. A. Erickson, B. J. Lehmann. Tulane Univ., B.E.Ch.E., 1943. U.S. Navy, 1942-45. Shell Oil Co., Junior Technologist, 1945-present.

EUGENE F. TIMS, Baton Rouge; age 26. Endorsed: A. K. Ramsey, W. D. Poole, W. P. Wallace. L.S.U., B.S.E.E., 1943. U.S. Army Signal Corps., 1943-46. Signal Security Agency, Elect Engr., 1944-45. Officer in charge installation & mtce. of ground radar and radio dept. for Panama Canal Dept., 1945-46. La. State University, Instructor in E.E., 1946-date. Member A.I.E.E.

For Student Member

JOHN J. FINEGAN, JR., Senior Electrical Engineer Student, Tulane University.

ROBERT L. PONS, Senior Mechanical Engineering Student, Tulane University.

JOHN H. SCHLUTER, Senior Mechanical Engineering Student, Louisiana State University.

Engineer's Licensing Law. In the December issue of the "Proceedings" the proposed model license law was published.

After many hours of careful consideration by members of the present board for licensing civil engineers and surveyors, and by members of other professional engineering groups, the final proposals were discussed in a meeting of Louisiana Council of Engineers on December 21. (The Council meetings on this law are attended by the chairmen or official representatives of the various engineering groups in New Orleans and surrounding cities, are presided over by the President of L.E.S.)

It is hoped that every engineer will support the bill at the next legislature. Louisiana is one of two states out of the forty-eight lacking such a law. This bill is designed to raise the general level of standing of the professional engineer, and is a mark of progress. The proposed law in this final form seems eminently fair, and was agreeable to all engineering groups represented at the council meeting.

Joint Meeting With the New Orleans Section, A.S.M.E. On December 8 the regular meeting of the Society was held jointly with the New Orleans Section, American Society of Mechanical Engineers. Dr. Jack T. Wilson gave an interesting talk on "Recent Developments in Electro-Nuclear Machines," to a capacity audience. President Nairne of L.E.S. and Chairman McLellan of A.S.M.E. presided.

Lake Charles Section Formed. In the latter part of 1947 a section was formed at Lake Charles the following were elected: F. T. Clarke, president; E. H. Goodloe, 1st vice-president; Ray E. Burgess, secretary; and G. H. Hill and Harrell R. Smith, members of executive committee.

It is indeed encouraging to have new sections formed, and undoubtedly this section will grow and prosper under the able leadership of its officers.

LESS SPEED . . . MORE CONSCIENCE IN DRIVING

By James S. Kemper, *Chairman*
Kemper Foundation for Traffic Safety

The solution to the traffic problem is epitomized in six words: "Less speed . . . more conscience in driving." Of this I am convinced from 35 years of close association with the problem of safety on our streets and highways.

More than 30 years ago when the Central Automobile Safety Committee of Lumbermens Mutual Casualty Company was organized I recall that in our studies of accidents we found two causes predominant—failure of someone to meet his responsibility as a driver, and speed too great for driving conditions.

The situation has remained unchanged through the passing

years. In fact, today perhaps more than ever before it is important to reappraise our position and to direct all our forces toward the objective of "less speed . . . more conscience in driving."

Perhaps the story of current accident facts is all too familiar, but I believe it deserves repeating. Last year 33,700 men, women and children lost their lives on our streets and highways. More than 1,200,000 others were injured, many of them maimed for life. A reliable estimate shows property damage in automobile accidents was upwards of one billion dollars.

Alarming is the increasing frequency and severity of accidents among our young drivers. The death rate in the young driver age group (15-24) increased nearly 30 per cent over the previous year. Based on mileage, teen-age drivers have the highest accident rate.

Alarming, too, is the fact that at least one out of five drivers involved in fatal accidents had been drinking.

Important and helpful as are the many contributions to highway safety of various safety agencies throughout the country, in working on these and other alarming problems' I believe that their efforts could be immensely more effective if they would face more realistically the fact that in the final analysis it is speed which takes the toll of lives and does the damage.

No fine-spun argument can get by the inexorable laws of nature which place a penalty on speed in geometric, not simple arithmetic proportions. A child darting out in front of an automobile traveling 30 miles an hour is four times as likely to be killed as he would be if the car were going 15 miles an hour.

Suppose you were obliged to drive to a distant city reached by a road traversing long miles of level country with few cross-roads. In your power is the decision to cruise at 40 or 50, 60 or 70 miles an hour, but not in your power is the decision of an unknown automobile driver to cross the highway without heeding a stop sign precisely at the time you are to be 200 feet away from that intersection at 10 o'clock that night. If you choose to cruise at 40 miles an hour there's no question that you can see the unknown driver in plenty of time to stop. If you select 50 miles an hour, the angel Gabriel is watching but you have a chance. If 60 miles an hour is your choice, Gabriel has picked up his pen, and at 70 miles an hour he is writing your name in the big book.

Evidence that reduced speed saves lives came from the record of wartime motorists who first heeded the Government's edict to drive no more than 40 miles an hour and later complied with the speed laws of 35 miles an hour. Further evidence was developed through the agency of the "Not Over 50 Club," a voluntary organization of motorists promoted by the companies with which I am associated more than ten years ago. From reports of the Club's more than 300,000 members, many of whom were our policyholders,

we had tangible evidence that reduced speed cuts down accidents.

People engaged in safety education, highway engineering, traffic control and law enforcement will reap the greatest reward for their efforts if they continually bear in mind that speed is the Public Enemy Number One on our highways.

The problem of promoting more conscience in driving is complicated and subtle, since it is inter-woven with our whole social fabric. There obviously is no simple solution and obviously we must continue to work on this problem as long as people drive automobiles, since like death and taxes it will aways be with us.

I believe we Americans generally, particularly our young people, look upon caution and carefulness as "sissy stuff." We are inclined to think of ourselves as bold and daring people and to some it may even seem socially desirable to have a reputation for driving an automobile with dash and derring-do. Until we can show people that the really skillful driver, "the All-American Driver," is the fellow who is considerate of the lives of others, not a selfish exhibitionist, we shall continue to read the tragic story that wanton carelessness leaves in its wake.

Recently, one of our policyholders wrote me an interesting and thoughtful letter on this very point. He called my attention to a story by a famous writer, appearing in one of the most popular and reputable national publications. The heroine, a beautiful girl well calculated to inspire emulation in the eyes of countless young people, was portrayed as whipping an automobile about with skillful abandon. The writer, with a sensitive reaction to current moods, was simply reflecting a highly dangerous attitude without thinking of the harm there might be in thus glamorizing recklessness.

In the last Christmas season the Lumbermens Mutual Casualty Company published a safety message in the *Saturday Evening Post* which I believe bears repeating. Under the quotation, "Am I my brother's keeper?", there appeared the following statement:

"Throughout the world this Christmas season, Americans are stretching forth their hands to other peoples. Food, shelter, medicine, supplies of all kinds are given to save life in a world ravaged by years of struggle. But as we give abroad, let us also give to our fellow Americans:

Let us each contribute his part to safe
driving on our streets and highways.

Let us this coming year at home give life by saving lives. Less speed, more care, more courtesy—these cost so little—mean so much."

Without question, automobile accident prevention is fundamentallly a moral issue. Behind the wheel of an automobile each of us truly is his brother's keeper. Society recognizes the moral

issue and defines it in practical terms through law. That is why "Enforcement" is the primary "E" of the accident prevention triumvirate.

As a result, traffic authorities and officers are placed in the vanguard of the safety crusade. Upon their shoulders rests the responsibility of enforcing society's moral code with respect to automobile safety.

Fortunately today in ever increasing numbers traffic enforcement and judicial officers are acquiring a broad professional conception of their duties. In addition to honest enforcement of the law, important steps are being taken to prevent infractions. Increased attention is being given to sensible uniform motor vehicle laws and scientific approach to traffic control. Certainly the Traffic Institute itself has been and is continuing to be one of the most powerful influences in this direction.

Now from the ranks of traffic enforcement officers all over the nation are springing powerful leaders in the cause of accident prevention. But these men need help. They need the help of automobile manufacturers to build safer cars. They need help from the road builders and traffic control experts. But most of all they need help from the public itself.

I believe that American people, when given facts, will reach the right solution. Giving people the facts, however, is not a job that can be accomplished with a single brilliant effort on a nationwide scale. Rather it is a matter of continuous grass roots effort and like any sound educational process it must evolve and progress as time goes on.

Every man and woman and youth who operates an automobile must be made to understand clearly his moral responsibility. That this can be accomplished is shown by the attitude of the average motorist toward the traffic light. A great majority of motorists have a deep and abiding respect for the traffic light. Whether it's 3 o'clock in the morning on a lonely thoroughfare or the evening rush hour, drivers almost invariably obey the red beacon. Anyone who violates the traffic light is not only frowned on by the law but is looked at askance by even his best friends. Surely there is no reason why this same wholesome attitude cannot be extended to other safety measures.

Some years ago we made a grouping of common-sense road rules which has been widely publicized and generally accepted by traffic authorities as pretty well covering the field. Here is the list:

"Obey the law and these common-sense rules of the road—

1. Follow the line of traffic; don't be a 'traffic weaver.'
2. Keep your position on hill or curve. If you want to pass a car, do it on the level straightaway.
3. Let approaching car go by before passing car ahead.

4. Slow down for the car that wants to pass you.
5. When you have to stop, pull entirely off the pavement.
6. Be watchful for children.
7. Stop for a standing school bus.
8. Wait for the signal to 'go,' don't 'jump' the lights.
9. 'Stop, Look and Listen' at railroad crossings.
10. Keep speed down—never over 50.
11. 'If you drink, don't drive; if you drive, don't drink'."

If we should have the same respect for all these road rules that we have for the traffic light, we would be far along in the crusade for safety.

A phase of public education of particular current importance is to enlist the support of parents in training young drivers. Whether the law says "16" is old enough to drive or not, isn't it still up to mothers and fathers to make the answer good? "As the twig is bent, so grows the tree," and as parents set the example so will the youngsters perform. Useful as they may be, high school courses for young drivers are not enough.

To promote public education, we must use every possible channel of communication. The press, the radio, the pulpit, the classrom, the meeting place all must do their parts continuously. In recent years much has been learned about molding public opinion. This new knowledge must be enlisted in the cause of automobile safety.

New knowledge in the field of psychology also has a bearing. Nervous tension and emotional strain easily can break the fine concentration and coordination required to drive a car properly. When individuals are made aware of psychological factors which may place them in jeopardy they have gone a long way toward eliminating these factors. I believe this approach to the problem well deserves further exploration.

Concerted effort will yield results. As an example consider the remarkable improvement made in industrial safety. Safety engineering and employee education, unremittingly and vigorously applied, have prevented countless injuries and saved thousands of lives in our nation's shops and factories.

Paralleling progress in industrial safety, we have made forward strides in traffic safety. But we have not gone far enough fast enough. Conscientious effort persistently applied is needed more than ever before to conserve life, limb and property.

—From *Traffic Review*

The Annual Meeting. Again this year, the annual meeting scheduled a number of splendid papers, inspection trips and industrial exhibits. Each year the activities expand. The dinner dance was well attended. General Chairman John K. Mayer and his vice-chairman and subcommittee chairmen are to be complimented on a splendid program.

PAPERS AND DISCUSSIONS

"PROFESSIONAL CONSCIOUSNESS"

By Carl L. Svensen*

The development of a professional consciousness by engineers since the general enactment of registration laws owes much to the National Society of Professional Engineers which has provided the means for a unified profession—a means which can be used by engineers in all the varied fields of practice—a means which does not conflict with the objectives of the great founder societies or of those devoted to advancement in the special fields of engineering. The NSPE provides the means of concentrating the bright light of true information on professional engineering as a entity and on its place in modern society, NSPE provides a means of representing all engineers at times and places where the full power and importance of professional engineering are required in the interest of both the profession and the public.

The Supreme Court's definition of a profession which is often quoted and which will stand repetition is:

"A vocation involving relations to the affairs of others of such a nature as to require for its proper conduct an equipment of learning or skill, or both, and to warrant the community in making restrictions in respect to its exercise."

It is in this way that the welfare of the public becomes a factor in the practice of engineering and makes it necessary to set up minimum qualifications as to the competence of all who practice professional engineering in any of its relations to the public.

Until engineering registration becomes universal for *all* professional engineers, they cannot be readily identifiable as a single group as lawyers and physicians are of their respective professions. Professional engineering is so complex and of such a highly technical character that the general public and the non-engineering administrator cannot be sufficiently informed to determine the quali-

* Presented at the Annual Meeting of the Louisiana Engineering Society, January 9, 1948 by Carl L. Svensen, Secretary-Director of the Texas State Board of Registration for Professional Engineers. Dr. Svensen graduated from Tufts College in 1907 with the degree of B. S. in Mechanical Engineering, and obtained the professional degree of Mechanical Engineer in 1921. In 1942 he received the honorary degree of Doctor of Laws from Saint Edwards University.

His experience includes work at the Warren Steam Pump Company, American Steel and Wire Company, General Electric Company, etc. Engineering teaching at Tufts College, Ohio State University and Texas Technological College, also private practice. He is the author of numerous engineering textbooks.

He was appointed on the original Board of Registration in 1937, reappointed in 1939 and again in 1945. He has served as vice-chairman (1937-1938), chairman (1938-1939), and as secretary-director since his election to that position in 1942. Dr. Svensen is a past president of the National Council of State Boards of Engineering Examiners.

Member of Engineering and Scientific societies including the American Society of Mechanical Engineers, National Society of Professional Engineers, American Society of Military Engineers, Fellow of the Texas Academy of Science, Sigma Xi, Tau Beta Pi, etc.

fications required for the proper design and supervision of present day engineering projects.

The true professionally conscious engineer occupies the position of a protector who guards the interests of his client and the public. This is the purpose and meaning of an all—inclusive engineering registration act—it identifies the members of a professionally conscious group and places upon them the responsibility which comes from a legal status.

But it may be said that the qualifications of certain engineers are known because they have practiced engineering successfully and that their work has stood the test of use. Certainly this is true and such engineers would be registered under an *all inclusive* engineering registration act. They would be given that recognition which is rightly theirs and which labels them as members of a legalized profession just as doctors are identified for the protection of the public.

Society has a large investment in universities, public health agencies, highway projects, utilities, and public engineering boards, commissions, etc. The public has a right to expect that there will be effective social use of these investments—that there will be a means to insure safety and to insure protection against wasteful financial outlay. This of course points to registration of *all* engineers and the development of a high degree of professional consciousness.

All states now have some kind of an engineering registration act. To be sure some of them are not as inclusive as others but the trend is toward strengthening the laws as the value of the protection which they afford the public is realized.

The Model Law, with which I am sure you are familiar is for *Professional Engineers* and not for separate branches of engineering. This points the way to a unified profession rather than the licensing of specialized practitioners.

The Model Law is approved and recommended by the National Council of State Boards of Engineering Examiners (of which all states and professions are members) as well as the A.S.C.E. the A.S.M.E., the A.I.E.E. and many other engineering groups. It provides a means for working toward greater uniformity of standards in all states as a majority of the state laws are based on this Model Law.

It appears that Louisiana and Montana are the two states which register Civil Engineers only. Since the Louisiana Act is next to the oldest registration law it would seem that sufficient time has elapsed to consider its provisions and make desirable amendments in keeping with changes in other states. California, Washington and Kansas have recently changed their registration laws to cover all branches. Illinois, until a few years ago, registered structural engineers only, but now has a professional engineering registration

Act. Ohio and Pennsylvania acts have been amended and strengthened within the last few years. And so as the value of the protection afforded the public by the registration of all professional engineers is realized and understood progress has taken place toward improving the laws and toward greater uniformity in the laws of the different states. And in contrast with this progress we find that no registration act has been removed from the Statutes. All progress has been in the opposite direction—that of greater protection from the unqualified and toward closer cooperation with other states. At the twenty-sixth annual meeting of the National Council of State Boards of Engineering Examiners in New York last October, forty-five of the forty-eight states were officially represented, and executive officers of twenty-two national engineering societies were present.

The desirability of Engineering registration is no longer a question. It is necessary protection and involves the responsibility for the future on those who plan today.

The requirement of the registration of all professional engineers identifies them and relieves the employer, public or private, of uncertainty.

With registration a necessary requirement for the practice of *all kinds* of professional engineering rapidly approaching near uniformity over the entire country, the responsibility for the protection of the public becomes a matter of vital importance in the few localities which are open for anyone to call himself an engineer to practice in branches of engineering not covered by registration laws. Not only is there no protection under such a condition but further the unqualified will be attracted to such localities. The best engineers will, of course, be where registration laws identify them. Who can tell about an engineer practicing a branch of engineering without the identification of a legal status? Who could tell about a doctor if he were not identified and given a legal status?

City and state departments, engineering and industrial companies are increasingly and rapidly coming to require the certification of registration as a condition of employment. The seal of a registered engineer on plans and specifications places the responsibility where it belongs just as the signature does on a prescription.

Sometimes the elements of cost enters into consideration—the thought that engineering services may cost more. We get what we pay for and cheap engineering is expensive at any price. The expense of poor engineering work will offset many times the salary or fee paid for such work. Often this expense shows up some time after the work is done. Repairs and replacement or maintenance are engineering matters which affect the total cost. The overall picture must be a part of every sound consideration of a pro-

ject. The qualified registered engineer can save more than the cost of the engineering services on bridges, buildings, electrical installations, public and private works of all kinds.

It takes twice as long to plan as it does to construct. Careful planning can cut the cost in two.

From the first engineering registration act passed in Wyoming in 1907 until the present day, constant progress has been made in understanding and appreciation of the value of engineering registration. Need for the law and knowledge of its meaning by the general public are the two things necessary for the effective operation of the law and for the full advantages to be obtained. You gentlemen can understand these things and can bring about a public consciousness of them as well as the professional consciousness of a unified engineering profession. The general public is often slow to realize the need for the protection afforded by the registration of all professional engineers. This is natural for they cannot be expected to know or to keep up with new materials, new methods, new equipment, and new designs, for economy of materials and money and for efficiency and above all for safety. These are matters of information which must come from those who have the responsibility for safe, efficient, and economic engineering work—all engineers. When the public comes to understand the seriousness and danger of improper engineering, planning, design and supervision, they will expect work to be done by qualified licensed professional engineers. People no longer would consider the Kick-a-Poo Indian "doctor", of days gone by, with his Sagwa medicine, "good for man or beast" as a reliable practitioner. They expect the legal identification of the doctor who treats their ills. So in the future they will expect the legal identification of the professional engineer.

The public and the public official are both protected when registered professional engineers are employed for all engineering work.

The Model Law is a developed and proven basis for an Act to provide for the registration of all who practice professional engineering.

The edition of 1946 has been approved and endorsed by the societies representing the Civil, Mechanical, Electrical, Mining and Metallurgical, Heating and Ventilating, Illuminating, Chemical, Marine and Consulting Engineers as well as by the National Council of State Boards of Engineering Examiners, the American Society for Engineering Education and the National Society of Professional Engineers.

Thus the Model Law is the answer to Engineering Registration from the assembled wisdom and experience of the professionally conscious engineers from all branches of engineering. It is the basis for an ultimate uniformity of laws so far as that is possible and for the maximum safeguarding of life, health and property.

ENGINEERING BRIEFS

Aircraft Window Ice Removal. Ice or frost on an automobile windshild of an airplane it is a hazard that canot be tolerated. The problem is a major one. An airplane window may, under the conditions of rapidly varying temperatures and altitude, ice over in a few seconds. Many schemes have been tried, such as passing hot air between layers of glass comprising the window, passing current through imbedded resistance wires, or infrared heating. None has been an unqualified success.

A novel one is being tried extensively with early indications of being a satisfactory answer. It consists of passing current through a transparent conducting film on the window "sandwich." This is now being applied on a commercial scale to several large military and public-transport planes.

The pilot's windows normally consist of a shock-resisting layer of vinyl from 1/16 to 1/4 inch thick between two layers of tempered glass. The electrical conductor, microscopically thin, is placed between the layers of laminated glass. Strips of silver along two opposite edges comprise the busbars. Temperature-sensitive elements of metallic oxide or of special resistance wire are embedded at appropriate spots and are connected in a bridge circuit to control the voltage applied to the busbars. A potential of about 400 volts is applied across the busbars on an on-and-off basis, the time ratio being determined by the temperature-sensitive elements. It is essential that the window temperature be held between fairly close limits as the impact resistance—a protective measure against birds, for example—falls off sharply if the temperature of the shatter-proof layer is not between 70 and 130 degrees F.

Because the high voltage required is considerably above practical aircraft generator voltages, alternating current, which permits use of transformers, is used. The power plants for one class of airplane being built consist of a pair of 11-kva, three-phase, engine-driven alternators. One generator is normally ample to supply all the power required for window heating, the second ordinarily used for cooking, coffee warming, etc. In emergencies the second generator can replace or assist the first generator as the situation requires.

* * *

Indicative of man's desire always to set new records, to press beyond existing ceilings is the announcement that this year will see the erection of the tallest man-made structure. The aerial tower for radio station KRNT, Des Moines, Iowa, will be 1530 feet high. This makes it 280 feet taller than the present highest structure, the Empire State Building and nearly three times the elevation of

Washington Monument. It will permit good coverage in a 120-mile radius of the 50-kw Westinghouse FM transmitter and later serve also television and facsimile transmitters. Pairs of 500-watt flashing beacons at five levels will warn aircraft of its presence. No special lightning protection will be required. The tower itself is a gigantic lightning rod for the many strokes it will intercept yearly. Rest stations for maintenance men climbing the tower are spaced at approximately 100-foot intervals.—*From Westinghouse "Engineer."*

Department Store Has Special Foundations. Recently completed at Fort Lauderdale, Fla., is a new Burdine's department store with the foundations of a special design dictated by local conditions. At the site the water table is only 2 ft. below the surface and studies showed the rock foundation material, which appears almost at the surface, to be very porous. Since it was uncertain how successful piles would be, special foundations consisting of a grid of heavily reinforced beams the largest 12 ft. wide and 9 ft. deep were used.

The structure provides 125,000 sq. ft. of floor space and it was made three stories high with the design allowing for addition of three additional stories if this latter proves desirable. Spacing of the steel columns on all floors is 24 x 38 ft. Floor construction called for the use of ribbed steel sub-flooring that simplified installation of telephone and lighting facilities.

The two sides of the structure seen from the street are almost entirely windowless and the walls consist of terra cotta faced with limestone and granite. The rear walls are stucco over terra cotta. Delivery of materials was expedited by use of lift forks for handling supplies.

Because no basement was used, in view of the high water table, the machinery for airconditioning the entire structure was placed on the roof in a small penthouse. The equipment has a capacity of 5,000 tons per day.

Caldwell-Scott Construction Co. of New York and Florida was the general contractor, and Abbott & Merkt Co., New York, architects and engineers.—*Engineering News-Record.*

For Long Life. A tiny new dry cell, with amalgamated zinc and mercuric oxide electrodes, is now available for many special applications. For a given capacity, under normal or heavy conditions of use, the new mercury cell is only half as heavy, and less than half as big as the conventional zinc-carbon flashlight cell, heretofore the only small dry cell generally available. Depending on the conditions of use, the advantages of the mercury cell may be even greater. With the price twice that of the conventional cell, the operating cost per hour for many applications is about the same. Furthermore, long life is considered an important convenience, regardless of cost. It is also claimed that the mercury cell can be stored longer at high temperatures without deterioration than the

older type. The armed forces made extensive use of the new cell, which is now being widely used for hearing aids and will soon be used in portable radios and other small devices. Since the new cell may be operated at elevated temperatures, it is expected to be used widely in equipment for geophysical prospecting for petroleum. Because of its smaller size, it cannot easily be used in equipment designed for zinc-carbon cells. Use for flashlights in general is not anticipated.

At a recent meeting of the Electrochemical Society, Samuel Ruben, inventor of the cell, disclosed its details, and engineers of the P. R. Mallory Company discussed it manufacture and uses. The mercury cell is entirely enclosed in a cylindrical steel container, which may be from three-fifths to one and one-quarter inches in diameter and one half or five-eights inch long. Although part of the electric circuit, the container does not otherwise enter into the cell reaction. Some conventional cells also have steel cases, but usually the case is metallic zinc, which is physically weaker than steel and is expended during the cell discharge, with consequent further weakening. The new cell, on the other hand, is physically strong and is well suited for use in instruments where an accurate fit is required.

The voltage of the zinc-carbon cell drops off with use, as is shown by the dimming of a flashlight bulb. When the output, initially 1.5 volts, has dropped to 0.9 volt, the cell is discarded. The mercury cell, however, with light loads maintains a constant output of about 1.3 volts until exhausted. As a result, the necessity for frequent volume adjustments for a hearing aid or intercommunication system is obviated. A sudden drop in voltage may be a disadvantage, however, since the device may go out of use without warning. With a heavier load, the voltage varies from 1.3 to 1 volt, depending on the application. The mercury cell's life can be closely estimated in terms of hours of use for any specific drain.

In spite of the advantages of the mercury cell in some applications, the zinc-carbon cell is not expected to become obsolete. Mercury is an expensive and scarce element; the necessity for conserving the world's mercury reserves will prevent widespread use where other materials are satisfactory. Undoubtedly research to improve the older cell will be accelerated. For example, synthetically prepared manganese dioxide is superior to the natural substance used in the zinc-carbon cell; recent improvements in its preparation will make more general use possible.

Another new cell, with magnesium and carbon electrodes, is now produced in England. It is reported to maintain a 1.0 volt output for extended periods under a relatively heavy drain, and is said to be rechargeable. Although the English development has not yet been adapted for use in small portable instruments such as the

hearing aid, tests are being conducted on its application where small cells are required.—*Industrial Bulletin of Arthur L. Little, Inc,*

PERSONALS

Prof. Donald Derickson Awarded Honorary Membership. At the annual meeting held on January 8, 1948, the Society conferred upon Prof. Donald Derickson an honorary membership, in recognition of his outstanding ability in Engineering Education, his proficiency as a Civil Engineer and his long record of loyal service to the Louisiana Engineering Society.

Prof. Derickson was appointed as Head of the School of Civil Engineering of Tulane University in 1912 and was retired as Professor Emeritus in 1945. He is a past president of the Louisiana Engineering Society, Louisiana Section of the American Society of Civil Engineers and he is now president of the Louisiana State Board of Engineering Examiners. He has been a member of the latter organization since 1916.

Prof. Derickson was chairman of the Engineering Committee that assisted in the development of the building code of the City of New Orleans. He is a member of the Technical Advisory Board and the Committee on Structural Research of the American Institute of Steel Construction. He participated in the Alaskan boundary survey and has acted as Consulting Engineer on many engineering constructions in the South.

The American Society of Mechanical Engineers will hold its National Spring Meeting March 1-4, 1948. Headquarters are at the St. Charles Hotel. An interesting program of technical papers, plant trips, and entertainment is planned.

1948

MEMBERSHIP LIST

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

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EUGENE F. TIMS, (J), (1948), *Electrical Engineer,* Instructor, Louisiana State University. *Mail*: 3391 Lakeshore Drive, Baton Rouge 15.

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

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

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

JAMES D. TUFTS, (1948), *Mechanical Engineer,* Asst. Supt., Pan-American Petroleum Corp. Box 97, Destrehan, La.

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

GEORGE H. TUNNER, (1940), *Safety Engineer,* Resident Engineer, The Travelers Companies, 227 E. Maple Ridge Drive. *Mail*: 417 Richards Bldg., N. O. 12.

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

—V—

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

WALTER J. VERLANDER, (J), (1942), *Mechanical Engineer*. *Mail*: 1140 Louisiana Ave., New Orleans 15.

WALTER P. VILLERE, (1946), *Civil Engineer*, Partner, Walter P. Villere. *Mail*: 725 Ursuline St., New Orleans 16.

LUCIEN T. VIVIEN, JR., (1930), *Mechanical & Electrical Engineer*, Heating & Sales Engr., Southern Heater Co. Home: 3129 Derby Place. *Mail*: 844 Baronne St., New Orleans 13.

CHRISTIAN M. VOELKEL, JR., (J), *Mechanical Engineer*, 2762 Wisteria St., New Orleans 17, La.

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

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

—W—

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

BATTAILLE HARRISON WADE, (1942), *Civil Engineer*, Dist. Construction Engr., La. Dept. Hwys., Lake Charles. *Mail*: Box 307, Jennings, La.

RICHARD E. WAGNER, (1933), *Civil Engineer*, Construction & Mtce. Engr., U. S. War Dept. N. O. P. E., 4400 Dauphine St. *Mail*: 4201 Elba St., New Orleans 15.

FRANK H. WALK, (1947), *Mechanical Engineer*, Dunham-Wilson Mfg. Co., P. O. Box 1487. *Mail*: 2225 Wisteria St., Baton Rouge 11.

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

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

JOHN E. WALLACE, (1948), Field Engineer, Gaylord Container Corp. *Mail*: 817 Avenue B, Bogalusa, La.

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

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

CHARLES P. WALTERS, (1947), *Power Plant Engineer*, Station Engr., Gulf States Utilities Co. *Mail*: 4223 Broussard St., Baton Rouge, 12, La.

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

RICHARD R. L. WARD, (1947), Office Engineer, Cit-con Oil Corp., 1516 Eastern Air Lines Bldg., 10 Rockefeller Plaza. *Mail*: P. O. Box 843, Grand Central Annex, New York, N. Y.

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

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

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

CHARLES H. WEATHERLY, (J), (1945), *Mechanical Engineer*, Test Engineer, General Electric Company, River Works, Lynn, Mass. *Mail*: 35 Baltimore St., Lynn, Mass. Home: 1424 Gen. Pershing St., New Orleans 15, La.

JOHN H. F. WEBERT, (1928), *Structural Engineer*, Chief Draftsman, Jones & Laughlin Steel Corp., P. O. Box 66. *Mail*: 4115 Clermont Drive, New Orleans 17.

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

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

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

WILLIAM WENNER, (1947), *Civil Engineer*, Cities Service Refining Corp. *Mail*: 1325 12th St., Lake Chrales, La.

WILLIAM WHIPPLE, (1936), *Mechanical Engineer*, Professor of Steam Engineering, Louisiana State University. 4666 Vanderbilt Drive. *Mail*: P. O. Box 8524, University Station, Baton Rouge 8.

WILL A. WHITAKER, (1945), *Mechanical Engineer*, Asst. Head, Engineering Dept. Standard Oil Co. of N. J., La. Div. *Mail*: 1167 Main St., Baton Rouge, 8, La.

COL. J. LESTER WHITE, (1937), *Civil Engineer*, Asst. to Mgr. Plant and Employee Services, The Ethyl Corp. Home: 1041 Camelia Ave. *Mail*: Box 341, Baton Rouge, La.

ANDREW P. WHITMAN, JR., (J), (1945), *Civil Engineer*, Instructor, College of Engineering, Tulane U., 5243 Constance St., New Orleans 15.

CARL B. WHYTE, (1946), *Civil, Electrical and Mechanical Engineer*, Chief Construction Engineer, Universal Oil Products Co., 310 S. Michigan. Home: 5539 Blackstone. *Mail*: P. O. Box 423, Chicago 90, Ill.

CHARLES Q. WIGGINS, JR., (1946), *Mechanical and Electrical Engineer*, Asst. Electrical Engineer, Godat & Heft, Terminal Station Bldg. *Mail*: 2915 Elysian Fields Ave., New Orleans 17.

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

EDWIN R. WILKINSON, (1947), *Electrical Engineer*, Head Mech. Engr. Dept., Standard Oil Co. of N. J. (La. Div.) *Mail*: 306 Richland Ave., Baton Rouge, La.

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

GERALD C. WILLIAMS, (1940), *Mechanical Engineer*, Zone Engineer, Standard Oil Co. of N. J., La. Div. Home: 1882 Cedardale Ave. *Mail*: c/o Standard Oil North Baton Rouge, La.

R. L. WILLIAMS, (1947), *Mechanical Engineer*, Freeport Sulphur Co., Port Sulphur, La.

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

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

W. HORACE WILLIAMS, Jr., (1943), *Civil Engineer*, Member of Firm, W. Horace Williams Company, 833 Howard Ave. *Mail*: 2611 Octavia St., New Orleans 15.

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

GEORGE FREEMAN WILLIAMSON, (1939), *Civil Engineer*, Asst. Chief., Avondale Marine Ways, Inc., Westwego, La. Home: 7830 Burthe St., New Orleans 18.

VICTOR L. WILLOZ, (L. M.), (Jan. 1, 1900), *Electrical Engineer*, N. O. Public Service Inc., 317 Baronne St. *Mail*: 4439 S. Miro St., New Orleans 15.

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

TROY L. WILSON, Jr., (J), *Civil Engineer*, Standard Oil Co. of N. J. (La. Div.) *Mail*: 464 Riveilon Street, Baton Rouge, La.

A. R. WINGATE, JR., (1925), *Civil Engineer*, Manager Fabricating Sales Dept. Jones & Laughlin Steel Corp., P. O. Box 66. *Mail*: 1624 Napoleon Ave., New Orleans 15.

WILLIAM A. WINTZ, JR., (1942), *Civil Engineer*, Asst. Prof. of Civil Engineering, Louisiana State University. Home: 3029 Highland Road. *Mail*: College of Eng., L.S.U., Baton Rouge, 3.

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

BURRIS D. WOOD, (1947), *Civil Engineering Aide*, La. Dept. of Public Works. *Mail*: 523 Park Blvd., Baton Rouge, La.

CARROLL L. WOOD, JR., (1946), *Civil Engineer*, Perrilliat-Rickey Construction Co. *Mail*: 4510 S. Prieur St., New Orleans 15.

EDWIN R. WOODMAN, (1947), *Highway Engineer*, District Construction Engineer, La. Dept. of Highways. Home: 1418 Glen Oak. *Mail*: P. O. Box 38, Shreveport, La.

A. ALFRED WOODS, (L. M.), (1914), *Civil Engineer*, Retired, 1923 State Street, New Orleans 15.

DURALD F. WOODS, (1922), *Civil Engineer*, Lutcher, La.

JOHN KING WOOLF, (1943), *Civil Engineer*, Member of firm, W. Horace Williams Co. Home: 298 Walnut St. *Mail*: 833 Howard Ave., New Orleans 13.

HUGH WORLEY, JR., (1945), *Civil Engineer*, Engineer & General Supt., Barber Bros. Co. *Mail*: Box 2229, Baton Rouge, La.

CHARLES J. WYLER, (1919), *Mechanical Engineer*, Assistant Chief Engineer, A. M. Lockett & Co., Ltd., 308 Whitney Bldg. *Mail*: 530 Jackson Ave., New Orleans 13.

JOHN D. WYMAN, (1947), Chief Inspector, Cities Service Refining Corp., Lake Charles. *Mail*: 1820 Seventh St., Lake Charles, La.

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WADE H. YAWN, Jr., (1947), *Civil Engineer*, Project Engineer, La. Dept. of Highways. Home: 402 8th St. *Mail*: Box 446, DeRidder, La.

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

W. C. YOUNGS, (1947), *Civil Engineer*, Asst. Dist. Engr., La. Dept. of Highways. *Mail*: 198 Watkins St., Lake Charles, La.

—Z—

MARIO G. ZERVIGON, (1943), *Electrical Engineer*, Associate Professor of Electrical Engineering, Tulane University. Home: 732 Third Street, Metairie. *Mail*: College of Engineering, Tulane University, New Orleans 15.

ANTHONY MICHAEL ZIBILICH, (1941), Capt., U. S. C. G., Retired. 5646 Canal Blvd., New Orleans 19.

ROBERT W. ZIIFLE, (1937), Engineer, Supt. of Equipment, New Orleans Public Service, Inc., 2838 Iberville St., New Orleans. *Mail*: 715 Pelican Ave., New Orleans 14, La.

T. H. ZUMWALT, (1944), *Civil Engineer*, Asst. to Chief Engr., Freeport Sulphur Co., Port Sulphur, La.

Student Members

FARRELL W. ADAMS, Box 8982, Louisiana State University, Baton Rouge 3, La.

JOHN J. FINEGAN, JR., 8410 Panola Street, New Orleans 18, La.

GEORGE T. HOBGOOD, Theta Xi House, University Station, Baton Rouge 3, La.

JOHN M. MORRISON, Louisiana State University, Baton Rouge 3, La.

ROBERT L. PONS, 2526 Chartres Street, New Orleans 16, La.

WESLEY B. ROOT, JR., 2520 Fairfield Avenue, Baton Rouge, La.

JOHN H. SCHLUTER, Box 6333, Louisiana State University, Baton Rouge 3, La.

FREDERICK W. WEISSBORN, JR., 211 Bellaire Drive, New Orleans 18, La.

Summary

SUMMARY		
Honorary Members		4
Charter Members		1
Life Members		50
Members:		
Local	295	
State	261	
Non-Resident	46	
Address unknown	8	610
Affiliate Members		29
Junior Members:		
Local	74	
State	42	
Non-Resident	14	
Unknown	8	138
Student Members		8
Total		840

Past Presidents

*Sidney F. Lewis	1898
*Thos. L. Raymond	1899
Henry J. Malochee	1900
*Frank M. Kerr	1901
*Alf. F. Theard	1902
*Alf. Raymond	1903
*J. F. Coleman	1904
W. B. Wright	1905
*W. H. Hoffman	1906
*G. W. LAWES	1907
*C. W. Wood	1908
*J. T. Eastwood	1909
*W. B. Gregory	1910
*J. C. Haugh	1911
D. S. Anderson	1912
*A. M. Shaw	1913
W. H. Williams	1914
*L. C. Datz	1915
*Samuel M. Young	1916
A. T. Dusenbury	1917
John Klorer	1918
Ole K. Olsen	1919
John Riess	1920
R. S. Manley	1921
Donald Derickson	1922
*J. S. Bareli	1923
James M. Robert	1924
Marcel Garsaud	1925
Farrar P. Hamilton	1926
*Edward S. Lanphier	1927
John L. Porter	1928
Frederick H. Fox	1929
James M. Todd	1930
*Frank G. Frost	1931
Frederick N. Billingsley	1932
John H. O'Neill	1933
A. L. Dunlap	1934
Edward S. Bres	1935
Allen S. Hackett	1936
C. S. Williamson	1937
Bernard H. Grehan	1938
David W. Godat	1939
William H. Rhodes	1940
David W. Stewart	1941
C. Glenn Cappel	1942
Karl P. Kammer	1943
Charles M. Kerr	1944
Reinhard A. Steinmayer	1945
Leo Jos. Lassalle	1946
Clayton L. Nairne	1947

* Deceased.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting Baton Rougo Section Louisiana Engineering Society

Date: June 7, 1947; Place: Harry Cloud's Camp; Officers Present: Mr. E. E. Peak, president; Mr. W. P. Wallace, 2nd vice-president; Mr. James J. Saurage, 1st vice-president, and Mr. A. J. Mary, sec'y. and treasurer.

This was a joint meeting held in conjunction with the Parent organization of the Louisiana Engineering Society. The business session and dinner was preceded by a full afternoon activity which included a tour of the Kaiser Alumina Plant in North Baton Rouge, golf at the L.S.U. Golf Club and horseshoe pitching at Harry Cloud's Camp.

The business session and supper started at 7:30 p. m. A delicious chicken dinner was enjoyed by all attending this meeting. There were 52 members and seven guests present. Prof. Peak called for the readings of the minutes. It was moved and seconded that the reading of the minutes be dispensed with.

Mr. Hugh H. Bowers of the Freeport Sulphur Company presented a new color motion picture entitled "Yellow Magic" telling the story of sulphur and recreating early Louisiana history. The high spot of the film was the scene of the first production of American sulphur here in Louisiana. This event took place in Calcasieu Parish in 1894 and signaled the scene of a new invention by Dr. Herman Frasch after years of failure by other promoters using ordinary mining methods.

After the showing of this film, which was followed by a short talk, the meeting adjourned.

AUSTIN J. MARY,
Baton Rouge Section, L.E.S.

Minutes of Meeting of the Baton Rouge Section

Date: August 26, 1947; Place, YJBO Auditorium; Officers Present: Mr. E. E. Peak, president; Mr. W. P. Wallace, 2nd vice-president; Mr. A. J. Mary, sec'y.-treasurer.

The meeting was called to order at 7:30 p. m. by President Peak, with approximately 20 guests and members present. The reading of the minutes of the preceding meeting was dispensed with. Mr. Lehmann reported that the State Licensing Law had been revised and was in the process of being prepared for distribution to the membership.

Mr. Peak called for reports of commitees. Mr. Hough, publicity committee chairman and Dr. Wallace, technical papers committee chairman, were present but had nothing to report.

Mr. Peak remarked that the small attendance was probably due to vacation periods and the fact that the University was closed.

There being no further business the meeting was turned over to Dr. W. P. Wallace who introduced Mr. W. D. Stroud of the Okonite Cable Company. The talk that followed was concerned mainly with a description of the different types of insulation used on present day electrical cables and the reasons for using the large variety of insulation materials. A lively discussion period followed. Mr. Stroud had on display a large group of cable samples which were used to demonstrate his talk.

The meeting then adjourned and refreshments were enjoyed by all present.

AUSTIN J. MARY,
Secretary-Treasurer,
Baton Rouge Section, L.E.S.

Date: November 6, 1947; Time: 7:30 p. m.; Place: Highway Testing Laboratory; Officers Present: James Saurage, 1st vice-president; W. P. Wallace, 2nd vice-president; A. P. Mary, sec'y.-treasurer.

Vice President Saurage opened the meeting with approximately 35 members and guests present. He explained that President Peak would not be present as he was out of town on business.

The reading of the minutes of the preceding regular meeting was dispensed with. Mr. Saurage called for the introduction of any guests that were present.

Mr. Lehmann and Mr. Saurage made a few remarks about the new Lake Charles Section of the society stating that they were off to a good start with 33 members. Dr. Wallace, chairman of the Technical Papers Committee, remarked that a speaker was needed for the December meeting. He asked for suggestions from the members.

Mr. Wintz, chairman of the Membership Committee, asked that each member urge at least one engineer to join the society in order to increase our membership. Mr. Saurage remarked that President Nairne set as one of his aims the pressing of passage of a general licensing law. President Nairne

appointed an Engineer's Council (14) from which a working committee was selected to draft such a bill. The Executive Committee met October 20th to clear up any bugs and the bill is presently being drafted and copies will be sent to all industrial areas if not to the individual members.

A nominating committee composed of Professor Pillet, Mr. Lehmann and Mr. J. T. O'Brien was appointed for selecting officers for the year of 1948. They are to be notified by letter. Mr. Lehmann suggested that after the meeting he would conduct a tour of the Testing Laboratory.

Following the business session, two excellent films on the subject of Electric Arc Welding were shown. These films were entitled "The Magic Wand of Industry," and "Controlled Shrinkage in Arc Welding," and were supplied by the Lincoln Welding Co.

There being no further business the meeting adjourned, and refreshments were served.

AUSTIN J. MARY,
Secretary-Treasurer,
Baton Rouge Section, L.E.S.

Executive Committee

Date: November 11, 1947; Time: 7:30 p. m.; Place: James Steak House; Officers Present: T. E. Peak, President; J. J. Saurage, 1st Vice-President; W. P. Wallace, 2nd Vice-President; A. J. Mary, Secretary and Treasurer; F. G. Hornsby, Leo Hough, J. T. O'Brien.

Mr. Peak called the meeting to order. It was decided that the tentative date for the December dinner meeting would be between December 15th and 20th. The exact date would depend on availability of a speaker.

Inasmuch as several new members failed to receive cards announcing the November meeting it was decided to request list of all new members from Mr. Fernandez.

The possible speakers for the December meeting were discussed. It was indicated that Mr. Skinner of the American Bitumuls Company and Mr. T. E. Landry of Standard Oil Company were two that Dr. Wallace could contact.

As soon as the date was decided on Mr. Mary would write Mr. Fernandez informing him of the plans.

There being no further business the meeting was closed and an excellent steak was enjoyed by all present.

AUSTIN J. MARY,
Secretary-Treasurer,
Baton Rouge Section, L.E.S.

Minutes of Ninth Annual Meeting, Baton Rouge Section of Louisiana Engineering Society

Date December 16, 1947. Time: 7:30 p. m. Place: Venetian Roof of L.S.U. Cafeteria. Officers present: T. E. Peak, President; J. J. Saurage, 1st Vice-President; W. P. Wallace, 2nd Vice-President; and A. J. Mary, Secretary-Treasurer.

There were sixty-six (66) members and guests present. An excellent supper was served at 7:30 p. m. after which President Peak opened the business meeting.

President Peak made a short talk thanking the members and officers for their cooperation during his term of office. He mentioned that none of the New Orleans group was present. Their absence was explained because of the unusual amount of work necessary for preparing the proposed "Engineers Licensing" law.

An introduction of the guests followed during which Mrs. Leo Odom, president of the Women's Auxiliary, was presented.

President Peak called for and received reports from the chairmen of the several committees as follows: Dr. W. P. Wallace, Technical Papers Committee; Mr. W. A. Wintz, Jr., Membership Committee; Mr. F. G. Hornsby, Entertainment and Arrangements Committee; Mr. Leo Huff, Chairman of the Publicity Committee was absent.

President Peak then called for the reading of the minutes of the last meeting. It was moved and seconded that the reading of the minutes be dispensed with. The report of the Treasurer was then called for and it was learned that the expenditures for the year amounted to $634.91. The receipts for the year were $594.50. The balance as of December 1, 1946 was $168.44, leaving a balance as of December 1, 1947 of $128.03.

Mr. Wintz, chairman of the Membership Committee, reported that as of December 1, 1946 the Baton Rouge Section had one hundred and twenty-two (122) members. This number has increased to one hundred and seventy-three (173) members as of December 1, 1947. Of this number, twenty-two (22) are either Junior members or affiliated members.

President Peak called for a report of the Nominating Committee. Mr. O'Brien then reported that the Nominating Committee, composed of Mr. H.

L. Lehmann, Mr. F. F. Pillet, and himself, submitted the following nominations: James J. Saurage, President; W. P. Wallace, 1st Vice-President; A. J. Mary, 2nd Vice-President; and Fred A. Hannaman, Jr., Secretary-Treasurer.

President Peak then called for nominations from the floor. There were none. Those named by the Nominating Committee were then elected by acclamation.

Mr. Lehmann then announced that the Section wished to present the retiring president with a gift as a token of appreciation for his work during the past year. President Peak thanked Mr. Lehmann and the entire section for the gift and as no other business presented itself, he turned the meeting over to Dr. Wallace, who introduced the speaker for the evening, namely; Mr. E. T. Landry of the Standard Oil Company, who gave a very interesting talk entitled "Old Louisiana Homes." The talk was followed by a brief question and answer period after which the meeting adjourned.

AUSTIN J. MARY, Secretary-Treasurer
Baton Rouge Section, L. E. S.

Minutes of Meeting of the Board of Direction, October 13, 1947

The meeting was called to order by President Nairne, with Messrs, Cucullu, Mire, Newton and Fernandez present. Minutes of the preceding meeting were accepted as amended.

The Secretary reported that all candidates for membership named in the September ballot had been elected. (A copy of the ballot is attached to these minutes.)

The Treasurer's quarterly report was submitted and accepted.

The Secretary briefly outlined the progress being made by the Anual Meeting committee.

The proposed license law for engineers was discussed, following which Colonel Newton moved that the president be authorized to accept the license law as drafted in principle at the next meeting of the Louisiana Council of Engineers with any minor changes which may be made in same. The motion was seconded by Mr. Mire and passed.

President Nairne announced that he had contacted all but one of the past presidents of the Society comprising the Honorary Membership Committee, and that all had replied enthusiastically in favor of making Professor Donald Derickson an honorary member.

Upon the Board's recommendation, the President appointed the following Nominating Committee for the forthcoming election of officers: Leo J. Lassalle, Chairman, F. N. Billingsley, C. G. Cappel.

The constitution and by-laws of the proposed Lake Charles section were accepted, with the understanding that the group be notified that the Parish of Vermillion was not included in their congressional district and therefore was not actually a part of their section; however, members residing in that parish could be included in the Lake Charles Section until such time as an adjoining section might be formed.

President Nairne then outlined the history of the Report of Committees on Organization of the Engineering Profession.

A letter from Mr. Rudolf Hertzberg concerning the Society's publication was discussed.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of Joint Meeting of the Louisiana Enginering Society with the New Orleans Section, American Institute of Chemical Engineers, held on Monday, November 10, 1947

The meeting was called to order by First Vice-President W. Stone Leake at 8:00 p. m. in the Jackson Room of the St. Charles Hotel. Approximately 100 members and guests were present.

Mr. Leake welcomed the American Institute of Chemical Engineers and their guests. Reading of minutes of the preceding meeting was dispensed with. It was announced that copies of the proposed Engineering License Law were available and that the secretary would gladly furnish copies to anyone interested.

Mr. Leake then read Section 3 of Article 3 of the Society's constitution concerning the nomination of officers and anounced that the Nominating Committee had been appointed, consisting of Messrs. Leo Jos. Lassalle, Chairman, F. N. Billingsley and C. G. Cappel, and that suggestions for nominations would be welcomed by the committee.

It was annuonced that on Monday, November 3, 1947 the Lake Charles Section of the Louisiana Engineering Society had been formed, with the fol-

lowing officers elected: F. Tackett Clarke, President; E. H. Goodloe, Vice-President; Ray E. Burgess, Secretary-Treasurer; Harry Smith, George H. Hill, Members of the Executive Committee.

Announcement also was made of the meeting of Louisiana Engineering Society and of the American Institute of Chemical Enginers who, after conducting the business of the section, called on Mr. Horace Thompson, Jr., who introduced the main speaker of the evening, Mr. B. DeLorenzo, Chief Engineer of the Brown Fintube Company, Elyria, Ohio, who spoke on "Applications of Fintubes in Heat Exchangers".

Following the usual question period, the chair was returned to Mr. Leake, who thanked the speaker, and the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of Meeting of the Board of Direction, December 8, 1947

The meeting was called to order by President Nairne in a private dining room at Arnaud's Restaurant. Members present were Messrs. Cucullu, Lassalle, Leake, Macdonald, Mire, Newton, and Fernandez. Messrs F. N. Billingsley and K. P. Kammer also were present by invitation. Minutes of the preceding meeting were accepted as read.

President Nairne outlined the organization meeting of the Lake Charles Section held on November 3.

A letter from Professor Donald Derickson, accepting honorary membership in the Society, was read by the secretary, and Messrs. Fox and Macdonald were appointed to compose the certificate to be presented to him at the annual meeting. A form of certificate to be presented to the Lake Charles Section was read by the Secretary and accepted.

Resignation of Messrs. James K. Gibson and J. Chris Nielsen, Jr., were accepted with regret. Messrs. Andre J. Dubus and Irwin Frankel were dropped from membership at their request.

A letter from the Engineers' Council for Professional Development concerning "Canons of Ethic for Engineers" was read, and it was decided to table the matter for action by the new board.

President Nairne related the results of the last meeting of the Louisiana Council of Engineers, and discussion followed concerning the underwriting of the costs involved in passing the Engineers' License Law. Mr. Cucullu moved that action of this subject be tabled until a special meeting could be held on the morning of January 8 at 9:30 a. m. The motion was seconded by Mr. Newton and carried. The reason for postponement of the matter is to conduct a poll of the membership and to determine the attitude of the Louisiana State Board of Engineering Examiners toward it.

Mr. H. L. Lehmann was appointed chairman of a committee of his own choice to write the obituary of the late member Warren C. Shankle. Mr. Ole K. Olsen was appointed in a similar capacity to prepare an obituary for the late William Wallace. It was announced that members of the Lake Charles Section were preparing an obituary for the late Joe A. Carruth.

The following were dropped from the membership roll: A. B. Bush Jr., John Culbertson, Richard A. Heehs, Warren E. Ibele, John W. Mullen, Jr., Thomas J. Rennie, John R. Tusson. The Secretary was instructed to write to the following members who are delinquent in dues, and if remittances are not received by the date of the annual meeting, they also will be dropped from membership: Charles Carter Brown, Wallace P. DeNux, Henry W. Gabbe, Harold C. Lee, Lawrence P. Street.

A letter from Mr. F. T. Clarke concerning an educational radio program was read.

Mr. Lassalle, Chairman of the Nominating Committee, announced the following nominations:

For President, W. Stone Leake; for First Vice-President, H. L. Lehmann; for Second Vice-President, L. J. Cucullu; for Secretary-Treasurer, John P. Fernandez; for Director for two years, F. Tackett Clarke; for Director for two years, Ernest L. Mire.

The proposed new constitution and by-laws were read and accepted by the Board with a few corrections which will be made by the committee, following which the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society held jointly with the American Society of Mechanical Engineers on December 8, 1947

The meeting was called to order by President Nairne with approximately 160 members and guests present. The president welcomed the A.S.M.E. Reading of minutes of the preceding meeting was dispensed with.

Mr. Stroud anounced that the American Institute of Electrical Engineers would hold their meeting on December 19.

President Nairne outlined the work of the Louisiana Council of Engineers

with reference to the proposed Enginers License Law. He then read Section 4 of the Society's by-laws, following which the report of the Nominating Committee was read by the Secretary:

For President, W. Stone Leake; for First Vice-President, H. L. Lehmann; for Second Vice-President, L. J. Cucullu; for Secretary-Treasurer, John P. Fernandez; for Director for two years, F. Tackett Clarke; for Director for two years, Ernest L. Mire.

Mr. Allen Betz moved that the report be accepted and the names placed on the ballot, seconded by Mr. R. F. Muller and carried. No nominations were received from the floor.

The chair then was relinquished to Mr. E. A. McLellan, Chairman of A.S.M.E., and following the business of that group Mr. Robert P. Lockett, Jr. was called upon to introduce the speaker of the evening, Dr. Jack Wilson, Physicist of Allis-Chalmers Manufacturing Company, who delivered a most interesting and educational lecture on "High Energy Atomic Particles and Their Industrial Applications". Following the usual question period, the chair was returned to President Nairne, who adjourned the meeting with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ,
Secretary-Treasurer

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

February, 1948

"PATRONIZE OUR ADVERTISERS"

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PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

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CONTENTS

The Crop Which the South Should Not Export. Each year at this time our engineering colleges are visited by representatives of industry in the east and north. They offer employment to our June graduates at excellent salaries. They take from us a product which has been paid for by the South—our professional engineers. Southern industry could absorb most of these young men if it could be awakened to the advantage and wisdom of employing the trained engineer. It is regrettable that each year this valuable product is lost to us.

The License Law. In the December issue of the "Proceedings" the proposed law was published. Numerous groups have met with the committee, and it is believed that the final draft is a good law. Write your senator and representative urging its passage. A state list is printed in this issue to assist you.

Members of the Legislature of Louisiana
1948-1952

Senators

District	Parish or Parishes	Name	Address
1st	Orleans (Wards 1-2-15)	Louis A. Mahoney	323 Pelican Ave., N. O., La.
2nd	Orleans (Ward 3)	Nicholas G. Carbajal ..	4130 Canal St., N. O. La.
3rd	Orleans (Wards 4-5)	John O'Connor	5971 Canal Blvd., N. O., La.
4th	Orleans (Wards 6-7)	Guy J. D'Antonio	2621 O'Reilly St., N. O., La.
5th	Orleans (Wards 8-9)	Frank C. Gipson	3624 Piedmont Dr., N. O., La.
6th	Orleans (Wards 10-11)	Arthur J. O'Keefe, Jr. ..	1204 St. Andrew St., N. O., La
7th	Orleans (Wards 12-13)	Sidney J. Ramond	2127 Milan St., N. O., La.
8th	Orleans Wards 14-16-17	Alexander E. Rainold ..	837 Broadway St., N. O., La.
9th	Plaquemines St. Bernard	Louis H. Folse	Arabi, La.
10th	Jefferson St. Charles St. John	Alvin T. Stumpf	Gretna, La.
11th	Ascension St. James	Clyde V. St. Amant	Gonzales, La.
12th	Assumption Lafourche Terrebonne	A. O. Rappelet	Houma, La.
13th	St. Mary Vermilion	Dudley J. LeBlanc	Abbeville, La.
14th	Allen Beauregard Calcasieu Cameron Jefferson Davis	Gilbert F. Hennigan	Fields, La.
		Guy W. Sockrider, Jr. ..	Lake Charles, La.
15th	Iberia Lafayette St. Martin	J. Maxime Roy	Lafayette, La.
		Edwin E. Willis	St. Martinville, La.
16th	Acadia St. Landry	Oscar Guidry	Church Point, La.
		Lessley P. Gardiner	Opelousas, La.
17th	Avoyelles Evangeline	Chester J. Coco	Marksville, La.

Senators

District	Parish or Parishes	Name	Address
18th	Iberville Pointe Coupee W. Baton Rouge	Louis Wilbert	Plaquemine, La.
19th	East Feliciana West Feliciana	E. M. Toler	Clinton, La.
20th	E. Baton Rouge	H. Alva Brumfield	Baton Rouge, La.
21st	Livingston St. Helena Tangipahoa	Rudolph P. Easterly	Denham Springs, La.
22nd	St. Tammany Washington	H. H. Richardson	Bogalusa, La.
23rd	Rapides	Crawford Hugh Downs .	Alexandria, La.
24th	Natchitoches Red River	Lloyd F. Wheat	Coushatta, La.
25th	Caddo DeSoto	Reimer Calhoun ..... Charles Emery Tooke, Jr	Mansfield, La. Shreveport, La.
26th	Bossier Webster	Drayton R. Boucher	Springhill, La.
27th	Bienville Claiborne	W. M. Rainach	Summerfield, La.
28th	Lincoln Morehouse Union West Carroll	C. E. Barham ..... Brooks Oliver	Ruston, La. Bastrop, La.
29th	Jackson Ouachita	John F. McCormick	West Monroe, La.
30th	Caldwell Grant LaSalle Winn	Puckett Willis	Sikes, La.
31st	Concordia East Carroll Madison Tensas	Andrew L. Sevier ..... Brenham C. Crothers ...	Tallulah, La. Ferriday, La.
32nd	Catahoula Franklin Richland	R. E. King	Winnsboro, La.
33rd	Sabine Vernon	R. L. Gay	Zwolle, La.

Representatives

Parish	Name	Address
Acadia	W. J. Cleveland	Crowley, La.
	C. E. Whipp	Rayne, La.
Allen	M. V. Hargrove	Oakdale, La.
Ascension	Velpeau M. Smith	Gonzales, La.
Assumption	Clarence J. Savoie	Belle Rose, La.
Avoyelles	Alton R. deNux	Marksville, La.
	L. O. Kelone	Marksville, La.
Beauregard	William L. Futrell	DeRidder, La.
Bienville	Lorris M. Wimberly	Arcadia, La.
Bossier	Jimmy Boyd	Bossier City, La.
Caddo	Algie D. Brown	Shreveport, La.
	Edwin F. Hunter, Jr.	Shreveport, La.
	Wellborn Jack	Shreveport, La.
	Keith M. Pyburn	Shreveport, La.
Calcasieu	Horace Lynn Jones	DeQuincy, La.
	Jesse J. Verret	Lake Charles, La.
Caldwell	John J. McKeithen	Columbia, La.
Cameron	J. H. Meaux	Cameron, La.
Catahoula	Russell J. McMillin	Jonesville, La.
Claiborne	John S. Garrett	Haynesville, La.
Concordia	Mike S. Ohlsen	Vidalia, La.
DeSoto	R. Shirley Williams	Mansfield, La.
East Baton Ruoge	Charles F. Duchein	Baton Rouge, La.
	Percy E. Roberts	Baton Rouge, La.
East Carroll	Vail M. Delony	Lake Providence, La.
East Feliciana	John S. Tomb, Jr.	Jackson, La.
Evangeline	Lee L. Fontenot	Mamou, La.
Franklin	P. C. Montgomery	Winnsboro, La.
Grant	Richard Elmer Walker	Pollock, La.
Iberia	J. Allen Daigre	New Iberia, La.
Iberville	Samuel C. Cashio	Maringouin, La.
Jackson	Nathan L. Ewing	Jonesboro, La.
Jefferson	James E. Beeson	Metairie, La.
Jefferson Davis	Marion Vallee	Welsh, La.
Lafayette	Richard J. Bertrand	Lafayette, La.
	J. Mayo Blanchet	Lafayette, La.
Lafourche	Paul R. Dufrene	Golden Meadow, La.
	Leonard J. Toups	Thibodaux, La.
LaSalle	Allen J. Fortson, Jr.	Jena, La.
Lincoln	Ragan D. Madden	Ruston, La.
Livingston	James R. Brignac	Port Vincent, La.
Madison	Henry C. Sevier	Tallulah, La.
Morehouse	K. E. McDonald	Bastrop, La.
Natchitoches	Sylvan Friedman	Natchez, La.
	Roy Sanders	Chestnut, La.
Orleans—Ward 1	Thomas A. Russell	1366 Constance St., N. O., La.
Ward 2	William Short Farrell	1329 Prytania St., N. O., La.
Ward 3	Rene A. Borey	4635 Banks St., N. O. La.
	Walter P. Clark	2824 Tulane Ave., N. O., La.

Representatives

Parish	Name	Address
Ward 4..	Geo. N. Gonzales.....	2017 Canal St., N. O. La.
Ward 5..	George J. Gulotta.....	144 Sherwood Frst. Dr., N. O. La.
Ward 6..	Omer Vilac	1117 N. Broad St., N. O. La.
Ward 7..	Max B. Blanchard.....	1219 Esplanade Ave., N. O., La.
	Joseph F. Blasi, Jr.....	2932 St. Bernard Ave., N. O. La.
Ward 8..	Ellis John Petrich.....	2524 Dreux Ave., N. O., La.
Ward 9..	Thomas L. Garvey.....	2215 Alvar St., N. O., La.
Ward 10.	George T. Corcoran.....	1760 Jackson Ave., N. O., La.
Ward 11.	James J. Finn.....	739 Fourth St., N. O., La.
	Charles P. Holderith.....	802 Sixth St., N. O., La.
Ward 12.	James L. Earhart.....	3300 S. Broad St., N. O., La.
Ward 13.	Laurance Eustis, Jr.....	1680 Robert St. N. O., La.
Ward 14.	George D. Tessier.....	1569 Calhoun St., N. O., La.
Ward 15.	Leonard L. Santos.....	808 Brooklyn Ave., N. O., La.
Ward 16.	Kenneth C. Barranger.....	7414 Maple St., N. O., La.
Ward 17.	William P. Hagerty.....	1838 S. Carrollton Ave., N. O., La.
Ouachita	John E. Coon.....	Monroe, La.
	Shady R. Wall	West Monroe, La.
Plaquemines	E. W. Gravolet, Jr.....	Davant, La.
Pointe Coupee ...	J. Thos. Jewell.....	New Roads, La.
Rapides	W. George Bowden, Jr.....	Alexandria, La.
	T. C. Brister.....	Pineville, La.
	Lawrence T. Fuglaar.....	Pineville, La.
Red River	Walter De Moss.....	Coushatta, La.
Richland	A Douglas Booth.....	Mangham, La.
Sabine	F. E. Cole.....	Many, La.
St. Bernard	J. Claude Meraux.....	Meraux, La.
St. Charles	Horace J. Dugas.....	Allemands, La.
St. Helena	Guy B. McDonald.....	Greensburg, La.
St. James	Sigur Martin	Lutcher, La.
St. John	Julius R. Fernandez.....	Wallace, La.
St. Landry	Edward Dubuisson	Opelousas, La.
	J. Howard Lafleur.....	Opelousas, La.
	Sidney Sylvester	Lawtell, La.
St. Martin	Robert Angelle	Breaux Bridge, La.
St. Mary	C. R. Brownell, Jr.....	Morgan City, La.
	E. J. Grizzaffi.....	Morgan City, La.
St. Tammany	Erwin J. Rausch.....	Abita Springs, La.
Tangipahoa	Charles Anzalone	Independence, La.
	Dewitt L. Sauls.....	Amite, La.
Tensas	J. C. Seaman.....	Waterproof, La.
Terrebonne	Morris A. Lottinger.....	Houma, La.
Union	Robert S. Kennedy.....	Downsville, La.
Vermilion	Lloyd P. Broussard.....	Abbeville, La.
Vernon	J. H. Anderson.....	Leesville, La.
Washington	B. B. Rayburn.....	Bogalusa, La.
Webster	C. W. Thompson.....	Doyline, La.
West Baton Rouge	Paul B. Landry, Jr.....	Port Allen, La.
West Carroll	Dudley Seamans	Oak Grove, La.
West Feliciana ...	W. D. Folkes.....	Jackson, La.
Winn	Marvin Wyatt	Winnfield, R.F.D., La.

The Next Regular Session of the Legislature Will Convene May 10th, 1948

New Members. Our membership grows and grows! Thanks to the fine cooperation of members and the membership committee, in this issue we are again able to welcome a number of new members.

For Member

WILLIAM WALTON BARNES, JR., Maplewood; age 29. Endorsed: R. E. Burgess, W. Wenner, S. D. Nolan. U. S. Naval Academy, B.S.E.E., 1941. Damage Control Officer, Gunnery Officer, U. S. Navy, 1944-47.

JOE M. BAKER, Sulphur, La. Age 37. Endorsed: F. T. Clarke, R. J. Kuhn, Russell Clark. Yaunt Lee Oil Co., Production and drilling, 1926-35. Stanolind Oil & Gas Co., Production and Drilling, 1935-41. Union Sulphur Co., Production Supt., 1941-date. Member South La. Geological Society, Houston Technical Club.

CHARLES R. DRAUGHON, JR., Baton Rouge; age 29. Endorsed: J. T. O'Brien, T. E. Peak, C. S. Pugsley. Louisiana State University, B.S.E.E., 1939. Petty Geophysical Engineering Co., asst. operator Seismograph Party, 1939. Standard Oil Co. of N. J., Baton Rouge Refinery, now Head Eqpt. Inspection Dept., 1939-date. Member A.S.M.E., Nat'l. Association Corrosion Engrs., American Society of Metals.

WILLIAM ROBERT EATON, Baton Rouge; age 43. Endorsed: L. M. Odom, C. K. Oakes, W. P. Wallace. Univ. of Missouri, B.S.C.E., 1928. State Highway, Effingham, Ill., Jr. Engr., 1928. The Texas Co., Tulsa, Field Engr., 1929. U. S. Geological Survey, 1929-date, now District Engineer at Baton Rouge. Member A.S.C.E.

JOHN THOMAS FOLK, Ruston; age 60. Endorsed: H. B. Batchelor, R. T. Sessums, R. S. Wynn. Clemson College, S .C., B.S.C.E., 1909. Louisiana Polytechnic Institute, Dept. Civil Eng., 1911-18, 1933-date. Member American Society of Engineering Education, National Education Association, La. Teachers' Ass'n.

CHARLES LEONIDAS GRAVES, New Orleans; age 32. Endorsed: F. C. Carey, A. L. Walker, B. M. Dornblatt. University of Louisville, Ky., B.C.E., 1938. Commissioners of Sewage, Louisville, Rodman, 1934. Modjeski & Masters, Field Engr. & Inspector, 1937-38. U. S. Geological Survey Recorder, 1938. Struck Construction Co., Timekeeper, 1938-39. Ash, Howard Needles & Tammen, Consulting Engrs., Kansas City, Asst. Res. Engr., 1938-40. Ill. Div. Hwys., Springfield, Jr. Engr., 1939-40. Modjeski& Masters, Harrisburg, Pa., Asst. Res. Engr., 1940-41. E. I. duPont de Nemours Co., Wilmington, Del., Project Planning & Scheduling Engr., 1941-46. J. Ray McDermott & Co., Inc., Gen. Contractors, Harvey, La., Civil Engr., June 1946 to date. Member A.S.C.E.

HERMAN LUTHER HENRY, JR., Ruston; age 29. Endorsed: W. E. Owen, R. T. Sessums, R. S. Wynn. Louisiana Polytechnic Inst., B.S.M.E., 1940. Illinois Institute of Technology, Student-Instructor, 1940-42, M.S. in M.E., 1946; Instructor in Technical Drawing, 1942-46. Louisiana Polytechnic Institute, Asst. Professor Mech. Eng., 1946-date. Member American Society for Engineering Education.

FRANK EARL HOGAN, Ruston; age 26. Endorsed: H. B. Batchelor, R. T. Sessums, R. S. Wynn. Louisiana Polytechnic Institute, B.S.C.E., 1942. Pittsburgh-Des Moines Steel Co., 1942-46. Louisiana Polytechnic Institute, Asst. Professor C.E., 1946-date.

MILES BREWTON HUTSON, New Orleans; age 58. Endorsed: C. B. Gamble, W. Stone Leake, L. C. Reed. Texas A & M College, B.S.E.E., 1909. Westinghouse Electric & Mfg. Co., apprentice course. Electric Appliance Co., Sales Engineer. U. S. Army Corps of Engrs., Lt., World War I. Citizens Light & Power Co., Electrical Engineer. Associate of Lyman C. Reed—Engineers Industrial Electric, Inc. Member A.I.E.E.

MILTON R. JOHNSON, JR., Ruston; age 28. Endorsed: H. B. Batchelor, W. E. Owen, R. T. Sessums. Louisiana Polytechnic Institute, B.S. in M & E, 1940. Tulane University, Student and Lab Instructor, Graduate School (E.E.) 1940-41. Gen'l Electric Co., Ft. Wayne, Ind., Design Engr., 1941-47. Louisiana Polytechnic Institute, Asst. Professor E.E., 1947-date. Associate Member A.I.E.E.

MILTON E. KIRKPATRICK, JR., New Orleans; age 26. Endorsed: Aaron Abramson, F. P. Fischer, J. Edwin Boelte. Michigan State College, B.S. M.E., 1943. Sperry Gyroscope Co., 1943-44. U.S. Naval Reserve, Aviation Electronics Technician, 1944-46. Southern Solvents & Chemicals Corp., 1946-47. Frank P. Fischer Eng. Co., present employer.

FREDERICK KRING, JR., Baton Rouge; age 43. Endorsed: J. T. O'Brien, R. J. Robertson, E. R. Wilkinson. University of Pennsylvania, B.S.M.E., 1925. Standard Oil Co. of N.J., 1926-present, now Asst. Process Supt., Baton Rouge Refinery.

GEORGE LYONS LOGAN, Lake Charles; age 26. Endorsed: R. E. Burgess, L. J. Lassalle, C. W. Stokes. Louisiana State University, B.S.M.E., 1943; B.S. Pet. Eng., Jan. 1948. U.S. Army Petroleum School graduate, 1943-46. U. S. Army Engineers, Lt. to Captain, planning and actual supervision of large scale construction and operation of petroleum tank farms, pipe lines, loading docks, etc. Six months as Field Engr., Graver Tank & Construction Co., operating in Cities Service Refinery, Lake Charles.

MICHAEL J. MARCHESE, New Orleans; age 26. Endorsed: G. H. Dudley, Rudolf Hertzberg, J. P. Fernandez. Louisiana State University, B.S.E.E., 1941. La. Power & Light Co., Student Engineer, 1941-42. N. O. District, Corps of Engrs., Jr. Engineer, 1942. U. S. Army, Airborne Radar Mtce. Offices, 1st Lt. AAF, 1942-45. N. O. District, Corps of Engineers, 1945-present.

HENRY C. MOFFITT, JR., New Orleans; age 39. Endorsed: F. M. Heroy, G. C. Rackerby, J. P. Fernandez. Miss. State College, B.S.C.E., 1931. U. S. Engineer Dist., Engineer, 1935-date.

JAMES BERNARD PETTEY, Tallulah; age 46. Endorsed: J. E. Jarman, T. W. Parish, J. E. Ross. La. Highway Commission, Inspector, Instrumentman, Res. Engr. on Highway Construction, 1921-33. C.W.A., Parish Engineer, Asst. District Engineer, 1933-35. La. Highway Commission, Resident Engineer, 1935-41. Madison Parish Police Jury, Sec.-Treas. and Engineer, 1941-42. U. S. Engr. Dept., Associate Engr., 1942-46. La. Dept. of Highways, Project Engr. charge of highway location and construction, 1946-present. Member La. Highway Engineers' Association.

EDWARD W. PHILLIPS, SR., Sulphur; age 44. Endorsed: F. T. Clarke, R. J. Kuhn, W. M. Larkin. Stone & Webster Eng. Corp., Lake Charles, Inspector of steel and concrete construction, 1 year. Shell Oil Co., Houston, Surveyor, 5 years. Union Sulphur Co., Sulphur, La., Office Engineer, 5 years.

HARRY D. RICHARDSON, Ruston; age 28. Endorsed: H. B. Batchelor, R. T. Sessums, R. S. Wynn. Louisiana Polytechnic Institute, B.S.M.E., 1941. E. I. duPont de Nemours Co., Wilmington, Del., 1941-44, Mechanical Engineer. U. S. Army Signal Corps., 1944-46. E. I. duPont de Nemours, Old Hickory, Tenn., Mech. Engr., 1946-47. La. Polytechnic Inst., Asst. Prof. M. E., 1947-date. Jr. Member A.S.M.E.

LAUREN W. SINGLETON, Ruston; age 35. Endorsed: W. E. Owen, R. T. Sessums, R. S. Wynn. The Citadel, Charleston, S.C., B.S.C.E., 1933. DuPont Technical High School, Louisville, Ky., Instructor Surveying & Mech. Drawing, 1934-41, 1946-47. C. O. 739th A.A.A. Gun B'n, 1942-46. La. Polytechnic Institute, Asst. Prof. C. E., 1947-date.

W. D. SMITH, JR., Sulphur; age 34. Endorsed: F. T. Clarke, R. J. Kuhn, R. S. Clark. Louisiana State University, B.S. Petroleum Eng., 1934. State of La., Power Tax Dept., Field Engr., 1½ yrs. Stanolind Oil & Gas Co., Houston, Field Engr., 6 yrs. Sr. Petroleum Engr., Gulf Coast Div., 4 yrs. Union Sulphur Co., Chief Petroleum Engr., 3 years. Member American Petroleum Inst., Am. Society Mining & Metallurgical Engrs., Geological Society of American Universities, Southwest La. Geological Society. Licensed Professional Engr. (Petroleum Engineering) Texas.

MILLARD P. SNYDER, Shreveport; age 29. Endorsed: A. F. Flournoy, F. H. Fox, A. M. Hill. Tulane University B.E. in C.E. 1940. United Gas Pipe Line Co., Shreveport, Asst. Engr. 1940-41. U.S. Army, 1941-45, retiring rank Capt. La. State University, 1946-47, B.S. Pet. Eng. J. Y. Snyder Interests, Shrevport, Mgr. & Part Owner, 1947-48. Licensed C.E., La. Jr. Member A.S.C.E., Am. Inst. Mining & Metallurgical Eng. Member Shreveport Geological Society.

JOHN D. TAYLOR, New Orleans; age 28. Endorsed: A. J. Harris, R. P. Lockett, Jr., H. A. Schaeffer, Jr. University of Oklahoma, B.S.M.E., 1941. General Electric Co., 1941-present; 2 yrs. Test Engr., 2½ yrs. Field Engr., 2 yrs. Sales Engr.

GEORGE B. WALTHER, JR., Lake Charles; age 33. Endorsed: L. D. McCorquodale, R. E. Burgess, E. W. Ruhnow. Louisiana State University, B.S. Agri. Eng., 1936. Enrolled in College of Electrical Engineering, 1931-34. U.S. Bureau Agri. Eng., Junior Engr., 1936-38. Mike Mitchell & Sons, Construction Engr., 1938-40. Federal Works Agency, Consrtuction Supt., 1940-42. M. W. Kellog Co., Progress Engineer, 1942-44. Cities Service Rfg. Corp., Sr. Engr., 1944-present.

ROBERT K. WELLS, New Orleans; age 48. Endorsed: A. M. Fromherz, Neville Levy, S. V. Massimini. U. S. Naval Academy, 1921. Mass. Inst. of Technology, M. S. in Naval Arch., 1924. Industrial Dept., Philadelphia Navy Yard, 1924-28. Treaty Engineer, Haiti, 1928-31. Asst. Repair Officer, U.S.S. Whitney, 1931-33. Asst. Supt. Construction, Newport News, 1933-36. Post-graduate work in metallurgy, Carnegie Tech., 1936-37. Navy Dept., trials and inspections, 1937-44. Navy Shipyard Terminal, Production Officer, 1944-46. Industrial Mgr. 8th Naval District, 1946-date. Member Am. Society for Metals, Soc. Naval Architects and Marine Engrs.

For Affiliate Member

HUNTER S. ALLEN, Baton Rouge; age 47. Endorsed: E. A. Landry, N. E. Lant, R. B. Richardson. Two yrs. in railroad engineering and 28 yrs. in construction and office, highway and municipal engineering, having served as Resident Engineer, Chief Engineering Auditor for La. Dept. Highways.

For Reinstatement to Membership

RAYMOND I. ALLEN, DeQuincy; age 43. Endorsed: E. H. Goodloe, L. D. McCorquodale, W. C. Youngs. Louisiana State University School of Engineering, 1923-25. La. Dept. Highways, 1925-41. U. S. Engineer Dept., 1941-45. La. Dept. Highways, 1946-present. With Dept. of Highways served as resident engr. on all types of roadway construction and location, draftsman and computer, and office engineer for a large construction project. With U.S.E.D. was in charge of numerous paving projects and buildings.

HARWOOD I. BROWN, New Orleans; age 30. Endorsed: M. M. Gurtler II, R. P. Lockett, Jr., A. M. Hill. Tulane University, B.E. in M. & E., 1937. Berry Motor Co., Draftsman and designer, 1937. Freeport Sulphur Co., Draftsman and Engr., 1937-41. Panama Canal Special Eng. Division, 1941-43. U. S. Army, 97th Infantry Division, 1943-46. Freeport Sulphur Co., Office Engineer, Construction Program, 1946-present. Member ASME, SAME, N.O. Geological Society.

HONORE M. HAYNE, Baton Rouge; age 55. Endorsed: B. P. Lyons, L. M. Odom, S. C. Smith. Washington & Lee University, B.S.C.E., 1914. Andian National Corp., Ltd., Cartagena, Columbia, Chief Engineer, 1928-32. Dept. Public Works, Baton Rouge, Chief of State Lands Section. Registered Prof. Engr. Texas (to 1942) Registered Engr., La. Member American Congress Surveying and Mapping.

For Transfer from Junior to Full Member

EUGENE H. FLEWELLEN, JR., Port Sulphur; age 28. Rice Institute, Houston, B.S. in Ch.E., 1940. Freeport Sulphur Co., Port Sulphur, Chemical Engineer, 1940 to date, now Asst. Supt. of Power Plant.

HERRICK J. LANE, JR., New Orleans; age 28. Tulane University School of Civil Eng., 1936-39. W. Horace Williams Co., Slidell, Timekeeper, June-Sept. 1936. U. S. Army Corps of Engrs. Construction B'n, 1942-45. W. Horace Williams Co., Engr. and Supt., 1945 to date.

HENRY LOUIS LANDRY, Baton Rouge; age 37. Southwestern La. Institute, B.S.E.E., 1939. McWilliams Dredging Co., Foreman Clearing Crew, Atchafalaya Spillway, 1 year. U. S. Geological Survey, Rodman, 1½ yrs. Gulf States Utilities Co., 8 yrs., now as Power Sales Engr.

For Junior Member

ALANSON JAMES ARNOLD, New Orleans; age 26. Endorsed: C. A. Burton, R. L. Nall, J. P. Fernandez. Tulane University, B.E. in M.E., 1945. Babcock & Wilcox, Mech. Draftsman, 1940-42. Flintkote Co., Mech. Engr., 1946-date. Member A.S.M.E., Tau Beta Pi.

VERNON M. BROWN, Lake Charles; age 25. Endorsed: F. T. Clarke, R. S. Clark, R. J. Kuhn. University of Texas, B.S.M.E., 1945. The Austin Co., Freeport, Texas, Draftsman, Nov., Dec. 1945. Southern Alkali Corp., Mech. Engr., 1946-present. Junior Member A.S.M.E.

GAUDENZ GADMER, New Orleans; age 24. Endorsed: R. L. Argus, J. M. Robert, C. S. Williamson, Jr. Tulane University, B.E. Ch. E., 1944. J. S. Abercrombie Pet. Ref., Jr. Chemist, 3 mos. U.S. Navy, Radar Technician, 2 yrs. Flintkote Co., Chemical Engr., 6 mos. Celotex Corp., Asst. Chief Chemist, 4 mos. Pan American Petroleum Corp., Petroleum Inspector, present position. Junior Member American Chemical Society.

EUGENE C. GRACE, New Orleans; age 26. Endorsed: J. M. Robert, J. K. Mayer, J. P. Fernandez. Tulane University. B.E. in M.E., 1944. M. T. Reed Const. Co., Gulfport, Miss., Mech. & Struct. Draftsman, 1942. Higgins Industries, Mech. & Struct. Draftsman, May-July, 1943. U.S.N.R., Engineering Officer, 1944-45. Wurdeman & Beckett, Architects, Los Angeles, Mech. Designer, 1945-47. A. R. Salzer Co., New Orleans. Mech. Engr., Sept. 1947-date. Tulane University, School of Eng., Instructor, Sept. 1947-date.

LINDA REX HAYS, Maplewood; age 23. Endorsed: R. E. Burgess, G. L. Smith, W. W. Wenner. Texas A & M College, B.S.M.E., 1947. Cities Service Refining Corp., General Eng. Dept., 8-1-47 to date.

JAMES M. KIDD, JR., Baton Rouge; age 25. Endorsed: E. E. Evans, W. P. Wallace, W. A. Wintz, Jr. Louisiana State University, B. E., 1942. U. S. Army, 1943-46. La. State University, Instructor, Eng. Mechanics Dept., 1946-present.

OLNEY RAY NEAL, Baton Rouge; age 26. Endorsed: J. J. Gutweiler, L. W. Harrell, A. G. Mundinger, W. W. Muse, Jr. A. G. Mundinger Eng., Rodman & Chainman, 1940. La. Dept. of Highways, Rodman & Chainman, 1941. Archer & Archer Eng. Co., Instrumentman, 1942. U.S. Army, 1942-45. La. Dept. Highways, Sr. Instrumentman, 1945-48.

GEORGE A. SCHNEIDER, JR., New Orleans; age 25. Endorsed: L. E. Broders, L. J. Lassalle, W. P. Wallace, Louisiana State University, B.S. M.E., 1947. Lone Star Cement Corp., June 1947 to date.

JOHN CARL SEEGER, JR., Ruston; age 22. Endorsed: W. E. Owen, R. T. Sessums, R. S. Wynn. Illinois Institute of Technology, B.S.C.E., 1947. Eng. Draftsman, summers 1941-1942. Chief Draftsman, U.S.N., 1943. Construction and Repair Officer, U.S.N., 1945-46. Member Am. Society for Engineering Education, La. Teachers' Association; Jr. Member A.S.C.E.

EMILE S. SHERRARD, Schenectady, N. Y.; age 25. Endorsed: T. W. Dietze, J. K. Mayer, J. P. Fernandez. Tulane University, B. E. in E.E., 1944. General Electric Co., Schenectady, N. Y., 1944-date, now engaged in development work on servo-mechanisms, Marine Aeronautics Eng. Division.

For Transfer From Student To Junior Member

WESLEY J. ROOT, graduate in Mechanical Engineering, Tulane University.

For Student Member

THOMAS J. ADAMS, Chemical Engineering Student at Louisiana State University.

ROBERT LEONARD PONS, Mechanical Engineering Student at Tulane University.

PAPERS AND DISCUSSIONS

"RESEARCH, THE KEY TO GREATER UTILIZATION OF SOUTHERN AGRICULTURAL CROPS"*

Col. Newton: Mr. President, members of the Louisiana Engineering Society, Ladies and Gentlemen. We are very glad to have this opportunity to take you on a conversational tour of the Southern Laboratory and to give you a few examples of how research works. Many people are of the opinion that research is some form of magic. I would like to disabuse your mind of that impression right now. There is probably more sweat, patience, perseverance, planning, and intellectual ability back of a successful research effort than any other normal way of earning a livelihood.

The Southern Laboratory is dedicated to a research program "To find new uses for agricultural crops." Since our normal domestic food markets are more or less saturated this means with us the "Industrial Utilization of Cotton, Sweet potatoes, Peanuts, Rice, and Other Southern Agricultural Crops." Research, coupled with development, is our principal tool in our attack on the problem.

Our first stop will be with Miss Mary L. Rollins, who is in charge of our Microscopical Laboratory. One thing essential to a good football team besides good players, is one drilled well in the fundamentals—the same is true with a good research program. In other words, we need to know a lot about what we are working with before we can give it a **new look.**

Col. Newton: What is the function of this microscopical laboratory?

Miss Rollins: Its function is to assist in research and development work on textiles. The microscope has proved to be a very useful tool in many different types of textile research.

Col. Newton: In what way does the microscope contribute to the work of the Southern Laboratory?

Miss Rollins: Some of the best examples are found in research on chemical treatments. One such treatment is copper naphthanate, a rot-proofing chemical applied to tarpaulin, tentage, awning, and sacking materials. Differences in rot resistance are not always consistent with the amounts of material applied to the fabric. In this picture we see cross sections of a sandbag fabric treated with copper naphthanate. An appropriate stain has been used to bring out the copper compound as a dark material surrounding the yarn.

* A panel discussion led by Colonel Harry P. Newton, Assistant Director, Southern Regional Research Laboratory, on Thursday night, January 8 in connection with the Annual Meeting of the Society.

You will note that there is no evidence of copper compound near the center of the yarn. This means that any fungus activity inside the yarn could proceed unchecked until it had eaten away the core of the yarn and materially weakened the fabric. The next slide will show you a fabric in which impregnation was satisfactory, the whole yarn being permeated with the chemical so that fungus growth would immediately be killed by contact with the copper salt.

Col. Newton: Was the difference in these fabrics borne out in other tests, or in practice?

Miss Rillins: Yes. In soil burial tests the second sample lasted much longer than the first.

Col. Newton: Were there not different amounts of material applied to these two samples?

Miss. Rollins: No. Chemical analysis showed the same take-up by weight. The difference was one of **distribution** of the compound, which could be detected only by microscopical examination. A similar example is that of a partially acetylated fabric. Partial acetylation is also a rot-proofing treatment but in this case the structure of the cellulose is modified, instead of having something added to it as in the case of impregnations or coatings. In this cross section the dark colored fibers are acetylated and the light ones are untreated cotton fibers. As you can see the treatment was not very uniform.

Col. Newton: I can see how this information might assist the chemist in improving his acetylation process to get better uniformity. Is the difference immediately apparent?

Miss Rollins: No. Both treated and untreated fibers are colorless, but an acetate dye can be used to stain the treated fibers without affecting the untreated ones so that their relative numbers and positions in the yarn can be detected. Another case where a stain is necessary in microscopical studies is to determine the distribution of latex which is applied to tire cord to improve the adhesion between the cord and the rubber.

In this slide the latex is stained with a red dye which has no affinity for cellulose so that the rayon fibers of the cord stand out plainly to show the depth to which latex has penetrated between them.

Col. Newton: What are those round cross sections outside the rayon cord?

Miss Rollins: They happen to be nylon filaments, but they have nothing to do with the cord. They were used as filling material to pack around the cord to prevent distortion in the cutting operation.

Col. Newton: Do you always have to use a stain in microscopic work

Miss Rollins: No. Only occasionally when the material you are looking for has the same color and refractive index as the cotton. In the next slide, which shows a resin treated fabric the resin is easily seen, not only in the cell wall of the fiber but also in the central canal. In other chemical treatments, such as parchmentization, the effect of the chemical on the fiber is apparent without staining. In this slide the cross sections of the yarns show the fibers at the outer edge fused together by the action of sulphuric acid. Such a treatment as this is used to produce a permanent stiffness as in the "permanently starched" organdies.

Col. Newton: Aside from chemical treatments do you follow any of the other laboratory research projects with the microscope?

Miss Rollins: Yes, we can occasionally be of help to the textile mill in the Cotton Processing Division by studying the construction of yarns or fabrics. The Ventile fabric is an example of a very tightly woven cloth developed during the war by the British as a water resistant material for combat clothing. Cross sections of the warp and filling illustrate the type of construction used to produce this fabric. In a mixed fabric the warp of cotton and the filling of rayon can be most easily distinguished by cross section especially when sections are cut in opposite direction.

Col. Newton: What about research on cotton tire cord? Have you had any hand in that?

Miss Rollins: Microscopical examination can show the type of adhesion between cord and rubber as in this cord pulled out of a synthetic rubber tire. In early synthetic rubber tires obtaining a satisfactory bond between the cord and the rubber was a major problem. In this case, as can be seen from the photomicrograph, the bond was entirely satisfactory. The structure of cords can also be compared microscopically. In this slide you see a cross section of an old type commercially manufactured cord. The great space between the component parts is evident, and the loose packing of the fibers can be easily seen. In the next slide you see the same cord after a special stretching operation developed at the Southern Laboratory. The cord is more compact and the fibers have been drawn more nearly parallel to the axis of the cord, all of which produces a stronger and more durable cord. A longitudinal slice through a tire cord shows the actual position of the individual fibers in the yarns which make up the plies.

Col. Newton: There seem to be a tremendous number of fibers in a tire cord. Are there that many in other types of yarns?

Miss Rollins: It depends on the weight of the yarn. The individual yarns which are twisted together to make each ply of the cords you saw are 25's yarns. This means that it takes 25 lengths of 840 yards each to make a pound. In a 60's yarn there are 60 840-yard lengths to the pound, and the cross section shows correspondingly

fewer fibers. A 300's yarn, which is about as fine as cotton can be spun has only 10 fibers in the cross section. One hundred and forty-two miles of this yarn weighs only one pound. The number of fibers varies considerably, of course, with the variety of cotton used in the yarn.

Col. Newton: Can you give us some idea of how a fiber is produced?

Miss Rollins: As the fiber begins to develop on the surface of the seed just after the flower falls, growth is very rapid. On an average seed there may be as many as 10,000 fibers, and not all of them will receive equal nourishment. For the first 16 days or so the single cell grows out as a long thin-walled tube filled with plant juices until it gets to be anywhere from one thousand to four thousand times as long as it is wide. After it attains full length the fiber begins to thicken by depositing a layer of cellulose each day until the boll opens. As the fibers in the ripened boll dry out they collapse and shrivel until the tube becomes flat and ribbon-shaped. In a cross section of a bundle of fibers some can be seen in the uncollapsed condition, but by the time they are harvested most of the fibers have an oval or flat cross section. The internal structure of a cotton fiber can be studied by swelling the fiber under the microscope with certain strong reagents which will dissolve cellulose. As the fiber writhes in the agony of solvation the outer skin or sheath is ruptured by the pressure of the swelling of the internal cellulose. In polarized light the strains set up by this pressure against the restraining walls of the outer sheath are readily apparent. As swelling proceeds the outer sheath peels off and the growth layers in the cell wall can be distinctly seen. After the constricting bands of the sheath slough off the cellulose layers straighten out and can be counted. A cross section swelled in the same manner resembles the stump of a tree, except that these layers are not **annual** but **daily** rings.

Fibers in which cellulose deposition proceeds undistributed become almost completely filled with cellulose and are referred to in our work as "mature" fibers. Those in which cellulose deposition is interrupted or retarded by injury or malnutrition are thin-walled and "immature" collapsing upon drying to give flat rather than round or oval cross sections. Every sample of cotton contains a certain amount of immature fibre but the better cottons contain less than 25%. Microscopical examination of cotton samples is a useful adjunct to research on the effects of fiber immaturity on processing as will be shown in the next series of pictures which follow depicting the development of one of our most useful tests.

Col. Newton: Thank you Miss Rollins for our short visit with you and your illustrations of how cotton grows. Our next stop

will be with Mr. Herbert O. Smith, who, among other things, is investigating the maturity of cotton.

What exactly do you mean by the term "maturity"?

Mr. Smith: In cotton, this word is used to refer to the cell wall development of a fiber. If for any reason normal growth is prohibited or arrested, a thin-walled immature fiber results. Such a condition may occur due to lack of rainfall, soil deficiency, insect attack, early frost, etc.

Col. Newton: Why is a knowledge of maturity important to the cotton mill and subsequently to the consumer of cotton products?

Mr. Smith: Immature cotton is generally considered of inferior quality for most uses, probably because such fibers do not spin or dye normally. The use of such cotton in too large amounts, and especially if not properly blended, will result in an unusually high percentage of manufacturing waste, will produce yarns of low grade from the standpoint of strength and appearance, and is likely to cause unlevelness and streakiness in dyed fabrics.

Col. Newton: You would advise then that mills avoid the use of immature cotton if possible?

Mr. Smith: Well, not necessarily. It depends upon the use intended for the final product. I can give you a very good example where immature cotton is desired in preference to normal mature cotton. In another phase of our work at the Laboratory we are doing research directed toward improvement of water-resistant fabrics. This work was initiated during the war in cooperation with the Army Quartermaster Corps to provide soldiers with rain apparel that would give better protection against wind and rain. We have found that a fabric made from very thin-walled immature cotton will prevent penetration of wind and rain much more effectively than a comparable one made from mature cotton. A more dense and tigher woven fabric can be produced from the thin-walled fibers due to their greater deformability and lack of resiliency or springiness. In addition, the larger number of thin-walled fibers per unit cross section and the correspondingly smaller capillary spaces naturally would tend to better resist penetration of rain.

Mr. Newton. Briefly, how is this test for maturity made?

Mr. Smith: The samples under examination are first enclosed in gauze bags to keep them separated and then they are placed in a boiling dyebath containing a mixture of a particular combination of two dyes of contrasting color, a red and a green, having very different dyeing properties.

On removal from the dyebath, the cotton will appear to consist largely of fibers that are now distinctly red and a smaller proportion that have been dyed green.

Col. Newton: Well, there can hardly be any question of whether or not the color, after dyeing corresponds to cell-wall development. It would seem that this visual identification of fibers might be of interest to cotton breeders.

Mr. Smith: It is definitely of interest. For example, by use of the dyeing technique, one may follow visually the progressive development of cotton lint on the seed. The number of days between flowering and picking is indicated. Through the 29th day the fibers were dyed completely green, but by the 32nd day, red definitely appeared in the fibers indicating that secondary wall development had begun. After this time the total amount of red increased progressively and finally, cotton from a boll which had opened normally dyed nearly all red corresponding to well-matured cotton.

Col. Newton: There is evidence of some green-dyed fibres on seeds even in the final stages of growth. Is this abnormal?

Mr. Smith: No, it's natural to find some undeveloped fibers on every seed. This is explained by the fact that there is a definite orientation of seed cotton in the boll during growth and the fibers located at the end of the seed farthest from the source of nourishment are likely to be underdeveloped and thus dye predominantly green.

Col. Newton: What was the origin of this new method for showing fiber maturity?

Mr. Smith: Well, the first application of this dyeing technique was to the diagnosis of trouble experienced by a southern mill with a particular lot of cotton in the manufacturing processes and dyeing. Some of the cotton being used in their blend was found by this special method to dye greenish in contrast to the larger proportion of the mix which dyed red. Examination of cross sections showed clearly that the green-colored cotton was unusually immature and could not be expected to behave normally.

Col Newton: Just exactly what knd of trouble did this mill get into?

Mr. Smith: This mill was daily turning out thousands of yards of piece-dyed herringbone fabric under contract. Very unexpectedly the fabric began to show light and dark streaks after dyeing, necessitating sale of the material as "seconds" with a terrific loss to the mill. The blame was immediately placed on the unfortunate dyer who, of course, denied responsibility and tried to shift the blame to the bleaching department. Well, everyone blamed the other person and at this point they asked for help in straightening this thing out. We were able to show conclusively that none of these men were responsible and if someone had to be blamed it would have to be the mill cotton buyer. Since the bales with excessive amounts of immature cotton were actually purchased for mill use,

it seems that the classer did not fully recognize the difference in the cotton or foresee its possible effect on manufacturing.

Col. Newton: Does the cotton classer consider maturity in his classification of a bale of cotton?

Mr. Smith: No, not strictly speaking. He may or may not recognize this property. It depends, of course, upon the degree of immaturity. Certainly more emphasis should be placed on maturity as a means of classifying cotton along with staple length, strength, etc.

Col. Newton: What does the dyed fabric represent?

Mr. Smith: Yarns were made from the mature and relatively immature cottons shown and woven as warp and filling respectively. The cloth was then subjected to the differential dyeing process with the great difference in color shown; purposely exaggerated, of course, over the smaller but serious difference that would be expected in practical dyeing.

Col. Newton: Do you think this dye test is applicable to the quantitative estimation of maturity?

Mr. Smith: Yes, such an estimate appears possible by means of the total color effect of dyed samples. This phase of the development work is now in progress. Comparison of dyed cottons is difficult when fibers are present in differently colored tufts, but this can be simplified by cutting the fibers to a near-powder which enables a sample to be mixed to a uniform color very easily. The sample is then suspended in water containing a small amount of an adhesive and filtered with suction to form a smooth, flat pad.

This gives an indication of the variation in color that can be expected from cottons that differ about 20% in maturity over a range of approximately 22 to 78%. A series of such pads can usually be placed in order of color easily by visual inspection, and can no doubt be evaluated by optical methods if greater precision is desired.

Col. Newton: Such an arrangement would no doubt place the cottons in the order of relative maturity, but just how would you go about expressing the maturity of a given sample on a percentage basis?

Mr. Smith: If reasonably good reproduction of results is assured, then the percentage maturity of an unknown dyed sample can be readily estimated by comparison to a standard color scale representing dyed cottons of known maturities. Simplicity and easy visability are two distinct advantages of the method as contrasted with the older and far more laborious process of observing and counting individual fibers under the microscope.

Col. Newton: Thank you very much Mr. Smith. I would like now to have you meet Mr. Percy J. Fynn, who has been doing some very interesting work in the field of weathering. When we

find out what causes cotton yarns and fabrics to break down then we can better treat them chemically to make them more resistant to weather effects.

Are you working with fabrics for clothing?

Mr. Fynn: No. These fabrics, designed for out-of-door use are materials such as awning, tents, tarpaulins, and a cloth known as shade cloth, which is used to cover acres of special crops like tobacco.

Col. Newton: What sort of protection do these fabrics require?

Mr. Fynn: In this climate, the two chief enemies of such fabrics are sun and microbiological attack, such as mildew. This particular research is directed toward learning as much as possible about the action of these weather factors and devising chemical treatment to minimize their effects.

Col. Newton: Probably one of the first things you must know about the sunlight is how much of it you have? How do you measure it?

Mr. Fynn: The amount of sunlight is measured with an instrument called a pyrheliometer. The ones in use at the Southern Regional Research Laboratory are thermo-electric instruments of a type developed by the United States Weather Bureau and consist of a thermopile of 50 junctions.

The cold junctions are attached to the underside of the white ring and the hot junctions to the black ring of the target-like receiver. The white ring reflects all the sunlight while the black ring absorbs all the sunlight which falls on it and becomes warmed. The difference in temperature produces a thermo-electric voltage which is measured and recorded on a strip-chart potentiometer which also automatically integrates the area under the curve of the chart record. This potentiometer is calibrated to read directly in radiation units. These units express the sun's energy in terms of the amount of heat generated by complete absorption on a given surface in a given time. The engineering units are B.t.u. per square meter per minute. In full noonday New Orleans' sunshine the receiver develops about 11 millivolts which is interpreted by the recording instrument as 1.5 gram calories per square centimeter per minute, or 60 B.t.u. per square meter per minute.

Col. Newton: In studying the action of sunlight what do you do about the rain and wind?

Mr. Fynn: To study the effects on fabrics of the sun's rays and particularly the effect of various spectral regions of sunlight, a special exposure cabinet was built to isolate the test pieces from everything but sunlight. This cabinet was constructed to move automatically and follow the motion of the sun across the sky and to reset itself each night in readiness for the next day. In this cabinet the samples are exposed only to sunlight and each sample to its

own spectral region. Measurements are made of the amount of light received by each sample and of the damage the light causes.

Col. Newton: Is the damage evident by change in appearance or feel of the cloth?

Mr. Fynn: Feeling the cloth and visual examination are not sufficiently accurate methods of judging the damage even when apparent, so special methods are employed to detect it. In one method the cloth is cut into measured strips and placed in a machine which measures the force required to pull the strips apart. The change in breaking strength from the original cloth is a measure of the damage. In another method, the cloth is ground to a fluffy powder and dissolved in a chemical solution. Undamaged cloth makes the solution very thick and viscous. Any chemical damage to the cloth results in a less viscous solution. This difference is detected by allowing a measured volume of solution to run out of a long tube through a very small opening in the bottom while timing the run with a stop watch. The solution of the most damaged cloth runs out fastest. From the results of this test it is possible to calculate mathematically a sensitive index of the degradation suffered by the samples.

Mr. Newton: What about the testing of treated materials?

Mr. Fynn: When the effects of exposure on untreated materials are known then treated materials are tested by similar exposure and the results are compared to determine the worth of the treatment. Treated materials are exposed to natural weather, to sunlight alone in the special cabinet, and to laboratory tests called accelerated weathering tests. In one of the accelerated tests samples are exposed to light from a powerful electric arc. The intensity of this light approximates sunlight and can be applied 24 hours a day, rain or shine. Furthermore, the character of the light from this arc is such that it is more active than sunlight and breaks down the material more rapidly. Distilled water spray, simulating rain, can be applied to the samples during the arc exposure for any desired proportion of the total time.

Col. Newton: Thank you Mr. Fynn. Now we will leave our work on Lint Cotton and visit with Dr. A. M. Altschul, whose investigations have turned up some very interesting angles in connection with oilseed storage.

Dr. Altschul, I understand that you are working with "hot" seed. What are "hot" seed and what makes them hot?

Dr. Altschul: Hot seed give oil mill operators, grain shippers, and elevator men many a sleepless night. Seed are alive, respire, and throw out heat, just as you and I. In order to maintain a comfortable temperature the ventilation facilities of this auditorium are taxed to remove the heat thrown out by all the people gathered here. You can imagine that seed stored in bulk in piles of 1000 tons

in size will develop considerable heat which cannot be dissipated readily and consequently temperatures as high as 170°F. may be reached.

Not all seed heat. Only wet seed, harvested in a rainy spell respire to such an extent as to develop dangerous temperatures. In this area a large fraction of the cottonseed, flaxseed, rice, and grain sorghum may be classified as wet seed. In other agricultural areas a significant portion of the crop always presents a storage problem and some years, as a result of unusual weather conditions, an entire crop may be threatened.

Col. Newton: Why do we worry so much about "hot" seed?

Dr. Altschul: Aside from the danger of having the seed burn and the need to cool the seed, "hot" seed represent a serious economic loss. When cottonseed heat, the oil, which is ordinarily used in shortening and margarine manufacture, is hydrolyzed in the seed to form free fatty acids which are good only for the soap kettle. Rice which has heated is discolored and "off" in taste. Wheat which has heated does not make as fine bread floor as does prime wheat. In a time when hunger is widespread the world over, conservation of our food resources is of paramount importance. We cannot afford to allow deterioration of foodstuffs in storage to take away from the mouths of the hungry even a small fraction of the food which might be theirs.

Col. Newton: What can be done to prevent heating and deterioration of seed during storage?

Dr. Altschul: At the present time, drying, cooling either by forced air draft or by moving the grain from one part of the elevator to another, or refrigerated storage is used to minimize deterioration. These methods are, however, not altogether satisfactory and considerable deterioration nevertheless takes place. At this laboratory we are investigating a different method, the chemical method. Inasmuch as processes which cause heating and deterioration are living processes, suitable chemical treatment should inhibit the enzymes in the seeds or the microorganisms associated with them and thus stop deterioration.

It would be necessary, of course, to find a treatment which has no effect on the industrial or food utilization of the seed or grain.

Col. Newton: How did you go about finding chemicals which may be suitable inhibitors of deterioration in seeds?

Dr. Altschul: We had to produce in the laboratory, conditions which somehow simulated the actual conditions of storage in a commercial seedhouse. We also had to create conditions conducive to rapid deterioration so that we could test a great number of chemicals rapidly. We built our test around an ordinary thermos bottle. By proper combination of repeating multipole switches and automatic potentiometer recorders, we were able to operate 74

such "seed-houses" at a time. We chose moist flaxseed as our test seed and started our screening operations.

Col. Newton: You mentioned a screening operation. Just what is a screening operation?

Dr. Altschul: Screening is a type of "Edisonian" research which has been used extensively in efforts to find new chemicals with specific biological activities. It is the method used to find new antibiotics, anti-malarials, insecticides and insect repellents, weed killers, plant hormones, etc.

Its use stems from the fact that the knowledge of the relationship between biological action and chemical structure is still in its infancy. Synthetic organic chemistry has made such great strides in the last decades and so many new types of compounds are available that the only way by which we can determine whether they have any biological activity is to try them separately for each specific purpose. We contacted the leading manufacturers of synthetic organic chemicals and have on hand close to 500 rare chemicals of which we have tested about 250. At first we were deliberately unprejudiced about the chemicals and just screened them at random but after a while it appeared that certain classes of chemicals had the desired activity.

Col. Newton: Did you find any chemicals which may be used in storage?

Dr. Altschul: Yes, we found over thirty chemicals which inhibit deterioration in seeds. Some of these were old friends like phenol, sulfanilimide, and propionic acid. Others like ethylene chlorhydrin, propylene glycol dipropionate, dichloramine B, and chloromethyl xylene have not been previously considered in storage work.

Col. Newton: How do go about translating the results in your laboratory to practical measures which can be used in industry?

Dr. Altschul: In order to bridge the gap between the laboratory and industry we have been conducting mill-scale storage experiments in cooperation with industry. A set of experimental bins was built by a Georgia cotton-oil mill for such storage experiments.

The results of our mill-scale experiments have been satisfactory. We have been able to stop further heating by our treatment. In one experiment, for example, we treated seed at a temperature of 100°F. The treated seed did not heat but the untreated control seed heated within a week to 130°F. Feeding experiments on rats and chicks showed that our treatments did not affect the food value of the seed products. As a matter of fact, in the case of flaxseed, our treatment rendered the flaxseed meal acceptable as a chick feed.

We have commitments with cotton oil, linseed oil, and rice mills for mill-scale experiments next season and will continue until the gap between the laboratory and the mill is bridged. We are

also cooperating with a state agricultural experiment station on the treatment of cottonseed to preserve viability.

Col. Newton: How will the cost of the chemical treatments compare with present day storage costs?

Dr. Altschul: It is difficult to estimate cost of treatment because most of the chemicals which we have found to be suitable are not yet in quantity production. We have been assured by the manufacturers that prices will go down as soon as a quantity market is assured. Furthermore, we have not confined our efforts to any one chemical so that the choice of chemical to be used for treatment will depend on its cost.

Our goal has been a cost of about $1.00 or less a ton of seed, which is a price that millers and elevator men are willing to pay. In the last analysis, we do not have to compare our costs with present day costs. If we can develop a method which will completely stop deterioration, then we do not have to worry about cost comparison, because the present methods are not completely effective and are of little value for very moist seed.

Dr. Newton: I am interested in your statement about the storage of planting seed.

Dr. Altschul: That is a new departure in our research. Heretofore we did not care whether the seed which we treated remained dead or alive as long as their industrial or food use was not impaired. In this research we not only have to stop heating but have to keep the seed alive and healthy.

Laboratory experiments showed that some of our treatments did indeed preserve viability. You will remember that you used your good offices to arrange for the cooperative storage experiment so that our chemical treatments could be given a thorough field test.

Col. Newton: Do you intend to continue your screening operation?

Dr. Altschul: Only on a limited scale. Now that we have thirty chemicals to work with, we intend to dig deeper and will try to determine the mechanism of their action. We intend to determine action of these chemicals on individual enzyme systems in the seeds and on the microorganisms associated with the seeds. We intend to us every chemical and physical means at our disposal. If it is necessary, we plan to apply radioactive isotope tracer techniques to the elucidation of the mechanism of inhibition of deterioration in seeds. The results of such research will, of course, be of great and immediate practical value because we will be enabled to more accurately plan our chemical treatments. There is, however, a second reason.

The great and justifiable publicity given atomic research and the labeling of this age as the *atomic age* has tended to obscure the fact that this is also the age of growth regulators. This is the age of

antibiotics and hormones, of herbicides and auxins, of sulfa-drugs and DDT, of penicillin and indole acetic acid.

These biologically active agents have served great practical purposes but they also have provided us with new methods with which to explore living systems so that we can know more about ourselves. In our work on "hot" seed we would also like to contribute to this age of growth regulators and perhaps add a wee bit to our knowledge of living processes.

Col. Newton: Thank you ever so much Dr. Altschul. Most oil seeds contain, among other things besides oil, varying amounts of protein. Mr. Jett C. Arthur is knee deep in work on peanut protein for both fiber and adhesives. I would like for you to get a preview of a growing agricultural industry of the South.

Mr. Arthur, how important is the peanut industry to the South?

Mr. Arthur: The peanut industry has grown from about 300,000 acres in 1909 to 3,000,000 acres in 1946. About 1,000,000 tons of peanuts were picked and threshed in 1946. Approximately two-thirds of this total went into candy, salted nuts, and peanut butter. The remainder was crushed for peanut oil, and the residual peanut meal was processed into a high protein cattle feed. In 1946 the peanut crop had a farm value of about $200,000,000.

Col. Newton: Does peanut protein appear to have possibilities as an industrial protein?

Mr. Arthur. The use of peanut protein in adhesives, sizes, cold water paints, and synthetic fibers is a comparatively recent development. Peanut protein contained in hydraulic-press or expeller-press meals are denatured and modified, so that they are unsuitable for these industrial applications. Peanut meals from which the oil has been removed by solvents, such as hexane, contain proteins with desirable charactertistics for industrial utilization.

Col. Newton: How is peanut protein isolated for solvent extracted meal?

Mr. Arthur: Peanut proteins contained in solvent-extracted meals are very soluable, and may be peptized by the addition of sodium hydroxide to a aqueous meals suspension adjusting the pH of the suspension to 7.5, the point of maximum protein solubility. The meal suspension is clarified by screening and centrifuging to remove the insoluable particles. The protein is precipitated from the clarified extract liquor by the addition of gaseous sulfur dioxide, until the pH of the liquor is 4.5, the point of minimum protein solubility. The precipitated protein is allowed to settle, and then is separated from the mother liquor by centrifugation. For purposes of storage the protein curd is dried to about seven per cent moisture in a forced draft oven at 120°F.

Col. Newton: How is the synthetic peanut protein fiber manufactured?

Mr. Arthur: The process for the manufacture of synthetic protein fiber was copied from the silk-worm whose patent claims are not recognized in the United States. A protein solution is extruded through a small orifice and into a coagulating solution.

The coagulated, filamentary protein substance is stretched and further hardened to give the fiber strength and resilience. Whereas, the silk-worm stretches the protein fiber by whirling away from the fixed end of the fiber, we prefer to move the fiber rather than the spinning machine.

In a laboratory scale spinning machine the protein solution is extruded from the reservoir through a platinum nozzle containing orifices about 0.1 mm. in diameter into the acid-salt coagulating bath. The coagulated, filamentary protein substance is taken up onto these revolving rolls, and the protein fiber is stretched and treated with a warm salt solution. The fiber is further stretched on these godets and passed to a second set of rolls over which a hot formaldehyde-salt solution is sprayed. The fiber is collected on the bobbin. Further after treatment is accomplished by placing this bobbin into large beakers containing appropriate chemicals in solution. Finally the fiber is washed with water and dried by warm air.

Col. Newton: How does the peanut protein fiber compare in strength and dyeing characteristics with wool?

Mr. Arthur: Peanut protein fiber has about 80 percent the strength of wool and takes wool dyes. Peanut protein fiber was recently reported to have a dry strength of 1.05 to 1.10 grams per denier, and a wet and dry elongation of about 30 per cent.

A cross-section photograph of the continuous filament type of peanut protein fiber produced in our laboratory shows that each of the filaments which make up the fiber maintains its individuality.

Col. Newton: What are some products in which peanut protein adhesive may be used?

Mr. Arthur: Peanut protein adhesive may be used in book binding and in gummed tape, box, plywood, and cork manufacturing. Equipment which our laboratory has for making and testing plywood products are: A plywood glue spreader, a hot press, and a shear tester. We also have a cold press, and a block shear tester.

The use of peanut protein adhesive for binding mineral matter to paper has been successful on a laboratory scale. High wax pick tests have been received with peanut protein coatings over a wide pH range. A single sheet coater is used to apply the mineral matter and adhesive to the paper surface.

The potential industrial uses for peanut protein are existent. So far the adaptation of this protein to the uses which were outlined in this discussion has been retarded due to the lack of a commercial source of solvent-extracted peanut meal.

During 1947 a plant in Alabama began producing the meal. There are other plants being planned. The future of peanut protein in competition with casein and hide glue is bright due to the lower cost of peanut protein. The industrial utilization of peanut protein will cause an increase in the farm value of the peanut crop.

Col. Newton: Thank you, Mr. Arthur. Most of the work that we have seen before is necessary but preliminary to adaptation in a manufacturing scale operation. Process Evolution is essential to proper transition from a laboratory scale operation to a sure-fire economical plant scale undertaking. Mr. Henry L. Vix, of our Engineering and Development Division is here and now we will see how he and his associates attack their problems.

Mr. Vix, what is meant by Process Evolution?

Mr. Vix: In our research program, Process Evolution is generally recognized as the transition of a laboratory method or procedure through engineering development to a commercial process.

Col Newton: What are some of the various steps or stages encountered in Process Evolution?

Mr. Vix: The development of a process goes through a number of distinct stages in the progress from the *idea stage* in the mind of an investigator to the *operating process* in a commercial plant. The chart shown on the screen is presented to illustrate some of these stages. It does not, by any means, represent the only course a development may take in the laboratory, nor is it meant to imply that every project must go through all of these stages. The important points are that different groups of research workers are involved and the responsibility shifts from one group to another as the work progresses.

Understanding and mutual confidence among the participating groups are the chief personal requisites in process evolution.

Col. Newton: Can you use one of our laboratory projects to illustrate process evolution as conducted at the Southern Regional Research Laboratory?

Mr. Vix: Perhaps the work underway at the laboratory on the utilization of cottonseed—an important farm commodity—may be a fitting example.

Col. Newton: Is the processing of cottonseed a relatively new endeavor?

Mr. Vix: No. For approximately 75 years, cottonseed has been processed into crude oil and a cake by means of either hydraulic pressing or screw pressing. The various steps in the cleaning and preparation of cottonseed to cottonseed flakes prior to hydraulic pressing are first the cottonseed; second the delinted cottonseed; third the hulled cottonseed; and fourth cottonseed flakes.

Col. Newton: Are the cottonseed flakes hydraulically pressed to produce the oil and cake?

Mr. Vix: Yes, first the flakes are cooked and pressed to yield the oil and cake.

Col. Newton: Are there any other commercial operations other than hydraulic pressing or screw pressing to produce oil from cottonseed?

Mr. Vix: Yes, solvent extraction of cottonseed flakes with commercial hexane has been used in Europe and South Africa for some time and has been recently adopted by a few mills in this country.

Col. Newton: At the Southern Regional Research Laboratory, the development of another operation for cottonseed is under way. Mr. Vix, what is this process called?

Mr. Vix: We call it the fractionation of cottonseed flakes into oil, meal, and pigment glands. It is quite different in procedure and principle from hydraulic pressing, screw pressing, or solvent extraction. We shall use the work undertaken at the Southern Regional Research Laboratory on cottonseed fractionation to illustrate the various stages in Process Evolution.

Col. Newton: Briefly relate the idea stage of research work which led to the discovery of fractionation of cottonseed.

Mr. Vix: Unlike most other oil seed, cottonseed contains a complex pigment system which constitutes but 1-2% of the entire composition of seed. The pigments are responsible essentially for the characteristic color of the crude oil and for rendering the meal undesirable as a source of a high-grade protein material for industrial utilization and thus limits its use mainly to an animal feedstuff. These pigments are located in a gelatinous suspension enclosed by a thick rigid wall and are commonly referred to as pigment glands.

Col. Newton: What was the method discovered for the fractionation of cottonseed?

Mr. Vix: It was discovered that some solvents were inactive toward the pigment glands and that the pigment glands, meal, and hulls were of different densities. Experiments showed that it was possible to find a solvent combination which permitted the glands to float and the meal and hulls to sink. The oil mixed with the solvent.

Col. Newton: Can you describe how this work was accomplished in the exploratory stage?

Mr. Vix: A Waring blender was used to detach the meal tissue from pigment glands. The whole range of commercial solvents was investigated and a number of suitable combinations were found to be effective provided a specific gravity of 1.378 could be maintained, which would permit the glands to float and the other solids to sink.

Col. Newton: Following the exploratory stage of research, which established the technical feasibility of the process how was the specific method stage developed?

Mr. Vix: A glass fractionation system was designed and used to establish preliminary operating conditions. With this equipment, a small quantity of pigment glands was produced for evaluation investigation.

Col. Newton: In regard to the fifth stage, a preliminary cost estimate showed sufficient promise for an economical process.

Mr. Vix, what is meant by the fifth step—"dish pan" stage?

Mr. Vix: The words "dish pan" stage are used for want of a more appropriate title. It involves expanding laboratory scale work in any convenient type of equipment or container available in order to produce larger quantities of product. Engineering unit operations are not necessarily emphasized in this stage.

Col. Newton: What quantity of cottonseed flakes was processed in this equipment and what quantity of products was produced?

Mr. Vix: Approximately 5500 pounds of cottonseed flakes were fractionated in this equipment to produce approximately 75 pounds of pigment glands and about a ton of cottonseed meal, practically free of pigment glands, hulls, and oil.

Col. Newton: Can you describe the product prepared at this stage of the work?

Mr. Vix: The meal is much lighter than that produced by hydraulic pressing and is even lighter than that produced by solvent extraction of cottonseed.

Col. Newton: I understand that the crude oil is practically the same in color as produced by the two commercial processes. Do refining and bleaching processes improve the color of the crude oil obtained by the cottonseed fractionation process?

Mr. Vix: Crude oil may be obtained from the three processes, namely, hydraulic pressing, solvent extraction, and cottonseed fractionation. Refining and bleaching of these three crude oils from prime seed yield comparable products.

Col. Newton: Were not the products prepared in stage five used for stage six, namely, the product evaluation stage?

Mr. Vix: Yes, for initial pharmacological, nutritional, analytical, fiber, adhesive, and other investigations.

Col. Newton: What are some of the results of these investigations?

Mr. Vix: Nutritional investigations on poultry, with the defatted cottonseed flour, essentially free of pigment glands and hulls, have shown that with regard to protein quality, it is superior to any other oil seed previously investigated. In addition, the meal's applicability for adhesives and sizes shows promise. Investigations

have indicated possible important pharmacological uses for separated cottonseed pigment glands.

Col. Newton: What is the purpose of preliminary engineering stage in the development of a process for cottonseed fractionation?

Mr. Vix: This stage of work is undertaken to study the chemical unit operations involved in cottonseed fractionation process and the sequence and coordination of these unit operations.

For the fractionation of cottonseed the following unit operations are involved: heat flow, fluid flow, disintegration, mechanical separation, filtration, evaporation, and drying. Not only is considerable experimentation required in adapting laboratory process to conventional chemical engineering unit operations, but problems in the design of special equipment are encountered. For instance in the unit operation study of disintegration, a special piece of equipment is used to obtain the proper condition for detaching satisfactorily the pigment glands from the meal tissue.

Col. Newton: What then are the results of the work accomplished at this stage of the process evolution?

Mr. Vix: The selection, where possible, of conventional equipment for the various operations in a pilot plant, and solving the problems of equipment design if special equipment is required for pilot plant work.

Col. Newton: Are the design and erection of pilot plant equipment for cottonseed fractionation underway?

Mr. Vix: Yes, conventional equipment for the main unit operations in the process has been obtained through contacts with various manufacturers and the erection of the plant is nearing completion. The cottonseed pilot plant under construction will have a capacity of approximately 500 pounds of cottonseed flakes in 8 hours.

Col. Newton: What is the purpose of pilot plant research for cottonseed fractionation?

Mr. Vix: To determine the overall efficiency of the process on a continuous basis, simulating in design and operation conditions, the proposed industrial plant in every respect except capacity.

Col. Newton: Why is pilot plant research necessary in the evolution of a process, such as the fractionation of cottonseed?

Mr. Vix: The reasons are many. Direct transfer from laboratory to plant is a hazardous and costly undertaking. Technical difficulties are usually much greater, and the methods employed to achieve the same end results are frequently much different when operating on a larger scale than when working in the laboratory. Some aspects such as corrosion, heat flow, product purity, etc., which may "make" or "break" the process do not become apparent until the operations are carried out on a scale larger than laboratory scale and in non-glass equipment. Objectionable features of

proposed process become apparent only when the operations are conducted in pilot plant under conditions similar to those which will be obtained in practice. Thus pilot plant research will determine whether cottonseed fractionation can be carried out on a large scale in factory equipment. Pilot plant research will establish the economic aspects of the process. It is impossible to determine overall production costs by laboratory experimentation. Pilot plant research will give the answer to the question "Can cottonseed fractionation be conducted at a profit?"

Mr. Vix: Pilot plant experimentation makes it possible to restrict the costs of inevitable mistakes to a scale that can be afforded.

Col. Newton: We have shown the various stages in the evolution of a process for cottonseed fractionation up to the pilot plant research step. It is evident that pilot plant research plays an important role in our industrial utilization of agricultural commodities.

Col. Newton: We hope that the results of our research will be sufficiently conclusive to attract the attention of industry and thus reflect in benefits to the farmer. We are very happy to have had this opportunity to give you a birdseye view of our research efforts directed toward greater utilization of Southern Agricultural Crops.

ENGINEERING BRIEFS

Tests On 500,000-Volt Electrical Transmission Line Now Under Way. Brilliant, Ohio—Tests have started here on what has been termed, "the world's mightiest transmission line." A half million volts—the most electrical pressure ever used on a transmission line —were sent over the transmission test lines. Through tests, engineers hope to find means for more economical transmission of electricity.

The experimental line was built as a joint undertaking by the companies in the central system of the American Gas & Electric Company. Also participating in the project are Westinghouse Electric Corporation, Ohio Power Company, American Bridge Company, Ohio Brass Company, Locke Insulator Corporation, Aluminum Company of America, General Cable Company, Anaconda Wire & Cable Company and General Electric Company.

"Higher transmission voltages will permit greater interchange of power between systems, will result in greater economies and will reduce the number of generators that the inter-connected systems must keep in reserve," Philip Sporn, president of the American Gas & Electric Service Co., said.

"To transmit the larger blocks of power, which expanded use makes necessary, will require higher voltages or electric pressure. This might be anything up to 500,000 volts. Nothing like that has ever been tried in this country and, up to now, we have suffered from a definite lack of technical knowledge on the subject.

"With our new test facilities we expect to get this information. We expect it will be enough to enable us to design and build higher voltage lines precisely enough to transmit power more economically and fill our rapidly expanding industrial and residential needs."

The actual "outdoor laboratory" consists of three test lines. Two are a mile and a half long and the third is 800 feet. The two long lines will be used for long duration tests and the other for preliminary tests on characteristics of various kinds of conductors. The test setup does not include generating facilities. Power is supplied by the Ohio Power Company.

"Up to now the highest voltage used in this country is 287,500 volts on the 265,-mile-long line from Boulder Dam to Los Angeles," A. C. Monteith, manager of the Westinghouse Electric engineering department, said. "We believe, however, that higher voltages—somewhere between 287,000 and 450,000—may be pratical. If they are, we can send large amounts of power from generating sites into the cities without too much loss along the way."

—*The Wall Street Journal*

High-Cost Holes. The business of perforating the earth is booming as never before as the petroleum industry seeks more and more oil and gas. The search extends to the submerged continental shelf of this country and to the remote corners of the earth. It also extends to even greater depths than before; a new record for a producing well, 13,904 feet, was recently set in Jefferson Parish, Louisiana. Finding, reaching, and extracting this buried treasure requires more investment by the petroleum industry than to do its refining, transporting, and marketing activities combined. Highly specialized devices, methods, and skills have been developed for drilling oil wells and subsequently handling the oil, if any is obtained.

Most wells today are drilled with a rotary rig, a device for rotating a special steel bit against the rock formations at the bottom of the hole. This rotating bit progressively disintegrates the rock against which it is pressed and the cuttings thus produced are flushed to the surface by a circulating stream of "mud." This mud is a carefully made mixture of water, clay, finely divided weighting material, and chemicals. Its composition is adjusted to provide a readily pumped fluid having a density sufficient to flush out the rock cuttings and to provide a column of fluid heavy enough to counterbalance gas or hydraulic pressure from the structure being drilled. The mud also cools the cutting edge of the bit, lubricates and helps support the drill pipe, and helps to wall off the hole. While being cycled to the bottom of the hole, the mud must not get thicker or thinner becouse of the high temperatures sometimes encountered, possible dilution with salt water, or additions of solids from the cuttings themselves. At the same time, it must allow most of the cuttings to settle out in pits at ground level. The mud mixture may be made heavier by adding heavy, powered materials, such as finely ground barites or iron oxide, and more stable by adding complex phosphates or tannic acid compounds. Recently, a synthetic cellulose dirivative, carboxymethylcellulose, has been used increasingly for bodying drilling muds. Sometimes the mud may be lost into porus strata; in this case, a plastic material, called jelflake, is added and filters out on the face of the formation to stop the oozing of the mud.

Special types of Portland cement are commonly injected at intervals between the casing of the well and the surrounding rock or other formation, to support the casing pipe. Cement is also used to shut off undesired water or gas flows from a porous structure, and for capping the top of the well. Synthetic plastics have

come into use for closing off undesired flow in some circumstances; about 6000 wells had thus been treated by late summer of 1947.

Even after the oil reaches the surface, it may require chemical treatment to break objectionable emulsions and to release the entrained water or brine. Some emulsions break by filtration through a bed of glass wool. Addition of ammonia to neutralize excessive acidity, or of formaldehyde, has been useful in reducing pipe-line corrosion during the movement of oil to a refinery.

Explosives are used in producing the synthetic earthquakes by which the geological structure of an area is explored, and in "shooting' a well to blast out and loosen structure at the bottom or at a producing level. Directional shooting, making use of some war developments, may show important improvements in this practice. Wells are "gun perforated" by firing special bullets through the pipe casing at selected intervals to permit flow from these formations into the well.

Since this activity takes place in a hole a few inches in diameter and some thousands of feet below the earth's surface, it is obviously desirable to see what is going on; this has recently become easier by means of an improved deep-well camera. This camera, which carries its own illumination, produces surprisingly clear pictures of the formation surrounding the hole, of the casing pipe's interior, and of objects, such as tools, lost in the hole, and gives a valuable clue to the composition and characteristics of the formation.

Various companies cater to this well-drilling business, including large chemical companies who supply chemicals or actually engage in service work in connection with their use. Numerous specialist companies exist, some entirely of a service type, others supplying apparatus or equipment, and some doing both service work and selling equipment. Other companies do nothing but drill the holes and fit them for production. Altogether, these organizations will spend well over 1.5 billion dollars drilling wells in 1947. Wells now cost over twice the prewar figures, and their greater depth today is one contributor to this increase. Drilling a well to 8,000 feet in Texas cost $12 a foot last year, while at the 12,000-foot level, the cost was $55 a foot. As oil becomes more expensive to find, its price will increase, and other fuels, including synthetic ones, will become more attractive.

—*Arthur D. Little, "Bulletin"*

Supersonic Sound Waves. Sound waves, beyond the range of the human ear, developed through long research in the science of

supersonics, have been found to be lethal when applied to mice and small insects, it was announced recently by the Army Signal Corps Engineering Laboratories at Fort Monmouth, N. J.

Tests for the Signal Corps at Penn State College, State College, Pa., have shown that white mice placed in a sound field died one minute after exposure to the ultrasonic wave.

Autopsies showed that the heating produced by the wave was sufficient to cause death. Mice subjected to only 30-sec irradiations survived, giving the research experts a time-element barometer for lethal exposures to the waves.

Mice, whose fur was removed before the experiment, lived about 2½ min. in the sound field. Thermocouple measurements, made both internally and externally, showed that the heating produced revealed no obvious damage to the organs of the sonically killed mice.

Other experiments were performed on the common roach and other insects, and in each case it was found that the sonic wave heating was sufficient to cause death. Insects killed by the ultrasonic irradiation included firebrats, yellow-fever mosquitoes, blowflies, meal worms, and caterpillars.

The scientists found that insects could be more quickly eliminated in groups than individually. The experiments produced results of more than biological interest, according to the researchers, giving some indication that the method might be employed in the study of pest control.

For the scientists at work on the supersonics project it was found difficult to put objects into the sound field, or to retrieve them, without encountering burned fingers and hands.

The men do not expose themselves to the direct beam and it is their practice to wear ear plugs. Even then, it has been difficult for them to avoid exposure to the radiated sound. Effects have run from loss of a sense of equilibrium to dizziness.

Supersonics, the science dealing with waves similar to ordinary sound waves, but above the audible range, is not expected to serve any immediate domestic uses, but offers promise in finding and developing more interesting uses which may be applied to industry.

Some time ago it was found that by means of supersonic-wave developments defects in materials could be detected, particularly in metal casings. The reflectoscope is an instrument that makes use of this new-found principle. (See Mechanical Engineering, October, 1947, page 849.)

There are three practical ways to generate supersonic waves. One is the use of an air-jet generator, employing much of the same principle as a whistle. (See Mechanical Engineering, December, 1947, pages 1041 and 1042.) This method is limited to frequencies below 50,000 cycles. Another method employs a magnetostrictive effect in certain materials, such as nickel, when used with an electric oscillator. This permits power up to 100,000 cycles. A third higher-frequency method employs certain electronic oscillators.

Experts in the study of supersonics feel that the principle has many unknown quantities that no doubt will be brought out throught continued research.

Recently, techniques were developed in which supersonic frequencies were used in emulsifying or colloidizing liquids by dispersion, such as the method used in producing homogenized milk.

—*Mechanical Engineering*

Argentine 5-Year Plan Reported Drastically Cut. Argentina—Authoratatiive sources indicated last week that the Argentine government is being forced to cut back its much heralded 5-year plan by about 75 percent, in order to bring the program into line with the realities of currency shortages and inability to bring the huge program into form.

Observers on the scene said that Maj. Gen. Royal B. Lord, whose Worldwide Development Corporation held a million-dollar contract to give President Juan Domingo Peron engineering advice on the plan, was about ready to end its work. The corporation's first year contract (now expired) more or less allowed engineers to survey the broader aspects of the 5-year plan, and recommend what they thought to be the feasible portions. On March 5 it was announced that the contract would not be renewed.

In brief, the reasons for cutback are: (1) First plans for the program included "everything but the kitchen sink"—every hydroelectric plan ever vaguely suggested was pulled out of discard to swell the plan into impressive size; (2) when the plan was first proposed, Argentine banks were literally bursting with dollars and pounds sterling accumulated during the war. Now, after a 2-year spending spree, the banks hold almost nothing but pounds sterling —a good part of which is tied up in backing Argentina's currency. Without dollars, steel generators, trucks and construction equipment to carry out the 5-year plan are hard, if not impossible, to come by; the lack of trained engineers and the failure of the mush-

rooming new government departments to get together on a coordinated program.

As a matter of fact, only one major construction job—the Nihuil Dam in the foothills of the Andes—has been finished, and bids have not been asked on its turbines and generators. This dam was started long before President Peron took over. Other parts of the program have been optimistically planned and announced, but none has gone into actual earthmoving operations.

In general, United States contracting firms have failed to land contracts in Argentina, although several firms, such as Morrison-Knudsen, Inc., and the Knappen Engineering Co. have full-time offices in the country. The government has been forced to throw contracts to higher bidders from other nations, whom Argentina could pay in pesos, lira, francs or any other currency but dollars.

—*Engineers News-Record*

Done With Detergents. Production of synthetic detergents, the "soapless soaps," will soon reach 750 million pounds annually, and predictions of a three-billion-pound production within fifteen years have been made. Although the synthetics, backed by the soap industry's inimitable promotional vigor, are doing well in competition with soap for ordinary cleaning, the producers are sparing no efforts to find new uses where soap is not applicable. One or another of the synthetics can be used in water which may be cold, hot, hard, salt, acid, or alkaline, and can usually be rinsed off easily and completely. Because of these and other special properties, many possibilities appear for synthetics, not only in cleaning, but in the proper control of wetting and mixing.

In the cold rolling of steel, an oil emulsion is applied to the surface of the steel sheet. With a synthetic detergent this emulsion still further reduces the friction and makes it possible to increase the speed at which the mill operates. Experimental studies indicate a possible increase in capacity of approximately 10 to 15 per cent, and large-scale adoption of the procedure is expected. In acid pickling of steel, detergents added to the pickling solution remove oil films and carbon from steel surfaces, permitting more intimate contact with the acid; as corrosion inhibitors, they protect the metal from excess acid attack. One detergent forms a foam on top of the pickling bath, which in experiments has partially blanketed evolution of acid fumes to make the surroundings more agreeable.

Accumulation of coal dust in the air of mines has long presented a health hazard. A few mines spray a fine mist of detergent solu-

tion into the atmosphere of the mine to dampen and ground suspended particles. Synthetics as wetting agents are sold for fighting fires, particularly in goods such as baled cotton or waste paper.

Concrete with air entrapped in minute air pockets is more resistant that the older types to cracking and scaling caused by weather and salts for dissolving ice. Some detergents are efficient as air-entraining agents in concrete, and although they may never completely replace existing products in this field, the market is large. At least one state highway construction program will use them.

Streets may be as clean as the vehicles which traverse them, if methods tested in two large cities are applied. As little as five pounds of detergent in the street-cleaning water was sufficient to wash a mile of highway. The detergent removed all oil film from the street in one flushing operation, leaving a skid-free surface. Cleaning of automobiles, buses, and trucks is now well established, with several proprietary compounds on the market. Advantages over alkaline washing materials include superior cleaning and easier rinsing, with less attack on the automobile finish. Regular washing with detergent solution keeps the car free from dust and oil film, and permits a high polish.

In the preparation of food, synthetics have had wide use. With lye solutions, they help to peel fruit prior to canning. Household detergents in small concentrations remove adhering insects and grit efficiently from vegetables, such as spinach and greens, and are easily rinsed away, leaving no taste on the vegetable, in contrast with soap. At least one detergent has been employed in commercial cake mixes to produce a light, fluffy product.

—*Arthur D. Little, "Bulletin"*

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Special Meeting of the Board of Direction, February 2, 1948

The meeting was called to order by President Leake, with Messrs. Mire, Nairne, Newton and Fernandez present. Upon the recommendation of the Board, the following members were appointed to standing committees for 1948:

Employment:
E. L. Fithian, Chairman
R. P. Bassich, Vice-Chairman
George H. Dudley
W. F. Guilbeau

Finance:
John K. Mayer, Chairman

Membership:
Charles P. Knost, Chairman
John S. Burke
Allen W. Betz
Robert L. Argus
R. E. Burgess
F. A. Hannaman, Jr.
B. M. Dornblatt
B. J. Lehmann
Roy T. Sessums

Professional, Civic and Industrial Affairs:
R. A. Steinmayer, Chairman

Publicity:
A. J. Naquin, Chairman

Legislative:
Charles M. Kerr, Chairman
Henri J. Molaison, Vice-Chairman
Leo M. Odom
C. Glenn Cappel
Frank E. Johnson
B. P. Lyons
F. Tackett Clarke
E. A. Landry
E. A. McLellan

Publications:
J. H. Collins, Sr., Chairman
J. M. Guillory
J. S. Janssen

Membership Qualifications:
(Anonymous—not for publication)

Technical Papers:
W. J. Drawe, Jr., Chairman

Student and Junior Activities:
F. J. Germano, Chairman
O. W. Stephenson, Vice-Chairman
H. B. Batchelor
H. W. Mason

Resignations of the following members were accepted with regret: Thomas G. Broussard, Geo. L. Cunningham, A. E. Hotard, D. T. McIver, Geo. H. Menefee, Irving H. Pray.

The subject of a reduction in dues for non-resident members was discussed, and it was decided that at the next regular Board meeting a recommendation would be made to the Committee for Revision of the Constitution and By-Laws that the dues be reduced to $3.00 for non-resident members.

A letter from the 1947 Membership Qualifications Chairman was read, in which he requested that Section 2 of Article II of the Constitution be amended to include scientists allied with engineering. This matter also will be taken up at the Board's next regular meeting.

It was announced that no further meeting of the Board would be held until March. There being no further business to be completed at this time, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society, February 16, 1948

The meeting was called to order by President Leake in the Beauregard Room of the St. Charles Hotel at 8:00 p. m., with approximately 100 members and guests present. Minutes of the preceding meeting were accepted as read.

President Leake outlined his program for 1948, consisting principally of the following objectives: passage of a general license law for engineers, and substantial increase of the Society's membership.

Mr. E. A. McLellan announced that ASME would hold its Spring meeting on March 1-2-3-4, outlined the program, and extended a cordial invitation to members of L.E.S. to attend.

Mr. Charles P. Knost, Chairman of the Membership Committee for 1948, announced that he was placing every member of the Society on his committee and requested that each one try to bring in one new member. He then introduced the speaker of the evening, Mr. W. R. Stevens, Supervising Forecaster, U. S. Weather Bureau at New Orleans, who delivered a most interesting lecture on "Hurricanes".

An unusually long and lively discussion followed the lecture, after which the meeting adjourned with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Annual Meeting of the Louisiana Engineering Society, January 8, 1948

The meeting was called to order by President Nairne at 3:30 p.m. in the Beauregard Room of the St. Charles Hotel, with approximately 190 members and guests present. Reading of the minutes of the preceding meeting was dispensed with. President Nairne introduced officers of local sections.

Mr. Mayer moved that the next meeting of the Society be held on February 16. The motion was seconded by Professor Dunlap and passed.

Dean Lassalle introduced the keynote speaker, Dr. Harold W. Stoke, President of Louisiana State University, who gave an extremely interesting address on "Engineering and Human Affairs". Following his address, President Nairne thanked Dr. Stoke.

The secretary-treasurer presented his annual report, copy of which is attached to these minutes, following which the retiring president gave his report.

Certificates of merit for presentation of papers at the Student Conference were presented to the following:

Verbon H. B. Whilhite—La. Polytechnic Institute
Benjamin Franklin Walsh—La. State University
Roy Glenn Cappel—La. State University
Albert Louis Platz—Tulane University
Robert Leonard Pons—Tulane University

It was announced that Junior Membership awards for 1947 has been won by Williford P. Evans of Louisiana State University and by Harold A. Rosen of Tulane University.

Dean James M. Robert then presented a certificate of honorary membership in the Society to Professor Donald Derickson, and President Nairne presented to Mr. F. T. Clarke, President of the newly organized Lake Charles Section, a charter for the section.

Mr. H. L. Lehmann read four special resolutions, copies of which are attached to these minutes. He then moved that these resolutions be accepted, seconded by Mr. James M. Todd and carried. Dean Lassalle then gave the Teller's Report and requested the following gentlemen to escort the newly elected officers to the rostrum:

James M. Todd, escorting W. Stone Leake, President
B. W. Pegues, escorting H. L. Lehmann, First Vice-President
Karl P. Kammer, escorting Lionel J. Cucullu, Second Vice-President
A. Lee Dunlap, escorting John P. Fernandez, Secretary-Treasurer
Victor J. Bedell, escorting Ernest L. Mire, Director for Two Years
Charles M. Kerr, escorting F. Tackett Clarke, Director for Two Years

Also escorted to the rostrum were the two directors now in office:

Frederick H. Fox, escorting Frank W. Macdonald, Director
C. Glenn Cappel, escorting Harry P. Newton, Director

Retiring President Nairne then handed the gavel to President-elect Leake, who accepted the office and adjourned the meeting.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction, January 8, 1948

The meeting was called to order by President Nairne in the St. Charles Hotel at 9:30 a.m. Members present were Messrs. Cucullu, Lassalle, Leake, Lehmann, Macdonald, Mire, Newton and Fernandez. Mr. F. Tackett Clarke, a newly elected board member, also was present. Members of the December meeting were accepted as read.

The secretary reported that all nominees named in the ballot were elected to office. He also reported that all applicants named in the December membership ballot were elected to membership. Copy of the ballot is attached to these minutes.

The results of the license law poll were announced as follows:

226 members voted in favor of the proposed draft
30 members voted against the draft
28 members were neutral
3 members voted for the draft conditionally
1 member voted against the draft conditionally

289 votes were cast in all

Mr. Lehmann moved that the Louisiana Engineering Society assist in underwriting the cost of passage of the law to the extent of $1000, with the understanding that other interested groups may contribute to whatever extent they feel capable. The motion was seconded by Mr. Cucullu and passed.

Resignations of Messrs. Charles M. Bull, Thomas C. Earl, S. G. Frank Haas, H. M. Shilstone, Jr., F. A. Wilson, Jr., were accepted with regret.

Mr. Lehmann moved that the next regular meeting of the Society be held on February 16. The motion was seconded by Mr. Mire and carried.

Mr. Macdonald moved that a one-year Junior Membership in the Society be awarded to the students graduating from Louisiana Polytechnic Institute and Southwestern Louisiana Institute with the highest scholastic averages in engineering. The motion was seconded by Mr. Mire and carried unanimously.

Mr. Mire moved that the president and secretary be authorized to sign all checks in the Society's checking account and that either may have access to the Society's safety deposit box. The motion carried.

The revised constitution and by-laws were reviewed and it was decided to refer same back to the committee for insertion of a paragraph on Expulsion of Members similar to the one in the present constitution, and for the addition to the by-laws the number of members required for a quorum of the Board of Direction.

President Nairne read a report of the Finance Chairman for 1947.

The Chair then was relinquished to First Vice-President W. Stone Leake who, on the recommendation of the Board, appointed Mr. Hiram W. Mason as Contact Representative for the Third Congressional District for 1948. All other contact representatives were reappointed.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXIV JUNE, 1948 NO. 3

CONTENTS

EDITORIAL NOTES AND COMMENTS

The Front Cover. An airplane view depicts the alterations at Pontchartrain Beach. Over one million cubic yards of fill have been placed. Breakwaters, retaining walls and groynes have been constructed. The photograph was furnished by Mr. A. L. Willox, Chief Engineer of the Board of Levee Commissioners, Orleans Levee District.

E. C. P. D. The following material is abstracted from a recent bulletin concerning the Engineers' Council for Professional Development, or ECPD. The history, aims and activities of organization should be of interest to all engineers.

What Is ECPD?

The Engineers' Council for Professional Development was chartered as "a conference body organized to enhance the professional status of the engineer through the co-operative support of those national organizations directly representing the professional, technical, educational, and legislative phases of an engineer's life."

The participating organizations are the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers. The American Society of Mechanical Engineers, the American Institute of Electrical Engineers, The Engineering Institute of Canada, the American Society for Engineering Education, the American Institute of Chemical Engineers, and the National Council of State Boards of Engineering Examiners. As of January 1947, ECPD's constituent societies represented well over 100,000 individual engineers.

How Does ECPD Work?

The idea of ECPD as a co-operative agency or conference body, rather than an independent organization, with its constituent organizations co-operating in carrying out plans is an innovation. In fact, the whole conception and plan of ECPD as set forth in its charter are novel and far-reaching. A Council group of 24 members, three from each of the participating societies, is commissioned "to promote efforts . . . toward higher professional standards of education and practice, greater solidarity of the profession, and greater effectivenes in dealing with technical, social, and economic problems," . . . and "to recommend to the governing boards of the participating bodies, procedures considered to be of value or significance in promoting the general objective . . . and to administer such procedures as have been approved by those boards."

Thus ECPD is both exploratory and promotional. Above all it is charged with the responsibility of devoting its efforts unremittingly to those matters directly concerned with the professional welfare of the individual engineer regardless of his specialized technical field. In fact, ECPD was envisioned as the nucleus in a mass movement of the entire engineering profession toward an improved status attained by improving the quality of engineers themselves. As such, ECPD collects and, through its participating societies, disseminates information about the best ways to advance this movement.

What Does ECPD Do?

ECPD's immediate objective is the development of a system whereby the progress of the young engineer toward professional standing can be recognized by the public, by the engineer himself, and by the profession, through the development of technical and other qualifications which will enable him to meet minimum professional standards and also to take his full place as a responsible citizen of the community.

ECPD's basic program is divided into four interrelated phases, and its present activities are organized accordingly. First, there is the continuing study of the processes by which young men and

women, who seem to show interest and promise of success in engineering education, may be guided with some assurance into an engineering career; conversely, and effort to insure that those who do not have the desirable qualifications may advisedly be warned against attempting such a career. The second phase has to do with co-operation between the practicing profession and the engineering schools and colleges. At the present time this phase is largely occupied with the far-reaching program of evaluating for accrediting the curricula offered by the various educational institutions in fulfillment of requirements for engineering degrees. The third phase is concerned with the establishment, development, and maintenance of appropriate programs of post-college training through which the young engineer may keep up with rapidly moving technical developments while he is accomplishing his professional apprenticeship in practical experience. The fourth phase of the ECPD program is concerned with the project of creating an effective correlation among the various methods and criteria of recognition of the evolutionary development of the individual engineer.

ECPD has contributed in a material way through this program to an increasing awareness by government, industry, and the public of the importance of the engineer in research, production, management, and marketing; and to the growing awareness of the individual engineer of the scope and magnitude of the opportunity and responsibility which confront him as a citizen as well as an engineer. Its future tasks include continuing research in engineering education, continuing survey and translation of the changing needs of society as they directly affect the engineer's professional training and recognition, and continuing survey and evaluation of personal aptitudes and humanistic studies required for success in each engineering activity.

PAPERS AND DISCUSSIONS

PRACTICAL APPLICATION OF CATHODIC PROTECTION TO GAS DISTRIBUTION SYSTEM IN NEW ORLEANS*

By Sidney E. Trouard, Electrolysis Engineer, N. O. P. S. Inc.

Cathodic protection has been used successfully in New Orleans since February, 1929. Originally, it was applied with the use of rectifiers to the coated steel high pressure gas mains which had just been installed in the city. Presently, it is being used for protection against corrosion of many other underground facilities. In this paper, discussion will be limited to a brief description of the corrosion processes and to the practical application of cathdoic protection to the coated steel gas system in New Orleans. The discussion will be purposely made as non-technical as possible.

In terms of results secured, it might be well to state that, despite the fact that the coated steel gas mains in New Orleans are buried in soils which are generally considered to be amongst the most corrosive in the nation, not a single corrosion failure or leak has been experienced on these mains in the twenty years that they have been in operation. Presently, the gas system in New Orleans totals 821 miles of main, of which 159 miles are of coated steel. The coated steel mains range in size from 1" to 36", and all are cathodically protected. It appears reasonably certain that with proper application and proper maintenance of cathodic protection, the useful life of a coated steel gas main can be prolonged indefinitely, as far as corrosion is concerned. In New Orleans, it has been found that successful operation of cathodic protection on underground structures is materially aided by the observance of the following points:

1. Secure reasonably good coating on the mains to be protected.
2. Maintain the system to be protected electrically continuously and electrically free from accidental electrical contact with other subsurface utilities.
3. Maintain the electrical potential of the system to be protected at least -0.85v to a copper sulphate reference electrode.
4. Maintain continuous operation of the device furnishing the electric current for the cathodic protection.

* Presented at the regular meeting of the Society on April 12, 1948

5. Generally, use many small rather than very few large units for furnishing the cathodic protection current. This is to minimize the danger of so called cathodic interference.

CAUSES OF CORROSION

All metals, iron included, have a definite inherent tendency to go into solution when immersed in water. In the case of iron this tendency is manifested in the form of electrically charged iron particles (ions) entering the solution. However, since the solution, or electrolyte as it is called, must remain electrically neutral, an equivalent amount of positively charged ions must leave the solution. When iron is immersed in water, this balancing of ions is accomplished by the plating out of a thin film of atomic hydrogen from the solution onto the iron surface. This hydrogen film is of paramount importance for, upon its ability to remain undisturbed on the iron surface, depends whether or not the iron ions will continue to go into solution. When iron ions go into solution from any spot on the iron (that is, when electricity discharges from that spot on the iron) corrosion occurs at that spot (See Figure 1). If allowed to continue accumulating undisturbed, the hydrogen film would stop the corrosion reaction by insulating or separating the iron from the solution and also by the tendency of the hydrogen to re-enter the solution. This film is commonly called a polarization film.

Unfortunately, however, the polarization film of hydrogen may be destroyed in several ways. First, any oxygen present in the solution will unite with the hydrogen to form water. Second, the film may be shaken loose by vibration, or brushed off mechanically, or may unite with salts dissolved in the solution, or may even bubble off as a gas. At any rate, if the film is destroyed, the corrosion reaction mentioned above will begin again, more iron ions will go into solution, and more hydrogen will plate out and tend to stop the reaction. It becomes quite evident, then, that the force or agencies tending to destroy or remove the film are the controlling factors in the amount and rate of corrosion attack. The destruction of the film is called depolarization, and the forces tending to cause the destruction of the film are called depolarizing agents.

Printed below is the so-called Electromotive Force Series of Metals. The voltages shown are those that exist between the metal surface and the ions of that metal in solution. These voltages are really an index of the tendencies of the various metals to go into solution. Thus the rare earth metals at the top of the series, such as potassium, sodium, and calcium (the so-called base metals) have a much greater tendency to enter solution than have the so-called noble metals, such as gold, silver, and platinum, at the other end

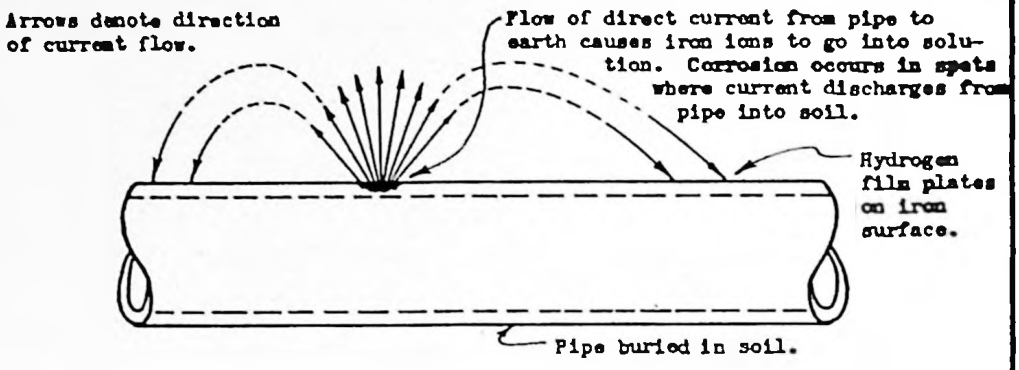


FIGURE 1

Corrosion occurs where current discharges from metal to soil. Hydrogen film forms where current collects on pipe.

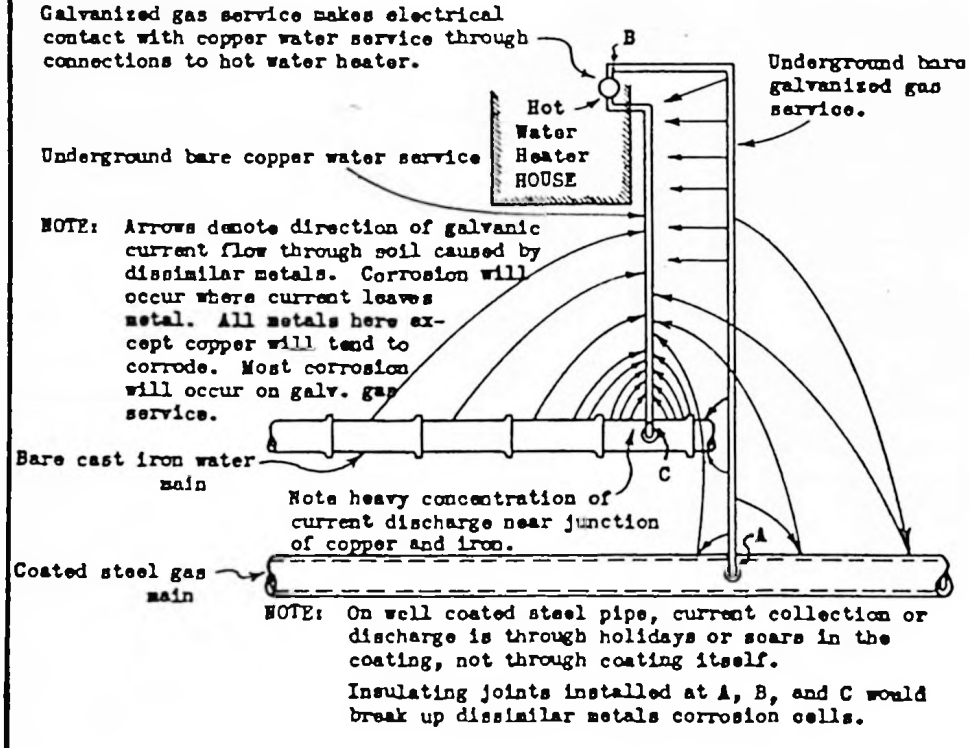


FIGURE 2

Corrosion Cell Caused by Dissimilar Metals

of the series. Gold for instance, will generally not even tarnish, whereas sodium has such a strong tendency to go into solution that it reacts somewhat violently when placed in contact with water. Metals ranging in between the base metals and the noble

metals have corresponding tendencies towards going into solution. The value for hydrogen has been arbitrarily selected as zero.

ELECTROMOTIVE FORCE SERIES OF ELEMENTS*

Metal	Potential
Potassium	+2.9241V
Sodium	2.7146
Magnesium	2.40†
Aluminum	1.70†
Manganese	1.10†
Zinc	0.7618
Chromium	0.557
Iron (Fe ++)	0.441
Cadmium	0.401
Nickel	0.231
Tin	0.136
Lead (Pb ++)	0.122
Iron (Fe +++)	0.045*
Hydrogen	0.000
Copper (Cu ++)	−0.344
Copper (Cu +)	−0.470
Silver	−0.7978
Lead (Pb ++++)	−0.80†
Platinum	−0.863†
Gold (Au +++)	−1.360†
Gold (Au +)	−1.50†

Chromium and aluminum and certain other metals and alloys such as stainless steel, possess the happy faculty of forming a natural impervious film or scale which protects them from corrosion attack. Iron, unfortunately, does not form such a protective film, even though it is more noble (that is, further down in the Electromotive Force Series) than aluminum and chromium. Hence, iron is generally much more susceptible to corrosion attack than are the metals which form scales. The formation of films of gas or scales of salts on the surface of metals is very important because these films or scales greatly influence the corrosion reaction. The ohmic resistance of the films or scales tends to retard current flow. Furthermore, a piece of iron plated over with atomic hydrogen exhibits behavior similar to a hydrogen electrode, rather than an iron electrode, hence corrosion cell current will be limited.

A number of factors influence aggravated attacks on iron. For instance, consider the effect of dissimilar metals (Figure 2). Suppose a copper or brass service is tied electrically to an underground steel main. The difference in position of iron and copper in the Electromotive Force Series of Metals will cause a flow of electric current in such a direction that iron ions will discharge into the solution from the surface of the steel main, the current will flow

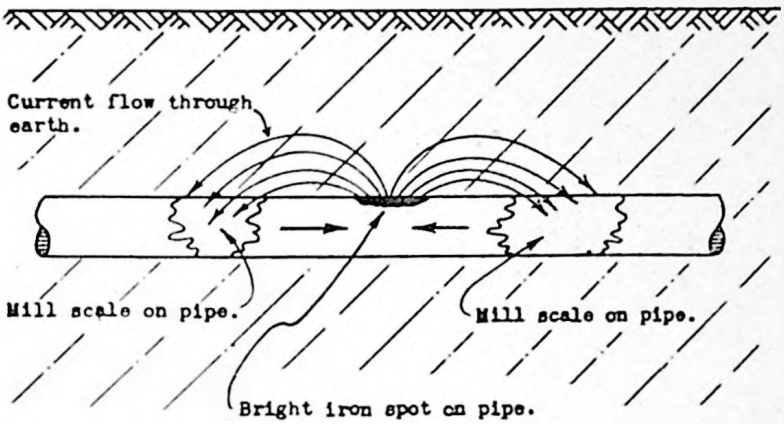
* From Handbook of Chemistry and Physics, 1947 Edition. Standard Electrode Potentials at 25° C.
† Values are approximate.

through the solution and collect on the copper or brass service, polarizing the latter. The surface from which the current discharged is called the anode, and corrosion will occur at the anode because of this current discharge (See Figure 1). The surface on which the current collected is called the Cathode, and the collection of the current at the cathode will tend to protect this surface from corrosion. The current generated in the cell is generally referred to as galvanic current. Such galvanic currents are usually generated when two dissimilar metals are connected together, the magnitude of the currents being influenced by such factors as the sizes of the anodes and cathodes, the readiness with which depolarization occurs at the cathode, the electrical resistance of the solution, and the relative position of the two dissimilar metals in the Electromotive Force Series. The farther apart the two metals are in the series the more driving force or voltage exists in the cell, the more current flows, and the more corrosion occurs at the anode, other things being equal. It might be stated that, generally, if any metal is tied electrically in a solution to a metal below it in the series, the metal higher in the series will be anodic and hence will corrode. For instance, if zinc (or galvanized pipe) is tied to iron, the current will leave the zinc and collect on the iron, causing corrosion of the zinc and protection of the iron. The use of zinc for galvanic anodes mentioned later is based upon this principle. If a piece of bright iron is tied electrically to a piece of rusty iron, and both metals are immersed in a solution the same effect is noted. Rusty iron has a position in the Electromotive Force Series close to copper, and a galvanic cell will be formed with the bright iron corroding. Good modern engineering practice prohibits the indiscriminate tying together of dissimilar metals underground, unless the dissimilar metals are shielded from the solution by good coatings. It is always good practice to use insulated joints between underground dissimilar metals, wherever practicable, in order to break up the galvanic cells.

Mill scale (Fe304) usually found on ferrous pipes also tends to accelerate corrosion. The mill scale sets up a galvanic cell with the bright iron, causing current discharge from the latter, with resulting pitting.

Aggravated corrosion may also be caused by galvanic cells formed when a pipe line passes through two or more soil zones wherein the chemical constituents of the soils differ (Figure 4) or where the salt or chemical constituents are more concentrated in one soil than in the other soil (Figure 5). The same is true for pipes passing through different soil zones where the oxygen concentration in one soil is considerably different from that of the adjoining soil (Figure 6).

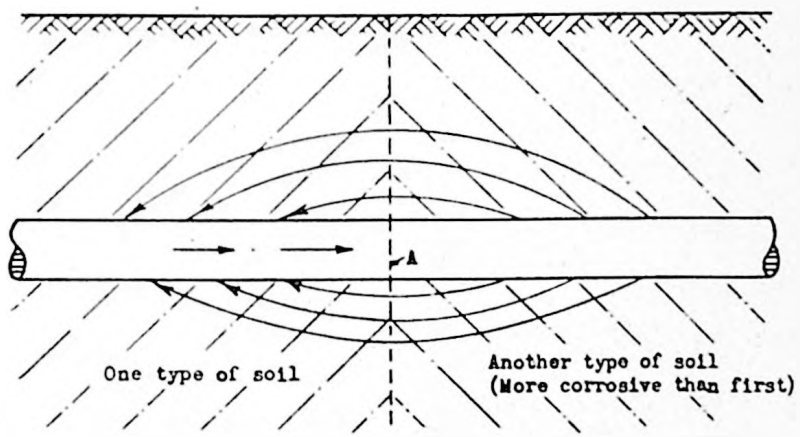
Pipes passing through beds of cinders or certain chemicals are



NOTE: Bright iron spot on pipe will be the anode and current will discharge from this spot to earth and cause corrosion to bright iron spot. Mill scale will be cathode and will collect current. The same action is noted between bright iron and rusty iron, with the bright iron the anode and therefore corroding.

FIGURE 3

Corrosion Cell Caused by Mill Scale or by Rusty Iron.



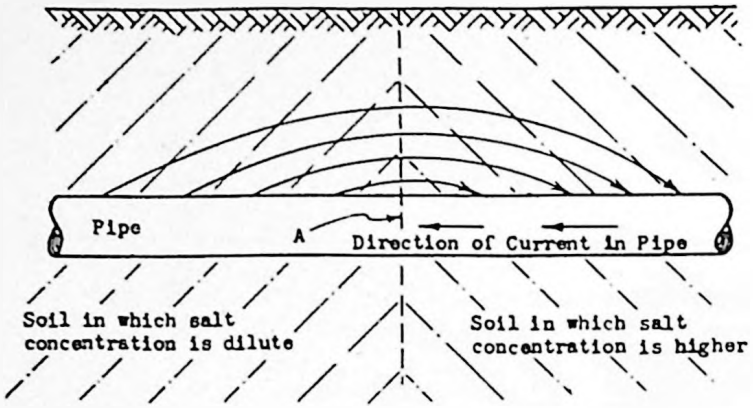
NOTE: Pipe in more corrosive soil will be anode and will corrode. Pipe in less corrosive soil will be cathode and will collect current. Insulating joint at A would stop this action.

FIGURE 4

Corrosion Cell Caused by Dissimilar Soils.

usually subject to direct chemical attack. In the case of the cinder beds, soil water leaches the acids from the cinders resulting in an acid solution of very low resistance—a condition favorable to rapid corrosion.

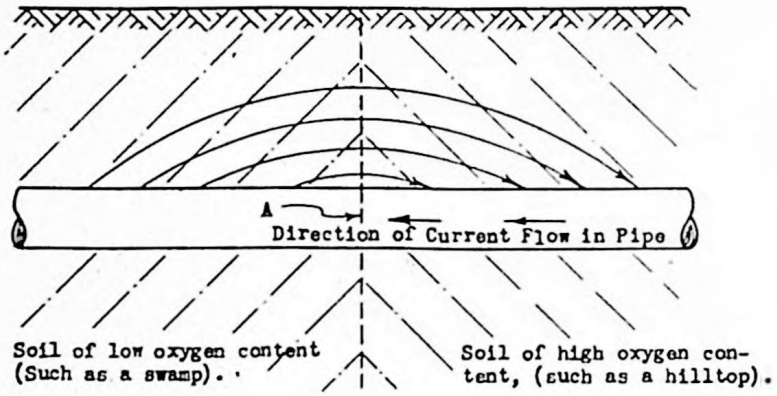
Stray currents from streetcar rails, or from welding machines,



NOTE: Pipe buried in soil of more dilute salt concentration is anode and corrosion occurs here. Pipe in other soil is cathode. Insulating joint at A would stop this action.

FIGURE 5

Corrosion Cell Caused by Difference of Concentrations of Salts in Soils.



NOTE: Pipe in poorly aerated soil is anode, and corrosion occurs here. Pipe in well aerated soil is cathode. Insulating joint at A would stop this action.

FIGURE 6

Corrosion Cell Caused by Difference of Oxygen Contents in Soils.

or from other sources, may cause rapid corrosion unless properly curbed. Fortunately, correct design of negative and drainage feeders for street railway systems can not only eliminate corrosion caused by stray currents, but can properly direct the stray cur-

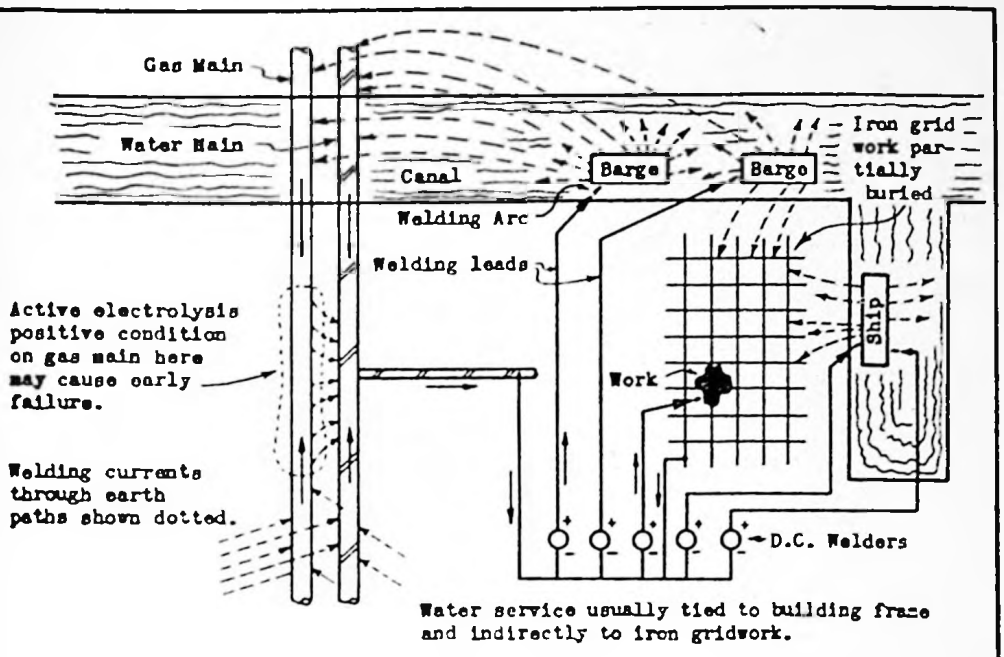
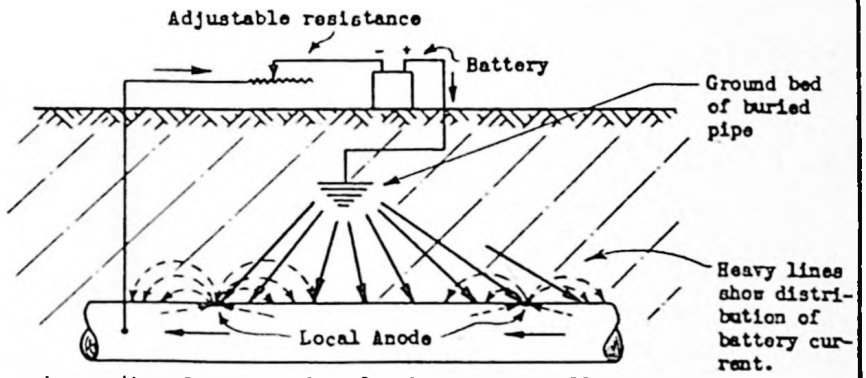


FIGURE 7

Stray Current Electrolysis Caused by Welding Machines with Earth Return.



Dotted lines show paths of current from local corrosion cell. By proper adjustment of resistor the galvanic currents streaming from local anodes can be bucked down to zero, or battery current can be forced to collect at the local anodes, rendering the original corrosion cell inoperative, thus stopping corrosion.

FIGURE 8

Schematic Diagram of Principle of Cathodic Protection

rents so that instead of causing corrosion they perform very useful duties in preventing natural soil corrosion. Operating engineers in many communities from which street railway systems have been removed now realize that from a corrosion viewpoint, the streetcars were much more of a boon than a curse.

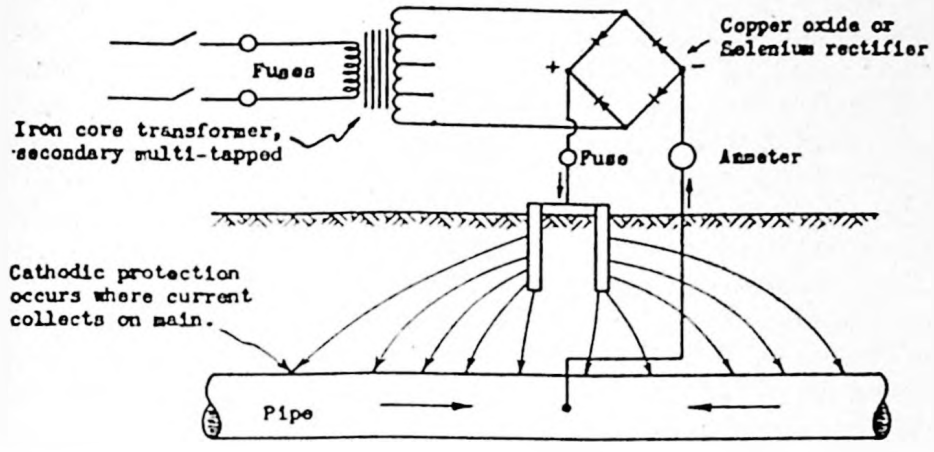
Stray currents from welding machines with one leg grounded can cause severe corrosion. A sketch showing the paths followed by such currents is shown on Figure 7. Part of the return current for the welding machines flows through the earth. In large shipyards employing a great number of welding machines, several thousands amperes of stray current may be circulated through the earth in a relatively small area, creating an acute electrolysis problem. The use of two insulated wires from ungrounded welding mcahines would obviously eliminate this action.

In various sections of the country, the action of certain anaerobic bacteria is held accountable for major corrosion. In this type of corrosion the bacteria is said to consume the polarization film built up on the cathodic surface and thus allow relatively heavy corrosion cell currents to circulate. This phenomenon has not been found to exist in New Orleans.

In terms of quantity of damage from corrosion cells, it should be mentioned that for every ampere of electric current discharging from iron 20 pounds of iron per year will go into solution. This can be and frequently is very serious when the corrosion takes the form of localized pitting. In the case of current discharge from zinc one ampere will consume roughly 23 lb/amp/yr. For magnesium, 8.75 lb/amp/yr will be consumed, for alumnium 6.5 lb/amp/yr.

CATHODIC PROTECTION AS MEANS OF COMBATTING CORROSION

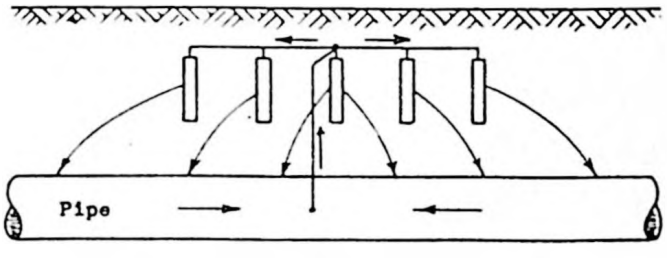
If we superimpose on any of the corrosion cells shown in Figures 1-8, a current from some outside source such that that current is forced to collect on the entire surface fo the pipe line—on areas that were anodes as well as areas that were cathodes in the original cell—and we regulate the distribution and intensity of the extraneous current such that all anodic spots are now cathodic, obviously we will have stopped corrosion. This process is called cathodic protection. It is shown schematically in Figure 8, using an external battery for supplying the current. With all the anodic spots bucked down to zero and even collecting current, it is obvious that the galvanic cell which originally existed and caused corrosion is now rendered inoperative. A polarization film will develop on the surface of the pipe, making the pipe more negative to ground (or to a copper sulphate electrode in the earth) and current requirements to buck all anodes down to zero will be diminished. In actual practice, it has been found that if a steel pipe is pulled down electrically in potential until it measures -0.85 volt to a copper sulphate electrode, full protection is secured on the main to be protected. To be on the safe side, a minimum standard of -0.900 volt is maintained in New Orleans. In making the above



Ground bed of junk metal, or graphite rods. Ground bed should be located at some distance from pipe under protection, and as far as practicable from other sub-surface utilities. Material of ground bed would ordinarily be consumed by current discharge to ground.

FIGURE 9

Schematic Diagram of Principle of Cathodic Protection Using Dry Disc Rectifier



Galvanic anodes of zinc, magnesium alloy, or aluminum alloy, buried in soil (usually in artificial backfill). Continuous flexible strips of magnesium 3/4" wide, 3/8" thick, with a #13 gage steel core, are also available for this use. Current discharge from anodes causes eventual consumption of the anode metal. Cathodic protection occurs where current collects on pipe surface.

FIGURE 10

Schematic Diagram of Principle of Cathodic Protection Using Galvanic Anodes.

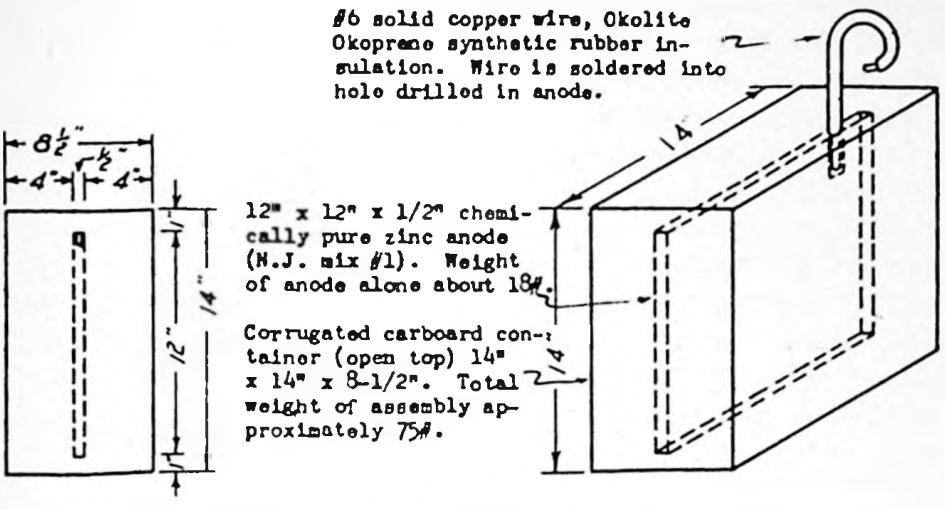
electrical measurements, a high resistance voltmeter (or a vacuum tube voltmeter, or a potentiometer type voltmeter) is needed to minimize the effects of the high resistance between the copper sulphate electrode and the earth. The copper sulphate electrode is a standard reference electrode and consists of a plastic tube about

8" long, and ½" diameter, the bottom end of which is plugged with a porous wooden plug. The tube is filled with a saturated solution of copper sulphate (CuSO4), into which a copper rod is inserted through the top end, and the top end suitably sealed. In use, the bottom end of the electrode is pushed into the earth (wet earth, if possible) and electrical conection is made to a copper or brass terminal on the top of the electrode. The resistance to earth of the copper sulphate electrode varies from about 250 ohms to possibly 10,000 ohms depending upon the condition of the electrode, and the dryness of the earth. Sometimes it is advisable to use CuSO4 electrodes in parallel, or to use a special electrode with a large area wood plug contacting the earth so as to minimize electrode resistance to earth.

Cathodic protection current may be furnished from any direct current source such as a rectifier (a device for converting alternating current to direct current), a battery, a direct current generator (driven by electricity, wind, gas, or gasoline) or by galvanic anodes. A schematic diagram of a typical rectifier as applied in a cathodic protection setup is shown in Figure 9. Rectifiers of copper oxide, selenium and mercury arc types, specifically designed for cathodic protection, already assembled, and ready to install in the field are commercially available.

In Figures 8 and 9, the negative side of the rectifier is shown connected to pipe line to be protected, and the positive side is shown connected to a ground bed buried some distance from the pipe line. Obviously the discharge of rectifier current from the buried ground bed will cause the eventual consumption of the metal in the ground bed, so that it will have to be replaced. In other words, the metal in the ground bed is sacrificed to protect the metal of the pipe line, and for that reason the ground bed is sometimes called a sacrificial ground bed. The ground beds are usually made up of junk iron or steel pipes or old rails buried in low resistance earth, some distance away from the pipe line. Carbon, treated graphite, and coke breeze or the equivalent are sometimes used instead of junk metal.

Another method of supplying current for cathodic protection is by means of galvanic anodes. This method is applicable generally only in areas where the electrical resistance of the soil is reasonably low—say 3000 ohms per cubic centimeter or less. It was shown previously that if any metal in the Electromotive Force Series is tied to another metal lower in the Series and both metals are immersed in solution, a galvanic cell will be formed wherein the metal higher in the Series will become the anode (and will discharge current, and thus eventually be consumed) and the metal lower in the series will become the cathode, (and will collect current, and thus tend to be cathodically protected). Metals such as



Zinc anode is centered in moist, homogeneous mixture of 50% gypsum, 50% bentonitic clay. Anode assembly is coordinated with expected construction work such that only enough anodes are precast to last one week. Anodes are then stored in damp atmosphere until used.

FIGURE 11

Zinc Anode Precast in Artificial Backfill

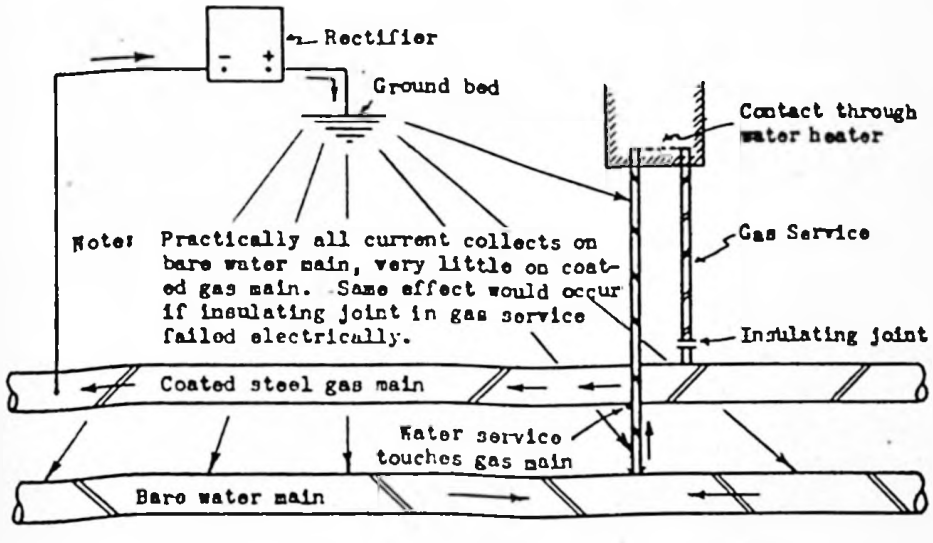


FIGURE 12.

Effects of Accidental Contact between Underground Mains

zinc, magnesium and magnesium alloys, and aluminum alloys lend themselves readily for use as galvanic anodes and are commercially available for this use.

Many soils contain certain chemical constituents (called anions) such as phosphates and carbonates, and these anions react with the

surface areas of the buried galvanic anodes in such a way as to throttle the electrical current output of the anodes. The anodes thus affected are said to have become passive. Their electrical resistance to earth increases, and their solution pressure is affected adversely. In certain other soils, notably those rich in sulphates, the galvanic anodes generally behave better, in that their electrical resistance does not increase materially, and their solution pressure does not decrease. Measured to a copper sulphate electrode, a commercially pure zinc anode normally should have a potential of about -1.1 volts. Pure magnesium will have a potential of roughly -1.7 volts, magnesium alloy -1.5 volts. When originally installed, aluminum alloy anodes in New Orleans showed open circuit potentials to CuSO4 of from -0.92 V to -1.45 V. The potential settled down to roughly -0.97 V after about one year service.

Obviously, if a galvanic anode is buried in an artificial environment rich in that type of anion which does not affect it adversely, its general behavior will be much improved. In the case of zinc and magnesium a backfill rich in gypsum (Calcium Sulphate) or ordinary commercial plaster has been found satisfactory, and the present general practice is to backfill these types of anodes in an artificial backfill containing gypsum. The artificial backfills for aluminum alloys usually consist of lime, salt and calomel. Aluminum alloy anodes are also commercially available precast in a Magnesite concrete shell in which are incorporated the recommended backfill chemicals. Magnesium anodes are available in a pre-packaged container, and also in flexible continuous ribbon from ¾" x ⅜" with a 0.092" steel core. In New Orleans, zinc anodes have been used with a great success since March, 1938, magnesium alloy anodes since October, 1945, and aluminum alloy anodes since January, 1947. The zinc anodes used in New Orleans are made from commercially pure zinc (99.92%) with impurities not exceeding the following:

Lead	0.08%
Iron	0.008%
Cadmium	0.003%

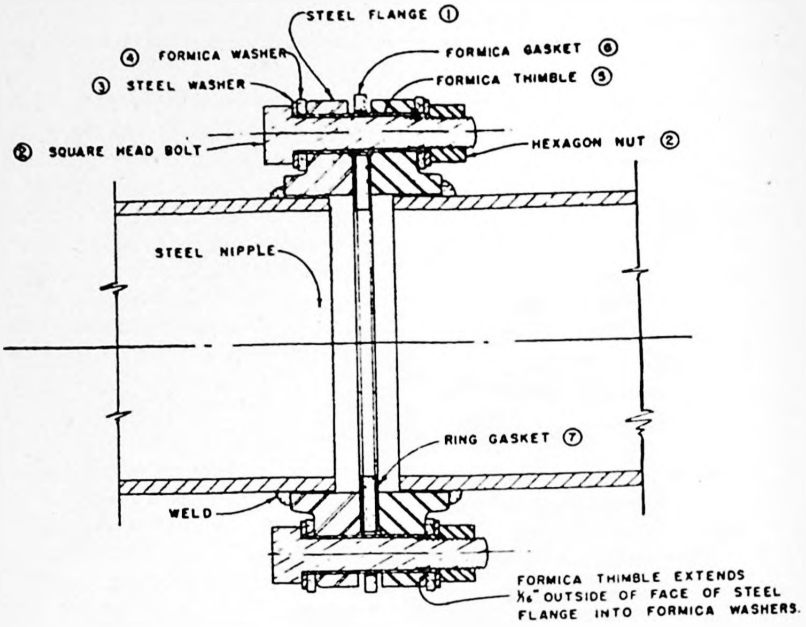
The use of galvanic anodes for cathodic protection is shown schematically in Figure 10. In Figure 11 is shown the method used in New Orleans for precasting zinc anodes in a wet artificial backfill of 50% gypsum, and 50% bentonitic clay. Anodes are precast only once a week, and then only enough are precast that all will be used within a week; meanwhile, they are stored in a damp atmosphere in the storeroom. The anode and artificial backfill are packaged in a corrugated cardboard box 14" x 14" x 8½" (the anodes are flat zinc plates 12" x 12" x ½"). In use, they are buried below the water level and a wire soldered to the plate is tied by means of a solderless connection in a nearby handhole to another

wire soldered to the steel gas main to be protected. In this way periodic electrical checks can be made of the performance of the anode and the gas main being protected.

The gas system in New Orleans is presently undergoing major expansion, particularly for residential use. Many of these extensions are relatively short (say 1000′ or less) and are of new coated steel pipe extended from existing cast iron mains. Since these new extensions are located in different parts of the city and are not tied together electrically, galvanic anodes rather than rectifiers are user for cathodic protection because of economies of original installation, and subsequent maintenance. Rectifiers are used in New Orleans on large networks of mains where current requirements are greater, and economies can be realized in original installation and subsequent maintenance and testing.

SOILS IN NEW ORLEANS

In New Orleans it has been noted that there is a definite relationship between the corrosivity of the soil in various areas and the elevation Cairo Datum of the areas. It has been found that the lower the elevation, the more corrosive the soil. New Orleans lies between the Mississippi River and Lake Pontchartrain which, being tied to the Gulf of Mexico, is brackish. Prior to the construction of the city, when no artificial levees or sea walls existed, the low areas which were approximately at sea level were largely cypress swamps, subject to overflow from both the Mississippi River and Lake Pontchartrain. In the overflows from the lake, salt deposited through evaporation of the brackish overflow waters, and progressively concentrated. In the case of the river overflows, the heavier sand particles deposited by gravity near the river front, (which accounts for the good soils in this area) and the lighter silts and colloids remained in suspension until deposited by gravity and evaporation in the lower and more remote areas. The elevation of the city varies from about 35′ Cairo Datum, near the river front, to 19′ Cairo Datum in the lower areas. Sea level is 20.4′ Cario Datum. As a result of the action mentioned above, there are three main soil zones: (a) River sand, which is mild, and generally non-corrosive in nature; (b) Sharky clay, which is high in colloid content, high in moisture, low in electrical resistance, approximately neutral or even slightly acid, high in salt content, and considered quite corrosive; (c)Acid muck soil, which is formed from decayed vegetation along the lake shore. This soil is high in total acid content, usually quite high in electrical resistance, and extremely corrosive. It has been estimated that penetration would occur on an unprotected bare spot on a steel main in this area in from 4 to 5 years. Most of the expansion of the gas system in New Orleans is in the corrosive areas.



CROSS SECTION
INSULATED FLANGE JOINT

FIG. 13.

COATINGS

The subject of pipe coatings is too broad in scope to be treated fully here. The requisites of a good coating may be stated to be:

1. High electrical resistance. Low moisture absorption, high dielectric qualities.
2. Mechanical strength. Ability to withstand rough field handling without excessive patching. Ability to withstand damage caused by shifting of soils (soil distortion), or by unfavorable backfills. Good bonding qualities.
3. Chemical stability. Coating should be chemically inert, capable of withstanding direct attacks of chemicals, bacteria, etc. of soils.
4. Longevity of service.
5. Economic feasibility.

Gas mains presently being laid in New Orleans are mill wrapped and consist of three thicknesses of coal tar enamel, one spiral wrapping of Fiberglas, one spiral wrapping of coal tar impregnated

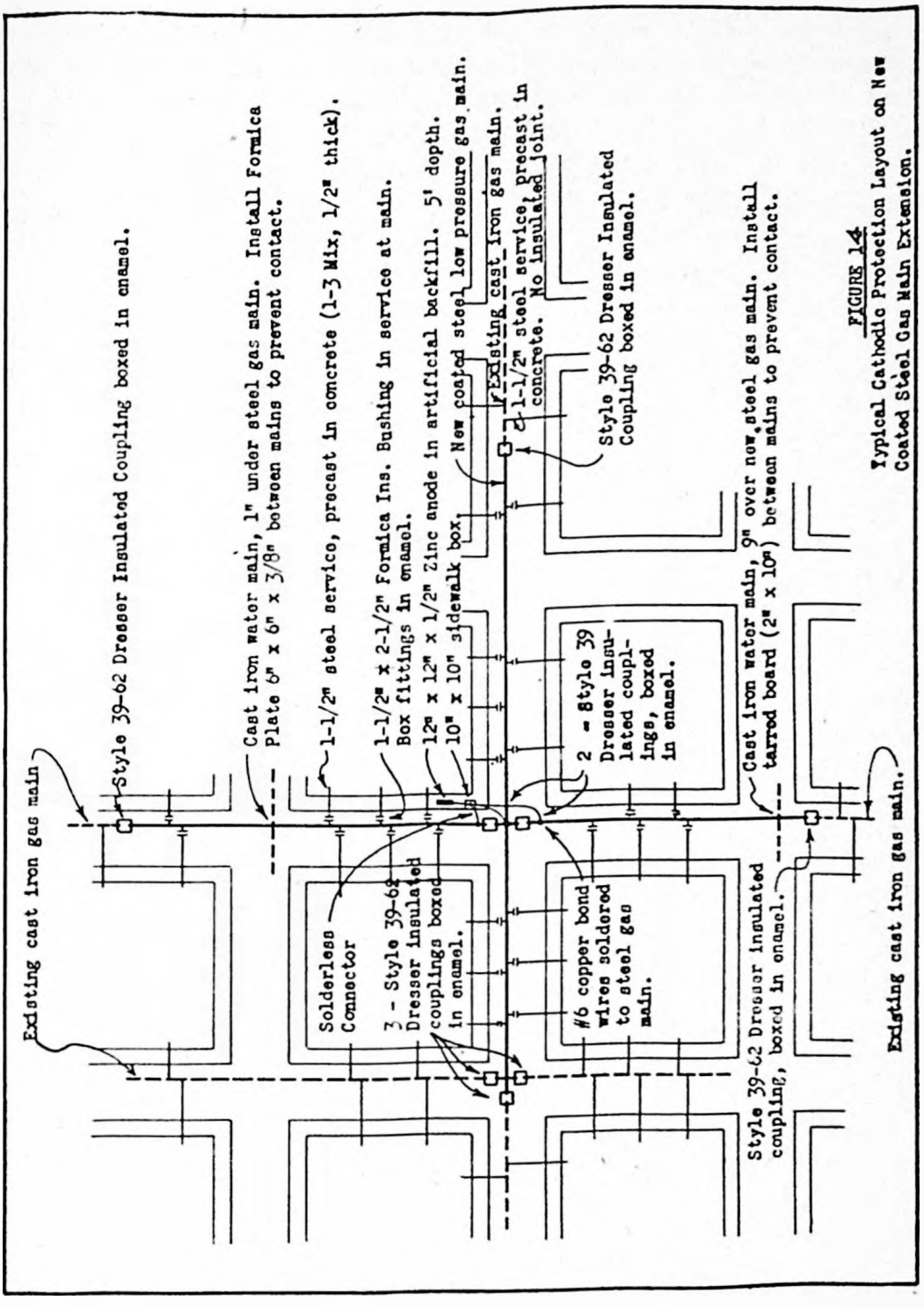


FIGURE 14
Typical Cathodic Protection Layout on New Coated Steel Gas Main Extension.

asbestos felt, and a final spiral wrap of Kraft paper. Minimum acceptable bituminous coating thickness is 0.156".

For low pressure gas services in New Orleans, a precast concentric jacket of 1-3 mix of coarse sand and cement has been found effective. Boxing gas services in concrete has been used in New

Orleans for nearly 50 years with excellent results. In a system containing 94,000 concrete encased gas services, an average of less than 20 services are replaced yearly because of corrosion.

INSULATING JOINTS

Insulating joints are indispensable in the effective application of cathodic protection, or in breaking up galvanic corrosion cells where cathodic protection may not be practically applied. For instance, in Figure 2, if insulating joints were installed in the dissimilar metal system at points A, B, and C, the galvanic cells caused by the various dissimilar metals would be broken up. Similarly, the current generated by the concentration cells shown in Figures 4, 5, 6, would be broken up the cells rendered inoperative, by installing an insulating joint at point A.

In cathodic protection work, insulating joints are necessary to electrically isolate the structure to be protected from other underground mains to which they tie, and are of convenience in sectionalizing for locating accidental electrical contacts between such structures. The bad effects caused by such an accidental contact are shown in Figure 12. Under this condition, the cathodic protection to the coated steel gas main is rendered useless because practically all of the current will collect on the bare main (which has low electrical resistance to earth) and very little will collect through the scars and holidays of the coated main which is to be protected. This results in the potential to CuSO4 of the structure under protection being changed adversely from, say -0.900 volts, to the potential of the bare main (say -0.500 volt), and corrosion will proceed despite the rectifier. In installing new mains, such contacts should be avoided, by using suitable physical separators (such as tarred boards, Formica blocks, etc.) between the structure affected. In existing systems, such accidental contacts should be located and removed before efficient cathodic protection can be effected.

In New Orleans, insulating Formica bushings are installed in the concrete coated services at the main. For high pressure bituminous coated services, the insulating joint is located at the service riser, and consists usually of a Formica bushing, or a Formica nipple, or in some cases an insulating flange. A detail drawing of the latter type of joint is shown on Figure 13. For sectionalizing insulating joints in the line, Dresser Style 39 Couplings, or insulating flanges of valves) are used. For insulating steel gas mains from cast iron gas mains, Style 39-62 Dresser Coupling are used. Typical practices employed on a new low pressure coated steel gas main extension are shown in Figure 14.

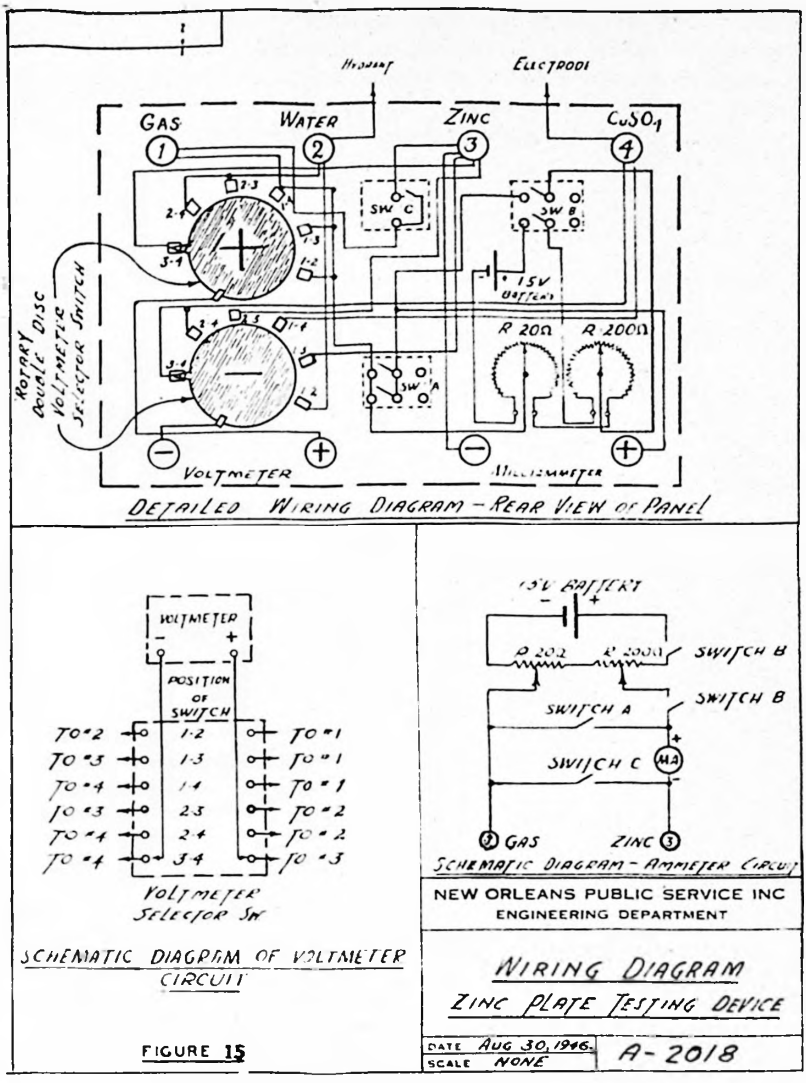


FIGURE 15

ELECTROLYSIS TESTING AND RECORDS. INSTRUMENTS

In New Orleans it has been found helpful to make a monthly check of rectifier current output and potentials to CuSO4 electrode at salient points of the structures under protection.

A periodic check (usually yearly) is made of all galvanic anodes and the results are recorded. From these readings a running check may be kept of such useful performance data as anode current

output, anode resistance to earth, coating resistance, potential of gas main to CuSO4 electrode, and open circuit potential of anode to CuSO4 electrode. A meter assembly, advised locally, and especially designed for testing of galvanic anodes is shown diagrammatically in Figure 15. In use, wires from the four respective building posts are extended to:

1. Gas Main.
2. Galvanic Anode.
3. Water Hydrant
4. CuSO4 electrode, 100' away from anode.

By proper manipulation of the rotary selector-switch, all possible combinations of readings may be secured between the four binding parts, with anode current on and off. A convenient feature consists of two 100' reels of wire incorporated in the assembly to facilitate testing. The meters used are standard instruments which were on hand and may be removed for other use.

By means of the potentiometer arrangement, the resistance of the milliameter can be nulled, or for testing purposes, extra current from the battery can be forced into the earth from the anode.

In addition to the high resistance voltmeter and standard milliameter mentioned in the assembly above, other useful instruments are (a) Shepard Soil Resistivity Rods; (b) A standard megger set used with four or more steel pins for soil resistivity measurements to any desired depths; (c) ordinary low resistance direct current multi-ranged voltmeter, and ammeter; (d) A pipe locator tone set —preferably one with an interrupted tone. This set is very useful in locating accidental contacts between underground mains, short circuited insulated joints, etc.

Recording millivoltmeters and high resistance voltmeters are valuable for determining effects caused by various stray currents, and for studying other phenomena.

OBITUARY

of

JAMES J. BULLIUNG

The sudden death of James Joseph Bulliung, a life member of this Society, has brought a keen sense of loss to his many friends.

Death came while he was at home with his wife after having been to his office that day. He had suffered from hay fever and asthma which seemed to have suddenly affected his heart.

He was born in New Orleans September 24, 1891 and lived in the City all of his life. He attended the Public Schools and while he could not afford to go to University he attended evening school and studied Architectural Engineering and Outdoor Advertising at both of which he became most efficient.

Mr. Bulliung started work with the New Orleans Railway and Light Co. in 1914 as a draftsman. He left this Company and returned some years later. During 1917 he became a member of the Louisiana Engineering Society and had been an active member ever since, particularly at the Annual Meetings and at the Summer Golf Tournaments. He was past President of St. John Golf Club, was a member of New Orleans Golf Association and many Civic Organizations. He took part in all of the varied drives for Red Cross, Community Chest, Boy Scouts, etc. He was loved by friends in all walks of life because of his gentlemanly manner, his kind and jovial disposition.

He married Katherine Cleary and had three daughters, Audrey, Dorothy, and Shirley, al of whom revered him as a good husband and father.

BE IT RESOLVED, that in behalf of the Membership of the Louisiana Engineering Society this memorial be adopted in trbiute to the memory of our late life member, James Joseph Bulliung.

BE IT FURTHER RESOLVED, that this memorial be spread upon the minutes of the Society and that a copy be sent to his wife, Mrs. James J. Bulliung, with an expression of sympathy and heartfelt condolence.

D. W. STEWART, Chairman
A. J. HARRIS
A. W. BETZ

OBITUARY

of

WARREN C. SHANKLE

The death on May 26, 1947, of Warren C. Shankle, Major (retired), at the age of 50 from the effects of a heart ailment aggrevated by service with the Corps of Engineers during the last World War, removed from our midst a most useful citizen and engineer with commendable qualifications.

Mr. Shankle was born at Powder Springs in the State of Georgia on January 7, 1897. He studied mechanical engineering at Tulane University before volunteering for military service in the first world War.

For 20 years, from 1919 to 1939, Mr. Shankle maintained an agency in New Orleans which sold, distributed and serviced construction equipment for contractors throughout the Southern states. The period from July in 1940 to January in 1947, with the exception of 15 months active military service, was spent as Equipment Engineer for the Louisiana Department of Highways. Active military service during World War II included special assignments to Fort Belvoir, Virginia, Fort Leonard Wood, Missouri, and the Ohio River Division Depot at Columbus, Ohio.

Participation in the activities of local units of the Louisiana Engineering Society, American Legion, Amvets and Woodmen of the World were a responsibility taken seriously by Mr. Shankle along with his devout religious affiliation with the First Methodist Church in Baton Rouge.

The undersigned members of your Committee feel that the Louisiana Engineering Society should honor the memory of Warren C. Shankle by adopting the following resolution:

BE IT RESOLVED, That, in behalf of the entire membership of the Society, this memorial in tribute to the memory of our late friend and colleague, Warren C. Shankle, be adopted.

BE IT FURTHER RESOLVED, That, these resolutions be spread upon the minutes of the Society and published in the Proceedings, also that copies thereof with an expression of sympathy and heartfelt condolence be sent to the widow; the daughter, Mrs. C. F. Record, formerly Myrtle June Shankle, residing in Clinton; the two sons, Arthur T. Shankle and Warren C. Shankle, Jr., of Alexandria.

H. L. LEHMANN, Chairman
L. V. WILLEY

ENGINEERING BRIEFS

New Move to get St. Lawrence power started by Governor of New York—International Joint Commission would be asked to allow N. Y. Power Authority and the Ontario Hydro-Electric Commission to work jointly.

Governor Thomas E. Dewey of New York has instructed the Power Authority of the State of New York to begin negotiations with Ontario for joint development of the water power resources of the International Rapids section of the St. Lawrence River. Under the plan sponsored by Governor Dewey, an application would be made to the International Joint Commission for permission for the work to be undertaken jointly by the Power Authority of New York and the Ontario Hydro-Electric Power Commission.

About 2,200,000 hp. can be developed in this section of the river at a cost to New York State of $131,000,000, for its half of the power, according to estimates of the power authority based on construction costs of May, 1947. Development of this power was included in the 1941 agreement between this country and Canada for the St. Lawrence seaway and power project, which was again rejected by Congress in March (ENR March 4, vol. p. 340) when a joint resolution giving effect to the agreement was referred to a committee for further consideration. At that time, little objection was raised to the power development portion of the program.

Action Under 1909 Treaty

This new plan for getting the power project started is based on the assumption that the work could be authorized by the International Joint Commission, which was set up under the Boundary Water Treaty of 1909. In a dispatch to the New York Times of May 2, A. O. Stanley, chairman of the United States section of the commission, is quoted as saying that the commission could approve applications for permission to build the necessary structures.

On the matter of work in the international waters not covered by the treaty, such as the proposed power development, Article III of the treaty says: "It is agreed that, in addition to the uses, obstructions and diversions heretofore permitted or hereafter provided for by special agreement between the parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the [boundary] line, affecting the natural level or flow of buondary waters on the other side of the line, shall be made *except by authority of the United States or the Dominion of Canada* within their respective

jurisdictions *and* with the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission."

The words in italics above appear to indicate that while approval by the commission would be necessary, approval by the governments of both Canada and the United States also would be required before actual construction would be undertaken. Further, as the treaty gives navigation requirements precedence over power development, the dams needed for power could not be built without first making provision for maintenance of the existing canal on the Canadian side, which would put out of service by the proposed power dams.

It does not appear probable that congressmen who advocate construction of a 27-ft. ship canal to replace the antiquated canal on the Canadian side would permit Congress to be by-passed in the manner suggested by Governor Dewey, as construction of dams without provision for the locks might block the seaway development indefinitely.—Engineering News-Record.

Into Thin Air. Captured German V-2 rockets, which can carry a ton of equipment more than one hundred miles up, have enormously increased our knowledge of the earth's outermost atmosphere. Several V-2's have been fired in New Mexico by the Army in a co-operative research program with a number of government and university laboratories. The results, published in technical reports, have been comprehensively reviewed by Ernest H. Krause of the Naval Research Laboratory in a paper for the American Philosophical Society.

The V-2 is 46 feet long and 5 feet in diameter. To keep it pointed in the right direction, the propelling gases from the rocket motor play on carbon vanes located in the tail and controlled by gyroscopes. It rises slowly from the ground and goes faster and faster until it reaches a speed of some 3500 miles per hour, when the fuel is exhausted. Thereafter the vanes cannot control the direction of flight and the rocket may roll, pitch, and yaw about, a serious disadvantage from the experimental viewpoint. On the next flight, the rocket will have a device to keep one instrument, the spectrograph, automatically pointed at the sum.

The rocket spends about five minutes above the 30-mile level, and some data taken during this time are radioed to the ground. To recover spectrographic and photographic data, the rocket is broken up—weakened by a small charge of TNT, it breaks on contact with the dense atmosphere—and the pieces tumble down relatively slowly. Even after extremely high flights, equipment often lands in fair condition, and occasionally, intact.

The present research concerns cosmic rays, the ionosphere, the spectrum of the sun, and measurements of pressure, temperature, and composition of the upper atmosphere. Much new and some totally unexpected information has been collected. Since cosmic rays change before they reach the earth, observation of primary rays has heretofore been impossible. The V-2 reaches the region of the primary rays and passes through the zone where the changes occur. This information will lead to a better understanding of what cosmic rays are and where they fit into the scheme of things.

Previously the radiant energy from the sum could be examined only at altitudes up to 20 miles. At 100 miles, wave lengths much shorter than those previously observed were found, but a layer of ozone lying between 20 and 40 miles absorbs these waves before they reach the earth.

Despite difficulties involved in dealing with the great variations of temperature and pressure found throughout the atmosphere, instruments for measuring these values were devised. At about 80 miles, pressures were recorded as low as one-ten-millionth of the atmospheric pressure on earth, corresponding to a high artificial vacuum. It is believed that, beyond the measured range, at 100 miles, the pressure is about 100 times lower. Striking variations in temperature were noted. Temperature drops rather steadily with altitude until it reaches about—63°F. at ten miles, and varies slowly for another ten miles. From 20 to 30 miles up, it increases steadily to 130°F., drops again to — 100°F. at about 50 miles, and finally rises again, reaching about 212° at 75 miles.

On various flights, special strains of seeds and fruit flies were taken up 106 miles to determine whether radiation above the atmosphere might produce mutations. On recovery, they showed no detectable changes, but this is not conclusive, since the specimens were shielded by metal.

The next several years should see interesting developments in upper-atmosphere research, now that the ground work and techniques have been perfected. At the present rate of firings, there are enough V-2's on hand to last another year or so, and complex long-range experiments are planned. The rocket has opened the door to vast regions of space previously known only through the astronomer's telescope.

—Industrial Bulletin of Arthur D. Little, Inc.

Electric Radiant Heating. A new electric radiant-heating panel which generates heat in the ceiling has been developed by the U. S. Rubber Company, Passaic, N. J. The panels, called Uskon, are heated by a conductive rubber-resistance element. Rubber is normally an excellent insulator against electricity. In Uskon, how-

ever, scientists reverse the chemical nature of the rubber to make it conduct electric current.

A company spokesman said the mounting cost and scarcity of oil, gas ,and coal will stimulate interest in electric heating. He claimed that the new system is the "most practical, efficient, and esthetic" ever developed. It can be used wherever electricity is plentiful. Present estimates by U. S. Rubber engineers indicate that it can be operated as economically as other heating systems in well-insulated houses where electricity can be obtained for 1½ cents per kwhr or less. To illustrate the economics of this type of heating the engineers selected a typical house, consisting of a large living room, kitchen, two bedrooms, and hall, and estimated the cost of heating for a year in twelve different cities. The house contains 8000 cu ft of space and it is well insulated to reduce heat loss to a minimum. The estimates are based on minimum power rates reported for the twelve cities. They do not take into consideration any special rates for heating that may be granted in various localities. They allow for continuous and uniform operation 24 hr per day at 68 F and do not make provision for savings that may be realized by operation of the system at lower temperatures in some parts of the house. The chief determining factors in the study are the power rate and climate. The estimates for a full year of operation are as follows:

Pittsburgh, $190.00; Buffalo, $247.50; New York, $252.00; Jacksonville, $39.30; Atlanta, $66.93; Memphis, $47.00; Denver, $291.60; Seattle, $220; San Francisco, $43.00; Bangor, $170.20; San Diego, $61.00; Chicago, $310.00.

The standard size of the heating panels is 4 x 4 ft. Other sizes are made to order when needed. The panels are about ¼ in. thick, resembling standard interior building boards. They may be nailed to the joists in the ceiling or may be installed over an existing ceiling. There are no wires in the heated area of the panel. Wires bring current to the edge of the conductive rubber. The heating element is sandwiched between several layers of phenolic insulation and the laminated construction is made rigid by a backing of $\frac{3}{16}$-in. asbestos board. Aluminum foil on the upper side serves as a reflector to prevent heat from going through the roof.

The panels operate on 220 volts. They are made in two standard wattage densities, 17 watts per sq ft and 22 watts per sq ft. The 17-watt panels are used in rooms with normal heating requirements. The 22-watt panels are used in bathrooms, over large window areas, and in rooms with abnormally high heat losses. The panels usually cover about 70 per cent of the ceiling. To provide the optimum results they are arranged in a peripheral pattern, with a

nonheating section in the center of the room which is filled in with standard building board. The peripheral pattern produces a slight air circulation which prevents "stuffiness" and disperses tobacco smoke and kitchen odors.

The temperature in each room is individually controlled by thermostat. The surface temperature of the ceiling averages about 100 F. This affords a flexible system in which certain rooms may be reduced in temperature while others remain at a higher level.

The panels may be finished with paint, paper, plaster, or fabric. Radiators, pipes, and other obstruction which interfere with room decoration are eliminated. There is no smoke, odor, or soot, Coal bins, fuel tanks, and furnaces are also eliminated. No chimney is required although one may be added for decoration.

The ceiling heats up to maximum temperature in about 15 minutes. Room space is comfortable at 68 F because the radiant heat "shines" directly on occupants, eliminating the necessity of warming the air.

The original cost is said to compare favorably with other systems. —Mechanical Engineering.

We extend our thanks to "WE," employees' magazine of the Winnipeg (Canada) Electric Company, for passing along the following anonymous Kiplingesque ballad, entitled, "I Learned About Safety From Them":

I have taken my jobs where I found them,
    I've roamed and I've bummed in my time;
I've had good luck in getting my partners,
    And four of the lot were prime.
One was a first class molder
    And one a gold miner from Nome
And one was a grand old machinist
    The last a young laddie from home.
Now, I weren't much for this Safety,
    But taking it all along
It's got me a-guessing, has Safety,
    And surely it cannot be wrong.
There's times you'll think it's just foolish;
    There will be times when you're sure it's all wrong;
But the lessons I've learned from the crippled and burned
    Make me think that it's good for the strong.
Now, I was a young cub in those days
    Learning my trade on the floor.
French Jonnie was working beside me
    When the crane broke as never before.

That big flask came down with a wallop,
Poor Jonnie was under the rim;
Why, it happened so quick it near made me sick—
But I learned about Safety from him.
Then I quit the trade for the Yukon;
Went a-diggin' for gold in the ice;
I met there a husky young miner
Who sure was in need of advice.
He was brawny, and lucky, and boastful,
This reckless young heathen named Tim.
Well, he's there to this day, but buried deep in clay—
And I learned about Safety from him.
Then I shifted from there down to Portland,
And got me a job building ships;
They put me to help a machinist
Who wasn't afraid of hot chips,
'Til straight in the eye he got one,
Red hot from the tool to his glim;
So now he is shy that useful right eye—
And I learned about Safety from him.
Then I came home to the Old State;
Thinking I'd learned a good rule,
Until this young lad on the drill press
Told me I was a damned fool.
But the sleeve he'd forgotten to button
Wound up in the spindle so slim;
Broke his arm with a snap like a dynamite cap—
And I learned about Safety from him.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, March 8, 1948

The meeting was called to order by President Leake, with Messrs. Cucullu, Lehmann, Macdonald, Mire, Nairne and Fernandez present. Minutes of the regular meeting of January 8 and of the special meeting of February 2 were accepted as read.

A communication from the New Orleans Chapter, Society of Plastic Engineers was read and the secretary was instructed to secure a copy of the constitution of the parent society as well as of the local section, if any, and a roster of the membership of the patter.

A letter from the Construction Industry Association of New Orleans concerning the license law was read. The secretary was instructed to thank this group for its constructive criticism, and to forward copies of this correspondence to Mr. Charles M. Kerr, Chairman of the Committees which is preparing the proposed law.

Two corrections in the constitution referred to in the minutes of the special meeting of February 2 were approved. It was decided that the revised constitution and by-lws would not be submitted to the membership until action has been taken by the legislature on the license law.

A communication from Mr. J. M. LeDoux containing an offer of a volume on engineering to the Society's library was read, and the offer was accepted with thanks.

A communication from the Engineers' Council on Professional Development concerning "Uniform Canons of Ethics in the Engineering Field" was referred to the Professional, Civil and Industrial Affairs Committee, of which Mr. R. A. Steinmayer is chairman.

Mr. Lehmann moved that no organizations except those allied with L.E.S. be permitted to use the Society's headquarters in the St. Charles Hotel. The motion was seconded by Mr. Mire and carried.

The Secretary was authorized to write to the members of the Louisiana Council of Engineers, suggesting that contributions toward the expense of passing the license law would be accepted cheerfully, and should collection exceed the cost the Louisiana Engineering Society would bear half of the total cost and other groups would be reimbursed in proportion to their contributions.

The secretary was authorized to place on the ballots for the year 1948 the names of all applicants who have been approved by the Membership Qualifications Committee.

The resignations of Messrs. E. J. Angelo and Donald Nestler were accepted with regret.

Mr. Arthur M. Hill was appointed Editor of the Proceedings for 1948.

The secretary was instructed to employ a Certified Public Accountant to audit the accounts of the Society for 1947.

Mr. David W. Stewart was appointed Chairman of a committee of his own choice to write an obituary in honor of the late beloved member, J. J. Bulliung.

It was decided that technical ppaers would be presented during the summer months as usual.

The Secretary was instructed to inform Mr. E. L. Fithian, Chairman of the Employment Committee, that New Orleans Public Service Inc. is in need of electrical engineers, particularly in the Sales Department.

Mr. Macdonald moved that the secretary's remuneration be $1500 per annum, beginning January 1, 1948. The motion was seconded by Mr. Nairne and carried.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society, March 8, 1948

The meeting was called to order by President Leake at 8:05 p. m. in the Jackson Room of the St. Charles Hotel. There were approximately 100 members and guests present. Mr. Macdonald moved that the reading of minutes of the preceding meeting be dispensed with, seconded by Mr. Dornblatt and carried.

President Leake invited members to introduce their guests, and following these introductions he presented the speaker of the evening, Mr. M. B. Willey, Chief Engineer of Ray McDermott Company, Inc. Mr. Willey's very interesting paper entitled "Engineering Characteristics of the Gulf Coast Con-

tinental Shelf" was read by Mr. Charles L. Graves, after which Mr. Willey answered a number of question on the subject.

Then was presented a most instructive film showing the construction of Superior Oil Company's drilling platform in the Gulf of Mexico, and the meeting adjourned with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction, April 12, 1948

The meeting was called to order by President Leake, with Messrs. Cucullu, Macdonald, Nairne, Lehmann and Fernandez present. Reading of minutes of the preceding meeting was dispensed with.

President Leake reviewed the activities of the Louisiana Council of Engineers.

The Secretary announced that all applicants named in the March ballot were elected to membership.

The Treasurer's quarterly report was read and it was announced that the deficit for the annual meeting was $483.73.

Resignations of Messrs. B. J. Haney and P. J. Guelfi were accepted with regret.

The Secretary was instructed to send a convelascent gift to Dr. R. A. Steinmayer, former president of the Society, who is ill.

A petition by the Society of Plastic Engineers for affiliation with the Society was read, and in view of the fact that a roster of the local membership had not been received, no action was taken.

Mr. Cucullu moved that the Secretary write to Governor-elect Earl K. Long and bring to his attention the Society's resolution concerning vacancies on the Board of Administrators of Louisiana State University.

Mr. R. M. Seago was appointed chairman of a committee of his own choice to handle the annual golf tournament and outing to be held in July.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society, April 12, 1948

The meeting was called to order by President Leake in the Jackson Room of the St. Charles Hotel, with approximately 90 members and guests present. Mr. Nairne moved that the reading of minutes of the preceding meeting be dispensed with.

President Leake outlined the progress of the Louisiana Council of Engineers and appealed to all members to assist in effecting the passage of the Engineers' License Act.

Messrs. H. L. Lehmann and D. W. Stewart read obituaries, respectively, of Warren C. Shankle and James J. Bulliung, recently deceased members of the Society, following which a moment of silence was observed in their memory.

Mr. Leake introduced the speaker of the evening, Mr. Sidney E. Trouard, Electrolysis Engineer of New Orleans Public Service Inc., who gave a most interesting address on "Practical Application of Cathodic Protection to Gas Distribution Systems in New Orleans".

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

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section Louisiana Engineering Society
Executive Committee

Date, January 7, 1948; time, 5:00 p. m.; place, Highway Testing Laboratory.

Officers persent: J. J. Saurage, president; W. J. Wallace, 1st vice-president; A. J. Mary, 2nd. vice-president; F. A. Hannaman, Jr., sec'y. and treasurer; T. E. Peak, past president, and J. T. O'Brien, past president.

President Saurage opened the meeting and discussions followed concerning the appointments to the various committees. The following appointments were made.

Technical Papers Committee: A. J. Mary, chairman; Fred C. Fenn, R. A. Mornhinveg, A. J. Ferguson, R. B. Lautner, Louis Duclos.

Entertainment and Arrangement Committee: H. L. Landry, chairman; M. H. Elissalde, G. T. De La Matyr.

Membership Committee: G. O. Coignet, chairman; M. A. Lea, D. H. Brown, O. J. Herbert, A. M. Melancon, H. A. Marcoux, H. A. Hall.

Publicity Committee: D. F. Latimer, chairman; L. V. Willey.

At the suggestion of Dr. W. J. Wallace, it was agreed to organize a Student Activity Committee for the first time.

Those chosen to serve on this new committee for the year 1948 were: W. P. Evans, chairman; K. M. Loughmiller, W. A. Wintz, Jr.

President Saurage stated that meetings should be held every two months, with the first regular meeting for 1948 tentatively scheduled for February 17.

It was decided to hold another meeting fo the executive committee approximately two weeks prior to the date of the regular meeting.

With no further business, the meeting adjourned.

F. A. HANNAMAN, JR., Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section Louisiana Engineering Society
Executive Committee

Date, February 14, 1948; time, 5:00 p. m.; place, Highway Testing Laboratory.

Officers persent: J. J. Saurage, president; W. J. Wallace, 1st vice-president; A. J. Mary, 2nd vice-president; F. A. Hannaman, Jr., sec'y. and treasurer; T. E. Peak, past president; H. L. Landry, chmn. entertainment committee; G. O. Coignet, chmn. membership committee, and D. F. Latimer, chmn. publicity committee.

President Saurage opened the meeting, with the setting of a definite date, February 26, 1948, as the date for the first regular meeting for 1948.

Mr. Mary stated that he had outlined the topics with prospective speakers for the regular meeting. These were discussed by the group with every one agreeing to the various programs as scheduled by Mr. Mary.

A short discussion evolved concerning the type refreshments to be served, with soft drinks and sandwiches being chosen.

Dr. Wallace was to assist Mr. Mary to secure permission to use the Physics Auditorium for the next meeting.

The guest speaker for this meeting is Mr. L. V. McLean, Associate Professor of Electrical Engineering at L.S.U. His subject will be "Dielectric and Induction Heating.

With no further business, the meeting was adjourned.

F. A. HANNAMAN, JR., Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section Louisiana Engineering Society
Executive Committee

Date, February 26, 1948; time, 7:30 p. m.; place, Physics Building, L. S. U.

Officers persent: J. J. Saurage, president; W. J. Wallace, 1st vice-president; A. J. Mary, 2nd vice-president, and F. A. Hannaman, Jr., sec'y. and treasurer.

There were forty-three (43) members and guests present.

Mr. Saurage called the meeting to order and proceeded with the introduction of the chairman of the various committees.

The members were then requested to introduce their guests.

Mr. Saurage stated that the Lake Charles Section had been organized and that plans were under way to organize a Section in Lafayette.

The reading of the minutes of the last meeting was dispensed with.

Mr. A. J. Mary introduced Mr. L. V. McLean, Associate Professor of Electrical Engineering at L. S. U., who gave a very interesting talk on "Dielectric and Induction Heating." A laboratory demonstration was used to illustrate his talk.

With no further business, the meeting was closed, and refreshments consisting of soft drinks and sandwiches were enjoyed by all attending.

F. A. HANNAMAN, JR., Secretary-Treasurer

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXIV AUGUST 1948 NO .4

CONTENTS

EDITORIAL NOTES AND COMMENTS

Our Annual Outing. On July 8 members and guests enjoyed an afternoon of golf and horse shoe pitching at the Colonial Country Club. In the evening the group dined and then were entertained by a fast moving floor show. Entertainment Chairman Allen Betz was ably assisted by Chairmen Mallard Seago and Dave Moodie. Allen Jensen and Francis Taylor were also on hand to keep things moving. Donors of prizes were most generous. A list of donors and winners follows.

Prize	Donated by:	Won by:
President's Flight		
Sterling Fruit Bowl	W. Stone Leake	K. P. Kammer
Guests:—Low Net		
Silver Vegetable Dish	Westinghouse	Dr. C. C. Granbury
Electric Clock	P. H. Dillon	Walter Fush
Eversharp Pen	C. Glenn Cappel	Ed. Horner
Silver Fruit Bowl	Pittsburgh Lab.	C. C. Savoie
Members—Low Net		
Silver Tray	W. H. Williams Co.	F. W. Macdonald
Portable Radio	W. D. Taulman & Assoc.	I. E. Hanson
Silver Tray	Asbestone Corp.	Hugh Blain
Silver Vegetable Dish	Murray-Baker-Fred.	Bob Rombach

Serving Tray	United Gas Co.	F. B. Blackstone
Poker Chips Rack	J. M. Todd & Assoc.	H. P. Newton
Electric Timer Clock	Gulf Eng'ring Co.	J. M. Todd
Parker 51 Pen	Flintkote Co.	J. Riorda
Pair Sun Glasses	Allis-Chalmers Co.	F. H. Fox
Electric Clock	Taylor-Seidenbach	E. A. MacLellan
Parker 51 Pen	So. States Equip.	A. L. Soule
Silver vegetable dish	N.O. Cement Prod.	L. E. Savage
Silver Fruit Bowl	Lone Star Cement	Geo. Cobough
Eversharp Pen	J. R. Wolff	R. L. Nall
Wallet	Service Foundry	R. H. Earl
Dozen Golf Balls	Anchor Packing Co.	Espay Reed
Members—Low Gross:		
Silver Platter	Boland Machine & Mfg.	J. M. Todd
Silver Tray	Allan J. Harris Co.	C. Knost
Electric Clock	Boh Bros Const. Co.	W. McDugall
Poker Chips (Rack)	R. P. Farnsworth Co.	G. Hammett
Horseshoe Pitching—		
Singles		
Silver Platter	N. O. Public Service	J. Vogt
Serving Tray	Orleans Materials & Equipment Co.	F. M. Taylor
Silver Vegetable Dish	General Electric Co.	V. Clawson
Electric Clock	Shilstone Testing Laby.	J. R. Edwards
Doubles		
Eversharp Pen & Pencil	Standard Supply & Hdw. Co.,	F. M. Taylor,
Eversharp Pen & Pencil	Freeport Sulphur Co.	J. D. Reid
Electric Clock	Harrison-Wilker Co.	J. Janssen
Electric Clock	Fletcher Equipment & Supply Co.	C. A. Burton
Attendance—Guests		
Electric Clock	J. H. Carter Co.	Bankston
Silver Vegetable Dish	Chase Brass & Copper	M. J. Ripp
Electric Clock	John Reiss	R. W. Jones
Fruit Bowl	Dixie Mill Supply Co.	Verne Clawson
Attendance—Members		
Reed Unit Fan	Reed Unit Fans, Inc.,	A. N. Durning
Portable Radio	Ray. Bassich and E. L. Fithian	J. Dugan
Silver Bowl	Equitable Equipt. Co.	A. Betz
Parker Desk Set	American Creosote Wks.	R. F. Miller
Silver Pitcher	Eagle Asbestos Co.	A. Abrahmson
Ronson Lighter	Jones & Laughlin Co.	H. P. Newton
Parker 51 Pen	Fredrichs Lbr. Co.	J. M. Kidd
Parker 51 Pen	Fisher Engr. Co.	R. Bassich
Silver Tray	Maritime Elect. Co.	E. Ernst
Musical Liquor Box	Mexico Refractories	Dr. Kyle Ward, Jr.
Electric Clock	A. B. Patterson	A. Wingate
Leather Stationery Set	Dixie Machine Welding	B. Rombach
Eversharp Pen	C. P. Knost	G. W. Hill
Electric Clock	Ole K. Olsen	Z. W. Bartlett
Eversharp Pen	R. E. Gosa	H. L. Smith
Electric Clock	Paul F. Jahncke	C. M. Kerr
Eversharp Pen	Shell Oil Co.,	R. N. Nall
Bath Room Scale	Crane Company	R. H. Habans

Our Front Cover. The Sterlington Electric Generating Station, principal source of power for the Louisiana Power and Light Company's transmission system, is one of the great steam electric lower stations of the South. An abundance of natural gas from one of the largest gas fields in the world, ultra-modern and efficient equipment, and a strategic location in the heart of a rapidly growing agricultural and industrial empire are the factors which combine at Sterlington to permit the production and distribution of electric power at low cost, and in the quantity, essential to the industrial development of the great Middle South area.

Five generators at Sterlington convert the energy contained in natural gas into electricity which flows over hundreds of miles of high voltage transmission lines into the richest sections of Louisiana, Arkansas, and Mississippi. Through a high voltage transmission network, the Sterlington plant is interconnected with two hydro plants in Arkansas and other steam plants and transmission lines of the Arkansas Power and Light Company, Mississippi Power and Light Company, and New Orleans Public Service, Inc. These facilities join to make up the ALMNO System.

This modern natural gas fired steam electric generating station actually consists of three separate sections. The original section went into operation in the fall of 1925. It consisted of two 12,500 kilowatt units. In mid-1928, the second addition, consisting of two 30,000 kilowatt units, was made. The latest addition, which was installed in 1943, is rated at 37,000 kilowatts. This addition was made to take care of the heavy increased war loads and large military establishments which were located in the service area. The plant, as it now stands, has a name-plate rating of 122,000 kilowatts and consistently carries 140,000 kilowatts.

In order to operate and maintain this power plant properly, 184 persons are employed. The Louisiana Power and Light Company now owns and operates a complete modern village where most of its employees and their families live. The population of the village is 342. One feature of the village is the company owned and operated Club House, where bachelor employees live. There is also a modern dairy and a truck farm which supplies fresh dairy products and vegetables for the Club House.

Employees are provided space for gardens and fruit trees. Community canning equipment is available for empoyee use; pastures are provided where many employees graze their registered milk cows. In every respect. Sterlington is a live, up-to-date, progressive community where almost anyone would be content to live.

Professor Donald Derickson Receives Doctor of Science Degree. On July 14, 1948 Allegheny College of Meadville, Pennsylvania conferred the honorary Doctor of Science degree on Professor

Donald Derickson. Professor Derickson was formerly the Head of the School of Civil Engineering of Tulane University and is now Professor Emeritus.

He attended Allegheny College and was later graduated from the School of Civil Engineering, Dartmouth College. Professor Derickson's grandfather also received a doctorate from Allegheny over one hundred years ago.

Professor Derickson was a member of the faculty of the School of Civil Engineering of Cornell University until 1912. From 1912 to 1945 he was Head of the School of Civil Engineering of Tulane University. He is a past president and life member of the Louisiana Engineering Society.

Professor Derickson is the president of the Louisiana State Board of Engineering Examiners and was also president of the Louisina Section of the American Society of Civil Engineers. He served as chairman of the committee that prepared the building code for the City of New Orleans and was a member of the committee that developed the soil foundation survey of New Orleans. Professor Derickson is a member of Tau Beta Pi, national honorary engineering fraternity. He has been engaged as a Consulting Engineer on numerous structural and foundation constructions in the vicinity of New Orleans.

PAPERS AND DISCUSSIONS

"RECENT DEVELOPMENT IN ELECTRO-NUCLEAR MACHINES"

Jack T. Wilson *

When we consider the recent history of the science of NUCLEAR PHYSICS, we observe that perhaps the greatest strides have been made in the design of high-energy machines by those scientists who have placed electron sources and heavy particle sources in a magnetic field.

The development of both heavy and light particle accelerating equipment has been the basis for the study of the behavior of atomic structure when bombarded by high-energy particles, and a very large portion of our knowledge of atomic structure has resulted from the experimental procedure employing high-energy particle accelerators.

Dr. Ernest Orlando Lawrence was, perhaps, the first scientist to make extended use of the heavy particle source in the D. C. magnetic field. The results of his experiments gave rise to the design and development of the Cyclotron. In this instrument, a heavy particle source consisting of an arc or similar device for ionizing hydrogen, deuterium, or helium, gave rise respectively to protons, deuterons, and alpha particles which could be accelerated in a magnetic field of constant intensity by means of "Dee"—shaped electrodes provided in the magnetic field and supplied with power from an external high frequency oscillator. In such an assembly the particle was accelerated in a chamber placed between the magnetic pole pieces and which was provided with a vacuum pump system to reduce the pressure to extremely low values. The design possibilities of this machine was explored in a very thorough research program carried on initially at the University of California, and later in many other universities and research institutions.

The limitations of accelerating power of such a device were calculated, and in recent years it became apparent that the device could be improved in efficiency by modulating the frequency of the oscillator which supplied the power to the "Dees". In the Cyclotron, the particle being accelerated describes a spiral path, and it would be an advantage to reduce the frequency of the oscillator as the particle reached the outer periphery of its excursion within the vacuum chamber. Cyclotrons under construction

* Physicist, Allis-Chalmers Mfg. Co.

at the present time include the facility of frequency modulation and such instruments are now called Synchro-Cyclotrons, and several are at the present time under construction in various research laboratories.

Dr. D. W. Kerst was the first to place an electron injector within a changing magnetic field and produce a supply of electrons having a substantial initial velocity. In the Kerst system the flux density of the magnetic field is increasing at the time of injection of the electrons, and the stream of electrons assumes a circular orbit within the field which is shaped properly in order to give a certain amount of focus and definition to the electron orbit structure. This development gave rise to a species of transformer which would produce electrons traveling at higher energies than had formerly been achieved in any electronic device, and Dr. Kerst chose wisely the name for such a device by calling it the "Betatron", and showing the similarity of particles produced by such a machine with the natural radioactive decay of some atoms which give rise to the high speed electron known as the "beta particle".

Perhaps the clearest concept of the Betatron will be produced when we consider that this type of instrument is similar in many respects to the electric power transformer. A primary coil is provided which excites a magnetic yoke and pole structure. The instrument differs from the power transformer in the fact that the magnetic yoke is broken with a gap. In this gap a doughnut-shaped vacuum chamber is placed and an electron source is provided within it. A circular orbit of electrons is produced within the doughnut during the time the flux density across the magnetic gap is increasing. Each time an electron makes a revolution in its circular orbit, it is the approximate equivalent of a turn of wire in the secondary of a standard transformer construction. Since the voltage output of the standard transformer is determined by the ratio of the number of turns on the primary as related to the number of turns on the secondary, so is the equivalent voltage output of the Betatron determined by the number of revolutions which any electron will make in its circular orbit during the time the flux density is increasing.

It became a relatively simple matter for Kerst to spin an electron in its orbit through 200,000 or 300,000 revolutions during one-quarter of the cycle of the alternating current exciting the magnetic structure. This proved that it could be practical, and desirable to construct an apparatus which would produce electrons having the energies of 100,000,000 electron volts or more. Shortly after the initial studies by Kerst and Serber, who verified earlier calculations of Wideroe and Walton, the first high energy Betatron

was constructed in the research laboratory of the General Electric Company in Schenectady, New York.

A program in the design of a Twenty-Two Million Volt Betatron for use in industrial radiographic processes followed shortly in the Allis-Chalmers Manufacturing Company, and the application of this electro-nuclear machine to industry proved practical and desirable with the result that accelerated inspection could be carried on in some of the largest manufacturing arsenals and during the recent war the program of ammunition production was increased.

In further consideration of the design of the Betatron, the theoretical physicists showed that there was a certain practical limitation upon the highest energies which might be expected from such a machine. This limitation was chiefly caused by the necessity of providing larger and larger orbits as the energies of the machines were increased. A large orbit size would require a high tonnage of steel in the construction of the Betatron yoke and pole piece, and also the limitations of size of the power supply necessary to excite such a system seemed to show that the highest practical energies obtainable from such a device would be limited to the ranges between 300,000,000 and 500,000,000 electron volts.

Dr. McMillan, of the University of California, with his associates proposed a variation on the design of the Betatron which consisted of introducing two or more electrodes into the doughnut-shaped vacuum tube and connecting these electrodes with an external oscillator which could be turned on after the electrons had received an initial energy amounting to 1,000,000 or 2,000,000 electron volts. This system employed the alternating current supply for the magnetic yoke, producing during the first quarter of a cycle in the magnetic field, a constant increasing flux density. The external oscillator which supplied power to the electrodes within the vacuum doughnut could be so controlled that the frequency of the oscillator would be synchronous to the rotation of a given group of electrons within the orbit, and each time this specific group of electrons made a revolution and passed through the field between the two electrodes, the electrons would gain in the amount of energy equivalent to the potential difference between the electrodes. This theory of design showed some interesting and amazing possibilities. It proved theoretically possible to construct such a machine which would have the energies equivalent to 350,000,000 electron volts with the utilization of relatively few tons of steel for the core structure.

A few preliminary experiments proved the machine to be one of feasible and practical design, and at the present time the General Electric Company and the Allis-Chalmers Manufacturing

Company have constructed the essential parts of such high energy machines which will soon be in operation in the University of California, at Berkeley, and the Massachusetts Institute of Technology in Cambridge. Dr. McMillan and his associates have suggested the name of "Synchrotron" for this species of accelerator which employs the synchronous high frequency oscillator to excite the electrons within the doughnut vacuum chamber.

The professional engineer and the scientist, whose work is not closely associated with such development, may find it difficult to distinguish between the three species of machine which have been so briefly described in the above paragraphs. For the sake of clarity it seems desirable to enumerate briefly the function of each type of machine.

1) THE CYCLOTRON employs a constant magnetic field and accelerates heavy particles only which are produced by stripping the electrons from the nucleus of hydrogen, deuterium and helium. This leaves the naked nucleus of hydrogen, which is a proton; and the naked nucleus of deuterium, which is called the deuteron; and the nucleus of helium, which is called the alpha particle. The Cyclotron employs two Dee-shaped electrodes which spin the heavy particle in a spiral path and fling it out of the magnetic field in a straight line. Such particles may be utilized to bombard other atomic structures. In order to increase the efficiency of this device, a frequency modulated power supply has been added for exciting the "Dees", and the Cyclotron employing such equipment is now known as the SYNCHRO-CYCLOTRON.

2) THE BETATRON is a species of transformer, and in its present stage of development it is suitable for the acceleration of electrons only. The electrons may be drawn out from the orbit in a straight beam and be utilized for physical experimentation, or they may be caused to strike a target within the doughnut-shaped vacuum tube, and as the result of collision they may produce high energy X-rays which either may be utilized for physical experimentation or for industrial radiography.

3) THE SYNCHROTRON. By the addition of an external high frequency oscillator supplying power to two or more electrodes within the doughnut vacuum chamber of a Betatron, we increase the energy producing possibilities of the Betatron and make it possible to accelerate electrons to higher energies than would prove practical with the regular Betatron. This bastard machine has been called the Synchrotron, and our current designs show that it may be

employed to accelerate either electrons or heavy particles, such as, protons and the nuclei of other atoms of low atomic number.

Industrial Applications of the Twenty-Two Million Volt Betatron

Of the three machines described in this paper, the Twenty-Two Million Volt Betatron has been the first to find important and practical use in industry. This use has come about through its unique advantages of being a tool for the inspection of thick sections of ferrous materials, bronzes, and also specimens composed of the elements of high atomic numbers, such as, barium, tungsten, mercury, lead and uranium.

The Betatron has now taken its place alongside the other types of industrial X-ray machines, which each have their place in certain types of X-ray inspection. The Betatron is chiefly significant in that it has increased the thicknes of a section of steel or bronze which may be accurately inspected with nondestructive X-ray analysis. To illustrate this unique advantage, I refer to Figure No. 1, which shows the absorption coefficient curve for iron with the theoretical intensity distribution spectrum of X-rays produced by the Twenty-Two Million Volt Betatron.

From these two curves, one can see that most of the X-rays produced are in the regions of low absorption of steel (the absorption curves for other heavy metals are similar). The X-rays in the approximate range of from 3 to 22 million electron volts are the most penetrating, and the absorption curve is nearly constant over this range which is the region of most of the X-rays produced by the Twenty-Two Million Electron Volt Betatron. This explains the straight line transmission curve shown in Figure 2, after one or two inches of steel has been penetrated by the ray.

Another factor, influencing the selection of 22 million electron volts as the best energy for thick-section radiography, showed us that by going to higher energies the secondary X-rays produced as a result of the absorption of the primary rays would be more penetrating than the primary rays at the film surface, and tend to result in a diffused image upon the film. This fact can be explained by an analysis of X-ray absorption. Unfortunately, the absorption of X-rays above one million electron volts generally results in the production of electron pairs with each electron of the pair produced having on the average nearly one-half the energy of the primary ray. These high energy electrons lose their energy with the accompanying production of X-rays which, because of the lower energy of such rays, may be more penetrating than the primary rays. The secondary rays travel in the general

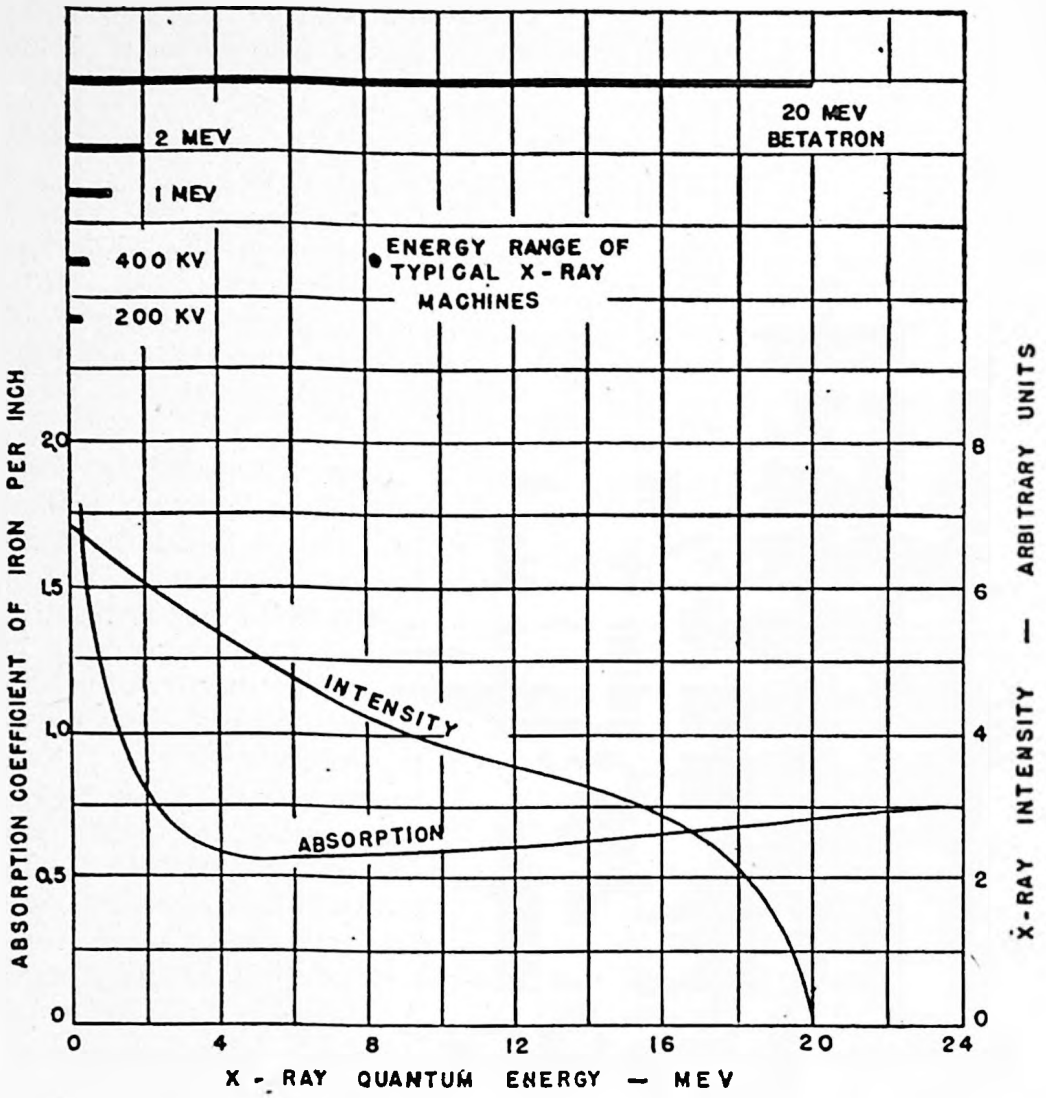


FIGURE 1

ABSORPTION CURVE FOR STEEL AND THEORETICAL X-RAY SPECTRUM AT 20 MILLION ELECTRON VOLTS

direction of the primary, but there is some divergence which affects the definition on the film. The 22 million electron volt Betatron tests show that a comparatively small part of the density on the film is caused by secondary rays. With higher energy betatrons, tertiary, and higher order X-rays would be produced which would be more divergent and penetrating than the secondary rays and, therefore, would produce a more diffuse image on the film.

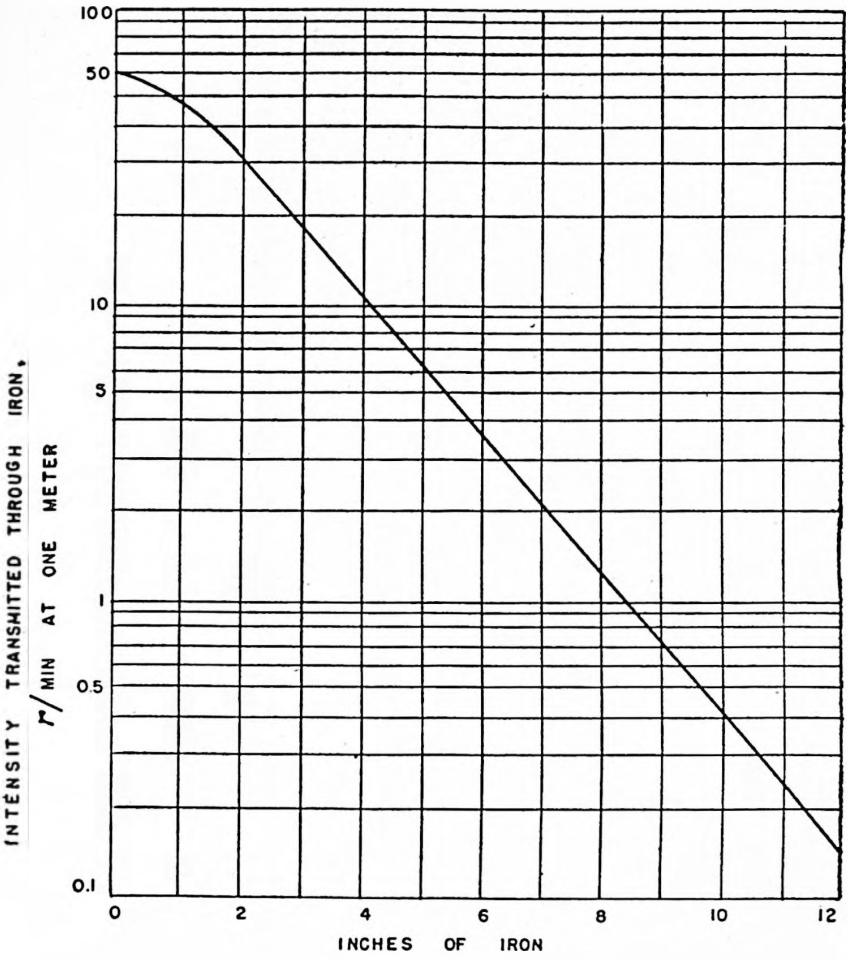


FIGURE 2

TRANSMISSION CURVE FOR STEEL
AT 20 MILLION ELECTRON VOLTS

The choice of a lower energy betatron was eliminated as the intensity for different energies at the same frequency goes as nearly the fourth power of the energy. At 10 million electron volts and 180 cycles the intensity would be ⅕ that at 20. This would necessitate a much higher frequency which would mean increased heating and higher power requirements. The heating would neces-

sitate liquid cooling and the advantage of a lower weight machine at lower energies partially would be lost. At lower energy output a smaller percentage of the X-rays would be in the region of low absorption so that the exposure would be much longer for the same intensity. Tests at 10 million electron volts show that the fraction of density on the film contributed by the secondary rays is considerably larger than that at 20 million electron volts.

Another advantage of 22 million electron volt X-rays is that an approach to absolute sensitivity is obtained. This means that the minimum size of a detectable flaw is almost the same regardless of the thickness of steel being radio-graphed. A $\frac{1}{32}$-inch flaw was displayed with almost equal clarity through various thicknesses of steel ranging from two to twelve inches. Eastman type A film was used in this experiment.

In 22 million electron volt radiography, no blocking is necessary nor is any masking necessary, for variations in thickness of the specimen, or around the outline. In fact, outlines may be less well defined when blocking is used.

Becaue the large angle of back-scattered radiation is detrimental to the image, no lead is placed behind the film. A thickness of 0.040 inch is used in front of the film for the best results. Thicknesses of from 0.010 to 0.020 inch will result in about 50 per cent more density for a given exposure, but the detail will be less clear so that it is not recommended.

The great penetration of 22 million electron volt X-rays makes possible the study of great variations of thickness on the same radiograph. Radiographs have been taken on which differences of thickness of over six inches of steel were examined. The penetration of thee X-rays implies that it is difficult to detect small flaws in specimens of low density or small atomic number.

The small focal spot inherent with the Betatron and not with other X-ray machines is nearly the ideal point source. The natural focal spot is 0.050 inch high and less than 0.005 inch wide. By using a special target which was developed, the height is reduced to 0.010 inch. This focal spot makes possible the enlargement of the specimen on the radiography by increasing the specimen-to-film distance.

Figures 3 and 4 show exposure charts based on different films and screens. The exposure is given in Roentgen units r and on the basis that the industrial units built have given about 75 r per minute, the exposure times can be calculated. Figure 5 gives a comparison between different films and screens.

With the pronounced beaming of the X-rays (characteristic of high energy radiation) for full utilization of the film, a good rule in

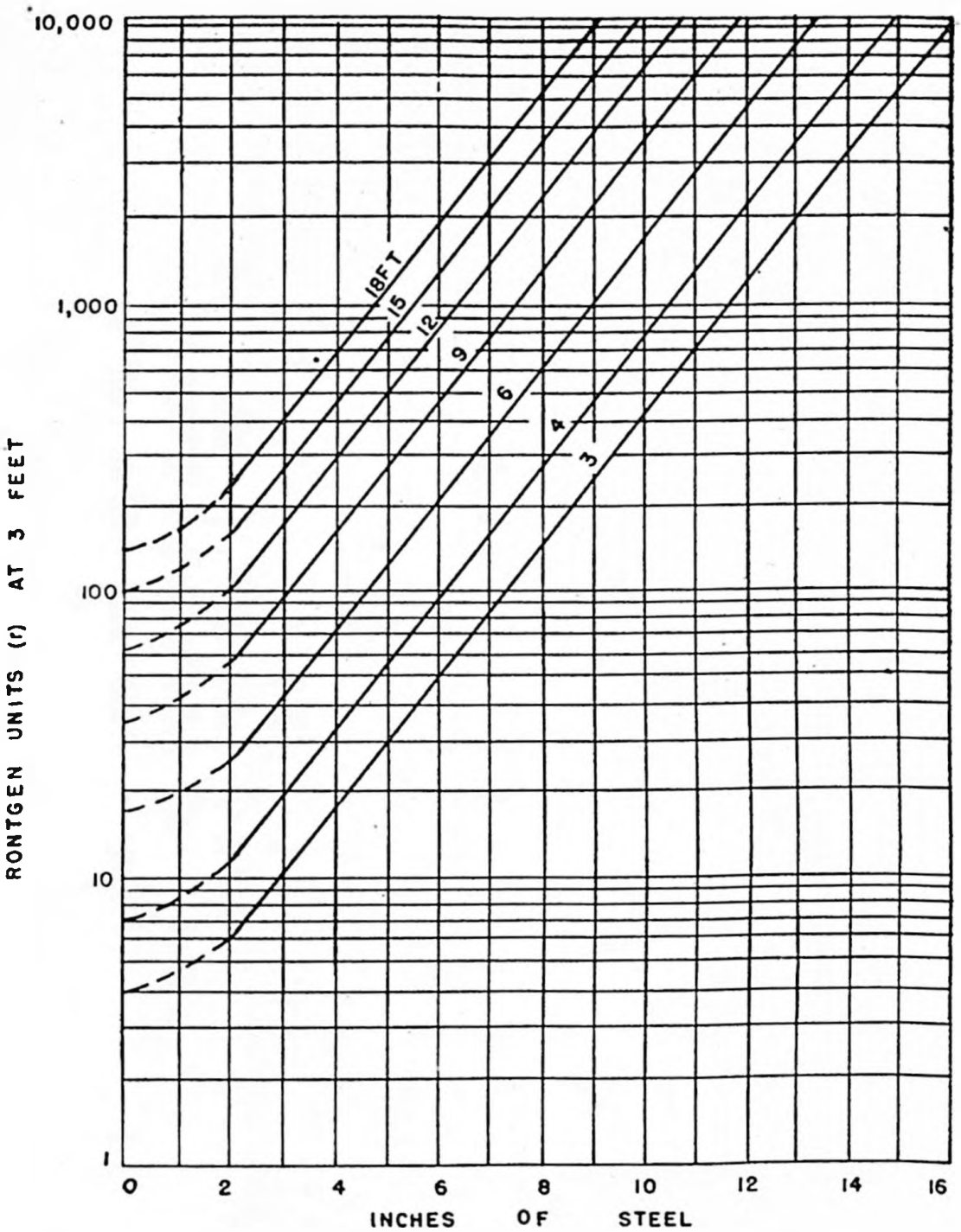


FIGURE 3

EXPOSURE CHART FOR 20-MILLION-ELECTRON-VOLT X-RAYS WITH EASTMAN INDUSTRIAL FILM, TYPE A, 0.040-IN. FRONT LEAD SCREEN, DENSITY OF 2

the taking of radiographs is to have the target to film distance at least five times the major dimension of the film.

The Betatron has increased to at least 20 inches, the thickness of steel and other heavy materials which can be radiographed

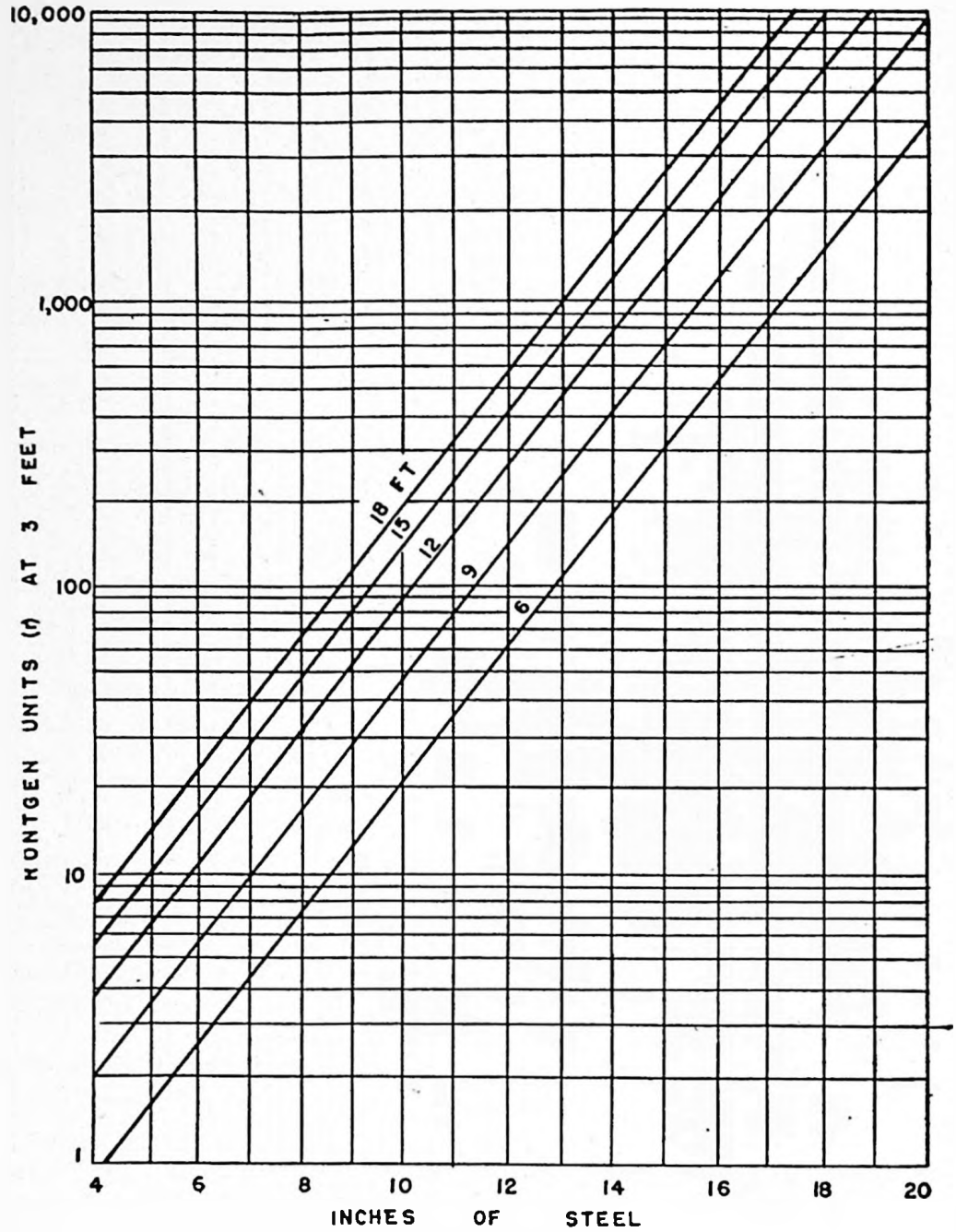


FIGURE 4

EXPOSURE CHART FOR 20-MILLION-ELECTRON-VOLT X-RAYS WITH EASTMAN INDUSTRIAL FILM, TYPE F, 0.030-IN. FRONT LEAD AND SPECIAL INTENSIFYING SCREENS, DENSITY OF 2.

satisfactorily, the maximum thickness depending on the minimum flaw to be detected or the detail desired.

Any new X-ray machine is considered for its possible application to medical therapy. As the main development has been in

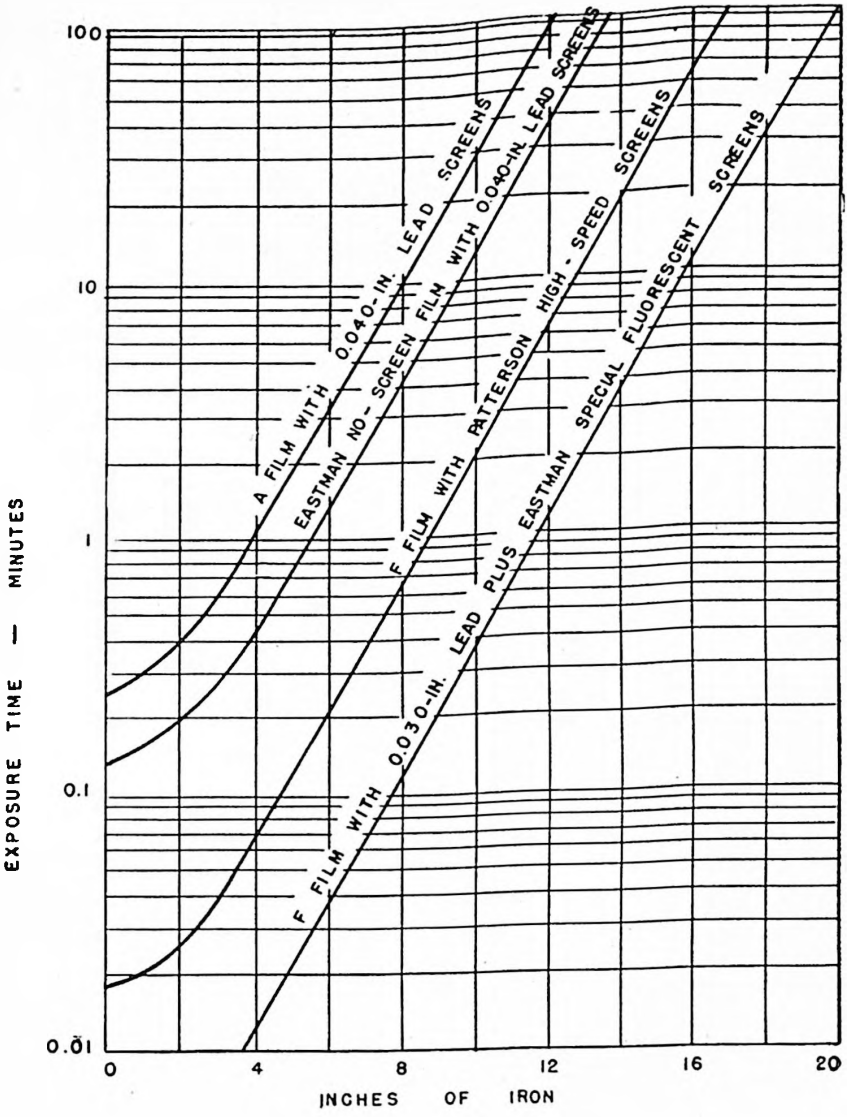


FIGURE 5

CHART SHOWING COMPARISON OF DIFFERENT FILMS AND SCREENS

producing a machine for industrial radiography, little time has been devoted to studying possible therapeutical application. However, one paper[10], has been published demonstrating the advantages of 22 million electron volt X-rays and recent experiments indicate

that the electron beam can be brought out of the doughnut. Perhaps, this electron beam may prove more effective in medical therapy than X-ray. Both the 22 million electron volt X-rays and electrons may be powerful weapons for the therapy of deep seated cancer.

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ENGINEERING BRIEFS

Solar-Heat Accumulator. A provisional experimental plant for the storage of solar heat has been erected in Switzerland, according to the December, 1947, issue of The Engineers' Digest (British edition).

Twenty six $1\frac{1}{16}$-in. pipes of 85-ft length are arranged at 4-in. center distance, giving a heating surface of 805 sq. ft, below a double-glass roof for protection from wind and are insulated to prevent heat losses. A storage tank of 33-cu. yd. capacity is placed in a pit filled with dry earth and protected by a large roof against losses due to rain water and conduction through moist earth. During sunny periods, water is pumped from the tank into the heating-pipe system, heated, and fed back into the tank. The heat gained is used to supplement heat requirements of a central heating system. During sunless periods, the pump is stopped and the heating pipes drain automatically. The central heating system can then be served from the storage tank only.

The plant was used during the wet summer of 1946 and results showed than the water can be heated to boiling point. The theoretical maximum heating power was calculated as 2200 Btu per sq. ft. per day, but the highest figure actually reached was 800 Btu per sq. ft. per day (July)); the monthly averages were 250 (March, August) and 420 (July). The highest water temperature of 148 F was reached in August. Average heat losses from the storage tank (580 sq, ft. surface) were 0.2 to 0.3 Btu per sq. ft. per deg F per hr, depending on the heat saturation of the earth surrounding the tank.

It is planned to add a double-tube counterflow heat exchanger and thus make the plant suitable for working all the year round and for bridging 10 to 12 sunless days. Pipe corrosion is to be prevented by automatic draining of the heating pipes during sunless periods and by filling with an inert gas under slightly increased pressure. Capital costs of the plant should be easily recoverable through saving of fuel and operating costs since a simple thermostat can insure fully automatic operation.

— Mechanical Engineering

Cheaper Sewage Treatment Is Promise of Tests Using Oxygen for Aeration. Great savings in sewage purification costs are foreshadowed by an improved biological treatment process in which pure oxygen is substituted for the air normally used for aeration.

Reduction in size of plant to one-quarter of conventional installations is indicated on the basis of research results obtained by

Daniel A. Okun, teaching fellow in sanitary engineering at the Harvard Graduate School of Engineering.

Development of the process—which has been termed "bio-precipitation"—was inspired by Malcolm Pirnie, consulting engineer of New York City. Mr. Pirnie suggested that because oxygen was now commercially available at very low prices, its applicability to a biological process might be studied. It was pointed out, among other things, that whereas sewage saturated with air contains only about 9 ppm. of dissolved oxygen, sewage saturated with oxygen will contain 45 ppm.

In conformity with a flow pattern suggested by Mr. Pirnie, laboratory apparatus was devised by Mr. Okun to oxygenate settled sewage. This was done in a vertical glass tube so arranged that settled sewage could be fed continuously from the top, with the oxygen diffused from the bottom and moving counter-current to the sewage flow. Oxygenated sewage was then pumped into the bottom of a precipitation tube containing the suspended biological floc. Effluent was collected from the top of the tube, part of which was recirculated with the incoming sewage.

Advantages of Process

According to Mr. Okun, the bioprecipitation process overcomes some of the disadvantages of a conventional activated-sludge process by embodying three new ideas:

1. Oxygen requirements are satisfied at all points in the flow of pre-oxygenating the sewage to be treated.

2. Use of pure oxygen promotes efficient gas transfer, and the high oxygen gradient enables the oxygen to penetrate deeper into the floc particles.

3. Separate final sedimentation facilities are not required. The biological media are not permitted to suffer the hazard of anaerobiasis (insufficiency of oxygen) ordinarily associated with sedimentation in final tanks.

Because of the more "sympathetic" treatment of the biological floc, and because more of it can be maintained in a given space than in an activated-sludge process, reports Mr. Okun, it is reasonable to expect better purification per unit of tank volume with the bio-precipitation process.

He states that the bio-precipitation process can be loaded about four times more heavily than a conventional activated-sludge process to achieve substantially the same results. In other words, for the same quantity of sewage treated, about one-quarter of the plant is required. The cost of oxygen at $4 per ton was found to be equal to the cost of compressing air at about 1 cent per kwh.

Pilot Plant Proposed

"All evidence", says Mr. Okun, "points to the possibility of great savings in sewerage-purification costs by the use of the bio-precipitation process. However, more precise assessment of its advantages must await the operational results of a proposed pilot plant, negotiations for the construction of which are already under way."

The research was conducted under the direction of Gordon M. Fair, dean of the Harvard Graduate School of Engineering.

Consider Radiant Heat for Boston Airport. Engineers at the Logan International Airport in East Boston, Mass., are considering the use of radiant heating techniques to melt ice and snow off the new field's long runways.

Ice and snow would be melted from the surface of the runway by a subsurface network of coils installed carrying water heated to 350 to 400 deg. F., piped from the airport's central boiler plant. Engineers say that this device would have prevented a recent airplane wreck at the port.

Designers of the system claim it will permit uninterrupted use of the runways at all times. The estimated cost of equipping a 6,000 by 150-ft. runway is $225,000, and the cost of operation over a normal winter is placed at about $6,500. These figures are based on the use of heat from the central boiler plant. If a separate boiler plant is required, the cost was estimated at about $400,000.

—Engineering News-Record.

Lodestones and Loudspeakers. The magnetic compass guided Columbus, but really strong magnetic materials, 20 to 30 times more powerful than ordinary steel, are recent. These new materials have spawned a host of instruments and gadgets and will probably yield more as product designers realize their possibilities.

A permanent magnet can push or pull without physical connection with its load, a handy property, and it needs no power source, as does an electromagnet. Little magnetized blocks hold papers against a bulletin board backed with steel and are removed without leaving a mark. An electric light can be attached to any convenient steel surface, such as an automobile fender, for repair work. Magnetic disks mounted behind a conveyor belt can hold iron and steel parts on the belt even if it is climbing vertically. Similarly, magnets remove dangerous bits of stray iron from non-magnetic materials traveling on a conveyor belt.

More complicated is the coffee maker in which the water, when it boils, lifts a piece of iron from the bottom of the pot, thus releasing a magnet outside the pot and turning off the electric heater, Magnets behind the work table of a machine tool can hold

the work on the table with a force of several hundred pounds; shifting the magnets releases the work. Chemical or other apparatus can easily be fixed in place, or cupboard doors kept closed, with magnets. A remote-control device so sensitive it can be operated by a radio signal depends on a permanent magnet. The minute current generated in the receiving antenna deflects a needle slightly, but enough for a magnet to pull it to one side and close a contact, thus putting the device into operation. Laboratory mixers in which a bar inside a flask is whirled by a magnet revolving outside have long been used; a similar houehold food mixer is now under development. This gadget can even whirl steel wool on the bottom of a dirty pan.

Permanent magnets convert electric energy to mechanical motion and vice versa, properties which are the basis of much electrical equipment, including some motors, generators, and meters, and the oldest device of all, the magnetic compass. Some of the most powerful permanent magnets are used in magnetrons, where they control the flow of electrons to produce the very high frequency power needed for radar.

Probably the largest market for permanent magnets is in loudspeakers, where the new materials lighten and simplify construction. By replacing electromagnets they also reduce power consumption, which is important in auto and other battery-operated radios. A new type of phonograph pick-up depends on a permanent magnet. Magnetic sound-recording wires must also be uniform and desistant to corrosion. They are usually made of stainless steel or brass plated with a magnetic alloy. Powdered magnetic oxides are applied to paper and plastic backings and, experimentally, to movie film for sound recordings. This may lead eventually to amateur sound movies.

The influence of a magnetic field on a permanent-magnet alloy lines up some of the elementary magnets within the material, and the metal remains magnetized after the original influence is removed. Development has been directed toward devising metallurgical compositions in which a high percentage of the elementary magnets will line up and stay lined up. Most of them contain nickel, cobalt, iron, aluminum, cooper, or titanium. The first of the now widely used Alnico series was developed in Japan after World War ; the European Ticonal series is of the same general type. Alloys called Cunico and Cunife were developed a few years ago in Germany; they are more malleable and ductile than the brittle Alnico alloys. Silmanal is least subject to demagnetization; Vectolite, another Japanese product, has high electrical resistance and is especially useful where there are strong demagnetizing

electric currents. Vicalloy and Remalloy were both developed in the United States, and are used widely in the telephone industry.

Alnico and Ticonal materials are so brittle and hard that they are not machined, but are formed in the proper shape by casting or by sintering a compressed powder. The strongest types must be heat treated in a magnetic field, which complicates manufacture and puts a premium on simple shapes. The magnets can be attached to other materials by soft soldering or silver soldering, or with adhesives. Cunife is usually made as fine wire from which small magnets can be cut or drawn. Cunico can be formed, punched, and machined, but is not especially strong. Some stock shapes of magnets are available and a wide variety of special shapes are made to the customers' individual requirements.

Heat, impact, vibration, stray magnetic fields, or contact with other magnetic objects will reduce magnetism. In making a magnet, however, it can be "stabilized" by suitable mistreatment to reduce its magnetic strength to a value which will not be further reduced by the known adverse influences it might encounter in service. Thus, the finished magnet stays magnetized indefinitely when used for the intended purposes.

So Much From So Few. Agricultural and industrial research can supplant war and pestilence in balancing food supply and population. In a recent speech accepting the third annual award of the Industrial Research Institute, Games Slayter of the Owens-Corning Fiberglas Corporation suggested that high nutritional standards and a high standard of living would automatically preserve the biological balance. Research directed toward enriching the soil and the productivity of agriculture, or toward extending and conserving our raw materials will create a high scale of living for a greater portion of the population. As this occurs, families become smaller and healthier, and a society retains its vigor and resourcefulness.

Mr. Slayter advocates a three-part policy of increasing agricultural productviity, extending raw materials through research, and improving living standards through research. Most of his remarks concern agriculture, in keeping with the doctrine of Baron Justus Von Liebig, "A nation rises and develops in proportion to the fertility of the land. With the exhaustion of the land, culture and morals apparently disappear." The future is pictured as a neck-and-neck race between population increase and food production.

Of the 20,500,000 farmers in the United States, most produce non-food products and only enough food for themselves. Actually, only 3,000,000 "production farmers" fed 125,000,000 non-farmers, at a high average level, and supply a 10 per cent exportable surplus. Never before has there been available for raising the living

standard such an excess of man hours over that necessary for food production. Although the United States, with 6.5 per cent of the world's population, has 20 per cent of its tillable and fertile land, this high productivity depends also on wise use of the land, as many examples are cited to show.

The "production farmer" makes fullest use of the research of the Department of Agriculture and of private industries. Usually he runs a one-or-two-man farm with the equivalent in mechanical power of 10 men and 16 horses. As one instance of mechanical assistance, hay can be harvested by chopping and blowing in 0.9 man hours per ton. With the hay rake, hand loader, and forks in the barn, as was common 40 years ago, six man hours are needed. Using a scythe, pitchfork, and wagon requires 16 man hours.

In Mr. Slayter's home county (Licking County, Ohio) a hunter's economy could have supported 176 people. Primitive agriculture would support 4000 to 8000. Today, with a balance of agriculture and industry, the county supports 70,000. As an indication of the future, if all the county's land were cultivated as well as that of the ten best farmers, the area could support 175,000.

In the United States, many have not yet attained a high scale of living and throughout the world there appears to be no chance, with present methods, to feed the growing population at the present United States levels. Mr. Slayter maintains, however, that by applying intelligence to the problem the job can be done and that, as the scale of living is raised, smaller and healthier families will automatically result. Thus a new, and more satisfactory, biological balance is struck.—Industrial Bulletin of Arthur D. Little, Inc.

Award Synthetic Fuel Plant Construction Contract. The Department fo the Interior said last week that it had awarded a $4,413,000 contract to the Koppers Co., Inc., for design and construction of a plant for the production of synthetic fuel near Louisiana, Mo.

The plant—which will produce oil from coal—is the third and last of the demonstration, or semi-commercial scale, plants planned under the synthetic liquid fuels research and development program of the Bureau of Mines. It will be built under terms of a bill recently passed by Congress to launch the United States government on a program of development of synthetic fuels (*ENR*, March 11, vol. p. 383.)—Engineering News-Record.

AUDITOR'S REPORT

CARLOS J. GRIMADER

Certified Public Accountant

920 Gravier Street **New Orleans 12, La.**

June 23, 1947.

Board of Direction,
Louisiana Engineering Society,
New Orleans, Louisiana.

Dear Sirs:

I have audited the accounts of the Louisiana Engineering Society for the year ended December 31, 1947 and submit the following:

Balance Sheet, December 31, 1947 (Cash receipts and disbursements basis) (Exhibit A).

Statement of Income and Surplus For The Year Ended December 31, 1947 (Cash receipts and disbursements basis) (Exhibit B).

The cash on deposit at December 31, 1947 in the regular checking account was confirmed by certification obtained from the depositary.

The U. S. Savings bonds and certificates evidencing shares of stock in the various homesteads were inspected by me on May 8, 1948 in the Society's bank box and the amounts to the credit of the Society in the various homesteads were further verified by certifications obtained from those institutions.

During 1947 liquidating dividends in the amount of $287.66 were received from Interstate Trust and Banking Co. in Liquidation. Up to December 31, 1947 this institution had paid 90% of the original amount forzen, leaving a frozen balance of $383.60 for which a reserve for loss of $382.60 is provided.

The advertising revenue has fallen off about 10% in 1947 and it appears that income from this source would be increased by instituting an advertising campaign.

In my opinion, the accompanying balance sheet and statement of income and surplus fairly present, respectively, your financial condition at December 31, 1947 and the results of your operations for the year ended that date.

CARLOS J. GRIMADER, **Certified Public Occountant**

Exhibit A

LOUISIANA ENGINEERING SOCIETY
BALANCE SHEET
DECEMBER 31, 1947

ASSETS

CASH IN BANK—Checking account		$ 4,701.29
UNITED STATES SAVINGS BONDS, SERIES F (Maturity value, $4,000.00)—redemption value		$ 3,082.00
INVESTMENTS—HOMESTEADS (at cost):		
Columbia Homestead Association	$ 362.54	
Commonwealth Homestead Association	305.64	
Greater New Orleans Homestead Association	1,560.61	
Security Building and Loan Association	500.00	
Sixth District Building and Loan Association	500.00	
Union Savings and Loan Association	500.00	
Total investments—homesteads		$ 3,728.79
PROPERTY—Furniture, Fixtures, Equipment and books—nominal value		$ 1.00
FUNDS ON DEPOSIT WITH BANK IN LIQUIDATION:		
Interstate Trust & Banking Co. in Liquidation (less reserve for loss $382.60)		$ 1.00
TOTAL ASSETS		$11,513.99

LIABILITIES

SURPLUS (Per Exhibit B)	$11,513.99

Exhibit B

LOUISIANA ENGINEERING SOCIETY
STATEMENT OF INCOME AND SURPLUS (ON CASH RECEIPTS AND DISBURSEMENTS BASIS) FOR THE YEAR ENEDED
DECEMBER 31, 1947

INCOME:		
Dues collected		$ 5,119.50
Advertising revenue (less commissions paid of $16.75)		671.82
Income from investments and savings accounts		170.11
Net profit—sale of certificates, buttons, etc.		11.30
Sale of proceedings and miscellaneous income		4.35
Total Income		$ 5,977.08
EXPENSES:		
Salary—secretary-treasurer		$ 1,125.00
Cost of publishing proceedings		1,538.50
Cost of annual meeting ($1,918.49 less receipts of $1,484.00)		434.49
Cost of annual golf tournament ($549.70 less receipts of $547.50)		2.20
Refreshments at meetings (less pro rata receipts from joint meetings held, $83.98)		352.40
Printing, stationery and postage		709.65
Payments to Baton Rouge Section		380.25
Present to retiring officer		43.05
Library expense—porter		48.00
Social security tax		27.50
Auditing		60.00
General expenses		164.62
Total Expenses		$ 4,885.66
NET INCOME FROM OPERATIONS		$ 1,091.42
SURPLUS CREDIT:		
Reduction of reserve for loss due to receipt of liquidating dividends from bank in liquidation		287.66
SURPLUS FOR THE YEAR		$ 1,379.08
SURPLUS AT BEGINNING OF YEAR		10,134.91
SURPLUS AT END OF YEAR		$11,513.99

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Regular Meeting of the Louisiana Engineering Society, May 10, 1948

The meeting was called to order by President Leake, with approximately 75 members and guests present. Minutes of the preceding meeting were not read.

President Leake reported upon the progress of the Engineering Registration Act in behalf of the Louisiana Council of Engineers, following which he introduced Mr. J. Henry Johnston, Management Conference Director of the Aluminum Ore Company of Mobile, Alabama, who gave an interesting and instructive lecture on "Operation of an Aluminum Plant". This was followed by a sound film entitled "Mine to Metal".

Following his address, Mr. Leake thanked the speaker and the meeting adjourned.

JOHN P. FERNANDEZ, **Secretary-Treasurer**

Minutes of Meeting of the Board of Direction, May 10, 1948

The meeting was called to order by President Leake, with Messrs. Cucullu, Mire, Newton, Lehmann and Fernandez present. Mr. Charles M. Kerr also was present by invitation. Minutes of the preceding meeting were accepted as read. A report upon the activities of the Louisiana Council of Engineers was presented.

The resignation of Richard A. Piske was accepted with regret.

A letter addressed to the Governor-elect by the secretary, regarding vacancies on the Board of Administrators of Louisiana State University, also the reply to same, was read.

A letter from Mr. George C. Bartley concerning the issuance of building permits was read. Mr. Lehmann moved that the matter be referred to the Committee on Professional, Civic and Industrial Affairs, seconded by Mr. Newton and carried.

It was moved and passed that the following members be dropped for non-payment of dues:

Carl E. Abrahmson, Andrew R. Anticich, Louis A. Braud, Benjamin Brupbacher, Jr., Thom E. Crossan, Sidney L. Hebrard, J. Gerald Hotard, B. L. Kiernan, Sr., Leon L. Labatt, Jr., C. Harold Louree, Thomas F. McCrary, Howard J. Hanson, Robert L. Martin, J. J. Pastorek, Raymond Sherrard, Jr., Harold A. Timken, Jr., Harry Waugh, Chester O. Weilbaecher, Guy W. Witmer.

It was decided to recommend to the Committee on Revision of the Constitution and By-Laws that the following be inserted in the new constitution: "The initiation fee and dues for the first quarter following election are payable at the time of election. If this requirement is not met within three months after notice of election has been forwarded, the Board may declare the election void."

It was moved and passed that the amount of scholarships offered by the Society be fixed at $150.00 for Tulane University and $75.00 for Louisiana State University.

Mr. Kerr was appointed chairman of a committee of his own choice to prepare the obituary of Gervais Lombard, former Life member of the Society recently deceased.

The Secretary was instructed to pay to Mr. Richard C. Cadwallader $250.00 on account of services rendered in behalf of the Louisiana Council of Engineers.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, **Secretary-Treasurer**

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXIV OCTOBER, 1948 NO. 5

CONTENTS

EDITORIAL NOTES AND COMMENTS

Speak Now Or . . . Each member of the Society has been mailed a copy of the proposed revised constitution. Since this document sets forth the rules by which your society is governed, you should read it. Much credit is due the committee which worked on this revision. Karl P. Kammer was chairman of the group; other members were F. N. Billingsley, vice-chairman, Lyman C. Reed, W. H. Rhodes, F. M. Taylor.

Pictures for OUR FRONT COVER. If you have some picture (large size, eight inches by ten inches) which you think would be interesting as a front cover, please advise the editor.

The Annual Meeting. The dates for the annual meeting in 1949 have been set as January 13, 14 and 15. The General Chairman is Jeffrey H. Collins. The following will serve with him:

General Vice-Chairman, John V. Dugan, Jr.

Cochairman ExOfficio, W. Stone Leake.

Secretary, John P. Fernandez.

Banquet Committee: Leal C. H. McLean, Chairman; A. R. Wingate, Jr., Vice-Chairman.

Contact with Woman's Auxiliary: Frank W. Macdonald, Chairman; Gayle Schneidau, Jr., Vice-Chairman.

Industrial Plant Inspection: J. Mason Guillory, Chairman; William T. Hess, Vice-Chairman.

Program Committee: William P. Oster, Chairman; Albert J. Fransen, Vice-Chairman.

Publicity Committee: H. M. Blain, Jr., Chairman; T. Edward Ernst, Vice-Chairman.

Registration Committee: David Moodie, Chairman; Sydney Ellis, Jr., Vice-Chairman.

Student Conference Committee: O. W. Stephenson, Jr., Chairman; F. J. Germano, Vice-Chairman.

Technical Exhibits: Cary B. Gamble, Chairman; (not-selected) Vice-Chairman.

Technical Papers: Noel P. Kammer, Chairman; Charles E. Cassagne, Jr., Vice-Chairman.

Reception Committee: Reinhard A. Steinmayer, Chairman; Clayton L. Nairne, Vice-Chairman.

PAPERS AND DISCUSSIONS

PRODUCING ALUMINA AT MOBILE *

Do you know about 1/12 of the earth's crust is aluminum. Abundant, yes!—and always has been: yet, it was awfully difficult to capture up to the year 1886. It was on February 23, 1886 that Charles Martin Hall (our Mr. Hall) produced his first historic pellet of aluminum. Strangely enough, about the same time Paul Louis Toussaint Heroult, a Frenchman working entirely independantly, made practically the same discovery. Their method, though somewhat crude as compared with our today's reduction lines, employed the same fundamental principles of dissolving aluminum oxide in a hot cryolite bath and passing through this solution an electric current which causes the oxygen to break away from the aluminum, join up with the carbon, of the carbon anode used, forming carbon dioxide gas which is liberated through the cryolite crust that has formed at the surface of the bath. The aluminum, now in molten form, settles out at the bottom of the container, which is known as a pot.

But, if I understand my topic correctly I am yet straying. I want tonight to give you a short, practical explanation of the part our plant at Mobile plays in the overall production of aluminum. In doing this I will very briefly summarize mining and begin with a statement: one that we certainly believe is true, at least at this time.

"Aluminum is the most abundant metal known, being found in practically all common rocks and clay banks; not always, however, in paying quantities or qualities". Unfortunately, however, it occurs only in the form of compounds necessitating the refining of these compounds by chemical methods known as the Bayer process. In this process the alumina (aluminum oxide) is separated from its compounds principally mud, silica, iron oxide and a few other impurities and then calcined before shipping to reduction plants.

In our process at Mobile the ore 'bauxite' is our principle raw material. Bauxite derived its name from Les Baux, a town in France, where it was first discovered. Our principle source is Surnam (S.A.) Dutch Guiana. However, we do use some domestic ore mined in our own company in Bauxite, Arkansas. Other deposits of foreign ore are found in France, Italy, Russia, China, India, The

*Presented by Mr. J. Henry Johnson, Management Conference Director, The Aluminum Ore Co., Mobile, Ala., at the regular meeting of May 10, 1948.

West Indies, Brazil and British Guiana. Other domestic deposits are found in Alabama, Georgia, Mississippi, Tennessee and Virginia. The natural coloring of the ore is apparently influenced by material such as iron oxide which is undersirable, though not a problem in our process.

Grade 'A' Bauxite contains at least fifty-five per cent alumina, not more than seven per cent silica (some of which may be inactive; the active portion combines with proportionate quantities of soda ash and alumina to form an insoluble compound sodium aluminum silicate), much smaller quantities of iron oxide, titanium oxide, et cetera. The mining is done both by the open pit and shaft mining methods. The open pit method necessitates the stripping of the undesirable dirt or over burden before dynamiting the bauxite strata. Subsequent to the dynamiting the lumps of bauxite are loaded in small ore cars, transported to the mill and dumped on belt conveyor to be carried to gigantic crushers in which it is broken up into small pieces. Following this crushing, the bauxite goes through a washing and sifting which removes some of the clay, sand and other foreign materials. The last procedure at the mines is a drying process which is done in long rotating dryers. This step removes the water which was soaked up in the washing operation and the bauxite is now ready for shipment either by boat or railroad car to an ore purification plant.

The extraction of aluminum from its ores differs from that of other common metals such as iron, copper, lead and zinc in that these metals are produced in crude form directly from the raw materials and later refined to produce the desired degree of purity.

Take for example, the production of steel. Here iron oxide, limestone and coke are charged into a blast furnace; resulting in the iron oxide being reduced to metallic iron by the action of carbon and carbon monoxide gasses. The metallic iron is drawn off into crude pigs which comparatively speaking contain a rather large amount of impurities. The crude pig iron is then refined by such processes as the Bessemer or open hearth methods producing a high quality steel.

The metal **'Aluminum'** is never found (in the pure state) in the raw material bauxite. In the reduction of aluminum oxide to the metal aluminum all impurities seem to find a very convenient method of combining with the molten metal resulting in an alloy of undesirable composition rather than pure virgin aluminum.

Thus, the bauxite is subjected to lengthy chemical refining. The resulting aluminum oxide, for shipment to reduction work, contains less than .02 per cent silica and less than .015 per cent iron oxide; the principle impurities that we have to contend with.

Our refining method is rather simple but it takes a h--- of a lot of machinery to complete the process. The big idea is to saturate a caustic solution with aluminum hydrate, using bauxite as the principle raw material, filter off the insoluble impurities, crystallize out the purified aluminum hydrate and calcine it to remove the water. Meanwhile an interesting thing is happening to the caustic solution, that carrying agent, which is overflowing from settling trays—it is enroute back to the mixers and digesters, in a manner similar to the return of an empty railroad car, for another load of raw materials.

Being more explicit. conveyor belts move the bauxite from the docks to the bauxite storage building which holds approximately 100,000 tons. This building is constructed somewhat on the order of a hopper bottom car allowing the bauxite to flow to the lower level center or tunnel where it falls on belts and is conveyed to large hammer mills; there it is crushed and passed on to vibrating screens that allow minus ten mesh material to pass on to bauxite storage bins with all plus ten mesh material being returned to the hammer mills for further grinding. Likewise, lime is crushed and conveyed to storage bins. A representative sample of each bin of bauxite is sent to the laboratory; there it is determined just how the material should be charged. (Charged with lime and soda). Accurate batches of bauxite and lime are made up in the weigh hoppers, then passed on to batchers on mixers that we call slurry mixers. It is here that the first liquor is added. Only enough, however, to make the material pumpable. The mixture is then pumped to digesters where the major and final portion of pre-heated causic liquor is added together with live steam to bring the temperature up to approximately 290°F. This occurs in a single digester (the live stream digester). It is subsequently passed on through a series of digesters which has a rotating paddle that churns the raw materials into suspension. The resulting liquor is then pumped from the discharge unit through flash chambers and a blow-off tank. Here through a series of three (3) flashes—twenty pound, ten pound and one pound stream respectively is recovered for use in pre-heaters.

The liquor is now pumped to the red press building where it is filtered. This process separates and leaves on filter cloths a mud containing iron and titanium oxide, silica and sodium aluminum silicate. Allowing the hydrate or sodium aluminate solution to pass on through. Even though the temperature of the aluminate liquor has now been lowered to 210°F. it is passed through heat inter-changers where more steam is recovered by means of vacuum pumps reducing the pressure and thereby lowering the boiling

point. The temperature of the liquor leaving the heat interchangers being approximately 160°F. is still too hot and thus passes through a large cooling tank, where forced air currents bring it down to approximately 150°F.

The sodium aluminate liquor is now ready for the precipitators. These are large cylindrical tanks where the saturated liquor is agitated and a hydrate seed charge is added to accelerate crystallization, the action desired. The settling of the hydrate is accomplished in three steps—i. e., first, the primary tanks: the resulting sediment of large dense hydrate crystals are pumped, after washing to remove soda, over to calcination. Next, the overflow from the primary tanks passes on to the secondary tanks, likewise on to the tray thickners where a similar action takes place but with the underflow from each going to hydrate seed storage and the overflow from the trays returning as spent liquor to be recharged with soda and pre-heated before again being used in the slurry mixers and digesters.

The hydrate that was pumped over to the calcine building is passed through dorco filters to remove wash water before going to and through the rotary kilns which remove the chemically combined water. Since removing the chemically combined water from the hydrate we now have alumina (alumina oxide) which passes through large rotary coolers to reduce heat and on to a line of peck carriers up to shipping bins and loaded out into cars either by gravity or air pressure, depending upon the type car used.

Calcination completes our processing of the ore bauxite. The alumina that we produce is shipped out to our reduction plants. The process at these plants consume quantities of electricity as well as carbon and cryolite. Aluminum pigs, the reduction plant's end product, in turn goes on to rolling mills, casting plants and extrusion plants.

In closing I want to again stray from the immediate subject. Our firm and the aluminum industry in America had its beginning in Pittsburgh, in the year 1888 and was known as the Pittsburgh Reduction Company. At that time we had a capital investment of about $20,000—a production of 18,000 pounds of aluminum, and a selling price of $5.00 per pound. In 1891 our company had moved from Pittsburgh to New Kensington and at that time with an investment of one million in tools and equipment we produced 167,000 pounds of aluminum that sold at 85c per pound. And so on and on—up the production ladder and down the cost ladder. Each year brought more tools and equipment, advancement in technical knowledge and general 'know-how' until in 1929 we were producing 164 million pounds that sold for 27c per pound. Now

bringing us up to the present, our company in 1947, produced 638 million pounds of aluminum and that was not all that was produced; with two other major producers, surely the volume of pig that year must have reached over a billion pounds. Along with this production came the usual price reduction: thus, you will find now aluminum pig consistently selling around 14 to 15 cents per pound. Considering that aluminum castings and aluminum wire weigh only one third that of steel and copper, right off the reel you can afford to order aluminum paying, if necessary, three times the price of steel or copper and still remain ahead by having less weight to handle.

Aluminum now ranks second only to steel in metals produced and with architectural and building applications soaring upward to a point at least equalling the demand of transportation, we with Alcoa envision great peacetime markets, far greater than ever dreamed of before the war. Needless to say we like that as I like meeting with you tonight!

NEW MEMBERS

As you read the list of new members, you will note the distribution through the state. Particular attention is called to the impressive list of students from Southwestern Louisiana Institute.

For Member

WILLIAM B. CATCHINGS, Baton Rouge; age 56. Endorsed: V. J. Bedell, J. T. Montgomery III, W. S. Nelson. Cornell University, 1914. Municipal sewer and water contracting, 1915-18. State Highway Dept. of Delaware, 1918-21. N. C. State Highway Comm., Raleigh, N. C., 1921-26. Private practice, 1926-33. U.S. Dept. of Agriculture, Highway Engineer, 1933-40. Civil Aeronautics Admin., Senior Airport Engineer, 1940-42. Pan American Airways, Inc., Chief Airport Engineer, 1942-43. Hq. AAF, Air Transport Command, Technical Advisor, 1943-45. State Highway Dept., New Mexico, Engineer, 1945-46. Civil Aeronautics Admin., Ft. Worth, Chief, Airport Soils and Paving, 1946-47; Baton Rouge, Dist. Airport Engineer, Feb. 1947 to date. Member ASCE, Ass'n. Asphalt Paving Technologists. Registered Prof. Engr., New Mexico.

HENRY G. CHALKLEY, Lake Charles; age 50. Endorsed: F. C. Gault, R. P. Lockett, B. S. Nelson. U. S. Naval Academy, graduate 1919. Engineer Officer, 1920-24. Sweet Lake Land & Oil Co., Engineer, Mgr., now President, 1924 to date. La. Canal Co., Engineer, Mgr., now President, 1929 to date. Lacassane Co., Inc., Engr., Mgr., President, 1935 to date. Prairie Land & Canal Co., Inc., Engr.-Mgr.-President, 1936 to date. Asst. supervisor of Shipbuilding, Orange, Tex., 1941-45; Supervisor of Shipbuilding, 1945. Now hold commission as Captain, USNR. Member ASME.

LAWRENCE E. CREASY, Baton Rouge; age 27. Endorsed: H. T. Barr, W. D. Poole, W. P. Wallace. Virginia Polytechnic Institute, B.S. Agri. Eng., 1942. Carnegie-Ill. Steel Corp., special engr. in mtce. dept., 1942-44. U.S. Army, 1944-46. American Growers Supply Co., Agri. Engr., 1947. La. State University, Associate Agricultural Engineer in research, Dec. 1947 to date.

RODERICK C. DUCHESNE, Ruston; age 34. Endorsed: A. P. Andrews, R. T. Sessums, S. C. Smith. Louisiana Polytechnic Institute, B.S.C.E., 1936. U.S. Engineer Dept., Vicksburg, Jr. Engr. Aide, 1936. Soil Conservation Service of Texas, Asst. Conservationist, 1937-43. Privately employed operating general mdse. business and farm at Baskin, La., 1943-46. State of La., Dept. Public Works, Eng. Aide IV, 1946-48. La. Polytechnic Institute, Asst. Professor Eng. School, Jan. 1948 to date.

ROBERT LAMAR GREEN, Baton Rouge; age 33. Endorsed: H. T. Barr, W. D. Poole, L. J. Lassalle. University of Georgia, B.S. in Agricultural Engineering, 1934. M. S. Degree, Iowa State College, Major in Agri. Eng. U.S. Dept. of Agriculture, Soil Conservation Service, Asst. Agri. Engr., 1934-47. La. State University, Asst. Professor Agricultural Engineering, 1947-48. U.S. Army, Cavalry Reserve, 1941-46, retiring rank Major.

EDWARD A. HODGE, New Orleans; age 33. Endorsed: H. T. Barr, W. T. Hess, W. D. Poole. Louisiana State University, B.S. Agri. Eng., 1938. La. Power & Light Co., Rural Service Consultant, 1938 to date, with exception of 4 yrs. as an officer in the U.S. Army.

CARL RANSOM HOGLE, New Orleans; age 45. Endorsed: D. W. Godat, J. M. Guillory, Brandt Pedersen. Duquesne Light Co., Work Dispatcher, 1923-25. Tennessee Coal, Iron & R.R. Co., Utility Engr., Asst. Chief, Chief Engr. of Power House, 1925-29. Carnegie Steel Co., Expediter, 1930-32. Hartford Steam Boiler Inspection & Insurance Co., Inspector, 1935-39. The Panama Canal, defense project designer, 1939-41. Federal Power Commission, Engr., Bureau of E.E., 1941-42. Goodwin & Van Keuren, Chief Design Engr. (M.&E.) for Army Air Base, 1942-43. Reynolds Metals Co., Electrical Engineer, 1943-45. Reconstruction Finance Corp., Supervising Engr., 1945-47. Godat & Heft, Principal Electrical Engineer, 1947 to date.

GEORGE GRIFFIN HUGHES, Lafayette; age 64. Endorsed: L. J. Lassalle, H. R. Mason, J. M. Robert. Alabama Polytechnic Institute, B.S.M.E., 1907; M.E., 1908. Woodward Iron Co., 1908-13. Southern Wheel Co., 1913-15. Conners-Weyman Steel Co., 1915-18. Schloss-Sheffield Steel & Iron, 1918-21. College of Engineering, Southwestern Louisiana Institute, now Dean, 1921 to date. Member ASME, ASEE.

RAYMOND E. JENKINS, Lafayette; age 26. Endorsed: B. P. Babin, G. G. Hughes, H. R. Mason. Southwestern La. Institute, B.S.E.E., 1942. Westinghouse Electric Corp., Test Engineer, 2½ yrs. Naval Ordnance Laboratory, Washington, D. C., 6 mos. Active duty, Navy, 5 mos. Southwestern La. Institute, Instructor, Asst. Professor in Mechanical Engineer, 1¾ yrs.

ROBERT RANDOLPH JONES, Baton Rouge; age 30. Endorsed: H. T. Barr, W. H. Carter, W. D. Poole. Virginia Polytechnic Institute, B.S. Agri. Eng., 1940. Army Air Corps., 1941-46, including design and development engineering in flight research. La. State University, Asst. Extension Agri. Engr. in Rural Electrification, 1947-present. Member American Society Agricultural Engineers.

FERNAND S. LAPEYRE, New Orleans; age 37. Endorsed: J. V. Dugan, W. J. Drawe, A. J. Fransen. Tulane University, B.E., M. & E., 1933. Standard Oil Co. of La., Junior Engineer, 1933-36. Murray-Baker-Frederic, Inc., Sales Engineer, 1936 to date.

WHARTON A. LE BLANC, Baton Rouge; age 30. Endorsed: H. T. Barr, W. D. Poole, W. P. Wallace. Louisiana State University, B.S. Agri. Eng., 1939. Illinois Central R.R., Civil Engineer, 1939-40. U.S. Army, 1940-46. General Gas Corp., Combustion Engineer, 1946-48. Member American Society Agri. Engrs.

VERNON EUGENE MILLS, Maplewood; age 32. Endorsed: S. D. Nolan, E. W. Ruhnow, J. D. Wyman. Agricultural & Mechanical College of Texas, B.S.M.E., 1941. Texas Pipeline Co., Mech. Engr., 1939-40. Houston Shipbuilding Corp., Mech. Inspector, 1941-43. U.S. Navy Eng. Officer, 1943-46. Magnolia Petroleum Co., Petroleum Engr., 1946-47. Cities Service Refinery, Lake Charles, Eng. Inspector, 1947 to date.

JOSEPH J. PICARAZZI, Lake Charles; age 27. Endorsed: S. D. Nolan, E. W. Ruhnow, J. D. Wyman. University of Michigan, B.S.E. (Mech. Eng.) 1943. U.S. Army, active duty, 1943-46. Cities Service Refining Corp., 1946 to date.

CLARENCE AUSTIN RICHARDS, Tallulah; age 39. Endorsed: J. E. Jarman, J.B. Pettey, Ellis Ross. Southwestern La. Institute, Civil Engineering, 1927-30; University of California, 6 mos. course in geology, soil mechanics. U.S. Corps of Engineers, School of Soil Mechanics and concrete, 1 year. Dept. of Highways, Inspector, 1931-33. U.S. Corps of Engineers, Surveyman, Engineer, 1933-41. E. I. DuPont Co., Asst. Chief Engineer, 1941-43. Kaiser DuPont Co., Senior Engineer, 1943-45. San Joaquin Gypsum Co., Res. Engr., July-Oct., 1945. Chief of Party on Highway Location, 1945-46. U.S. Engrs., Location and Soils Engr., 1946. La. Dept. of Highways, Asst. Project Engineer, Dec. 1946 to date.

JOSEPH S. RIORDA, New Orleans; age 32. Endorsed: L. J. Cucullu, J. S. Burke, G. E. May. Tulane University, B.E. in E.E., 1938, N.O. Public Service Inc., Sales Engineer, 1938-41. U.S. Air Forces, Radar Technical Officer, 1941-45. N.O.P.S.Inc., Sales Engineer, 1945 to present.

WALTER JOSEPH SCHWARZ, New Orleans; age 39. Endorsed: C. A. Burton, J. L. Dickson, R. L. Nall. University of Vienna, Austria, 1930; University of Lyon, France, 1932. Textile weaving and dyeing, 1933-37. United Fruit Co., agricultural research, 1939-40. The Flintkote Co., Chief Chemist, 1940-date.

J. P. SESSIONS, Vidalia; age 45. Endorsed: J. M. Doyle, T. B. Smart, S. C. Smith. La. State University, B.S.C.E., 1925. La. Highway Commission, Bridge Detailer, 1925-26. Adams County, Miss., Asst. Eng. highway location, 1926. Private practice, 1927-28. Fisher Lumber Co., Ferriday, La., Engineer on land surveys, logging railroad survey and construction. 1928-36. Private practice, 1936 to date. Licensed C.E., La. and Miss.

C. MORRELL SUPPLEE, JR., New Orleans; age 39. Endorsed: B. J. Haney, C. M. Rogers, J. N. Wilson. Drexel Institute, 1926-28. Carnegie Tech., 1928-32, B.S.M.E. Temple University, B.S. Ind. Eng., 1935. University of Virginia, Chemical Engineering, 1940-41. Biarritz American Univ., Biarritz, France, 1945, Organic Chemistry. The Brown Instrument Co., Flow Meter & Mech. Engr., 1936-37. Lago Oil Co., Aruba, Netherlands West Indies, 1937-39. Solvay Process Co., Process Control Engr., 1940-41. U.S. Army Engineers, 1942-45. U.S. Coast & Geodetic Survey, Geodetic Engineer, 1945-46. Sewerage & Water Board, Mechanical Engineer, present.

JOSEPH JACKSON THIGPEN, Ruston; age 30. Endorsed: R. A. Smith, R. T. Sessums, R. S. Wynn. Louisiana Polytechnic Institute, B.S.M.E., 1936. Seismic Explorations Inc., Houston, recording truck helper, 1936-37. U.S. Military Academy, Cadet, 1937-41, graduating with B.S. Degree and commission in the Corps of Engineers. Officer in Aviation Eng. Battalion constructing airfields in SW Pacific area, 1941-44. La. Polyetchnic Institute, Asst. Prof. M. E., Sept. 1947 to date.

JOSEPH ROLAND TROXLER, Lafayette; age 27. Endorsed: B. P. Babin, G. G. Hughes, H. R. Mason. B.S.M.E., Southwestern La. Institute, 1942. Westinghouse Company, Test and Field Engineer, 4½ years. Southwestern La. Institute, Asst. Professor Mech. Eng., 1½ years.

CALVIN T. WATTS, Ruston; age 34. Endorsed: R. T. Sessums, R. S. Wynn, F. E. Hogan. La. Polytechnic Institute, B.S.C.E., 1938. Carter Oil Company, Rodman, Instrumentman, 1938-39. Louisiana Polytechnic Institute, Testing Engineer on PWA building program, 1939-40; Asst., Associate Professor Civil Engineering, 1940-date. Member LTA, ASEE, ACI.

For Reinstatement to Membership

GERARD P. CARUSO, New Orleans; age 31. Endorsed: H. M. Fraser, H. A. Levey, F. M. Taylor. Tulane University, B.E. in Ch.E., 1939. International Lubricant Corp., Engine Oil Research, 1939-42. U.S. Naval Reserve, 1942-46. International Lubricant Corp., Research Engineer, 1946-date.

For Junior Member

NED J. BOND, JR., Baton Rouge; age 27. Endorsed: H. T. Barr, W. H. Carter, W. D. Poole. University of Georgia, B. S. Agri. Eng., 1943. Associate in Agricultural Eng. Research, La. Agri. Experiment Station, 1946-date. Member American Society Agricultural Engineers.

CHARLES ROLLIN CAMP, JR., New Orleans; age 21. Endorsed: W. E. Blessey, F. H. Fox, F. W. Macdonald. Graduate Civil Engineer, Tulane University, June 1948.

ROBERT NELSON CREWS, New Orleans; age 24. Endorsed: W. E. Blessey, F. H. Fox, F. W. Macdonald. Graduate Civil Engineer, Tulane University, June, 1948.

GEORGE BEL DAVIS, New Orleans; age 25. Endorsed: W. E. Blessey, F. H. Fox, F. W. Macdonald. Graduate Civil Engineer, Tulane University, June, 1948.

GARLAND O. EDELEN, West Monroe; age 26. Endorsed: H. T. Barr, W. T. Hess, W. D. Poole. Louisiana State University, B. S. Agri. Eng., 1943. Army Air Force, 1943-44. La. Power and Light Co., Rural Service Representative, 1946-48. Member American Society Agricultural Engineers.

GLENN D. GARBER, Lake Charles; age 27. Endorsed: R. E. Burgess, G. L. Smith, J. D. Wyman. Louisiana State University, B.S.M.E., 1947. Cities Service Refinery, Inspection Dept., 1947 to date.

FRANK MELVILLE HEROY, JR., New Orleans; age 21. Endorsed: W. E. Blessey, J. W. Allee, J. P. Fernandez. Graduate Civil Engineer, Tulane University, June 1948.

ALPHONSE R. JOLLISAINT, JR., New Orleans; age 29. Endorsed: F. F. Pillet, H. A. Schaeffer, W. P. Wallace. Louisiana State University, B.S. Arch. Eng. 1943; B.S.C.E., 1947. Army Air Corps, Aircraft Mtce. Officer, 1943-46. August 1947 to date, surveying, design and construction supervision, F. C. Gandolfo, Jr. Licensed C.E., La. Jr. Member ASCE.

LELAND E. MORGAN, Baton Rouge; age 24. Endorsed: L. J. Lassalle, W. D. Poole, W. P. Wallace. Louisiana State University, B.S. Agri. Eng., 1943; M.S. Agri. Eng. 1945. Agricultural Experiment Station, L.S.U., Research Assistant, 1943-45. Agri. Extension Service, L.S.U., Engineer, 1945-present. Member American Society of Agricultural Engineers, Tau Beta Pi.

JOHN STANLEY NORTON, Baton Rouge; age 25. Endorsed: H. T. Barr, W. D. Poole, E. F. Tims. Pennsylvania State College, B.S. Agri. Eng., 1945. La. State University, Research Associate in Agricultural Engineering, 1945-48.

GEORGE ARTHUR SEAVER, JR., New Orleans; age 24. Endorsed: B. A. Grehan, D. E. Guiza, W. S. Leake. Tulane University, B.E. in C.E., Feb. 1944. USNR, Civil Engineer Corps, Commissioned Officer, 1944-46. Boh Bros. Construction Co., Field Engineer, 1946 to date. Licensed C.E., La.

SUREY R. SLOVENKO, New Orleans; (JUNIOR MEMBERSHIP AWARD) Graduate of Tulane University, June 1948 in Chemical Engineering.

MATTHEW McC. SPANGLER, Lake Charles; age 27. Endorsed: L. D. McCorquodale, B. H. Wade, E. H. Goodloe. High school graduate, I.C.S., correspondence course in civil eng. National Park Service, Eng. Aide, 1 yr. Virginia Hi-Way Commission, Eng. Aide 2 yrs. La. Dept. of Highways, Sr. Instrumentman and party chief, 4 yrs.

JAMES M. STEWART, JR., Lake Charles; age 23. Endorsed: W. M. Davis, C. U. Schexnailder, V .E. Sicks. Louisiana State University, B.S.M.E., 1944. Cities Service Refinery, Draftsman, Jr., Engineer, 1946-present.

ROBERT L. THEAUX, Sulphur; age 23. Endorsed: W. M. Davis, C. U. Schexnailder, V. E. Sicks. Southwestern La. Institute, 1941-43; Tulane University, 1943-44, B.E. in C. E., 1944. U.S. Navy, 1945-46. Cities Service Refinery, Engineering Draftsman, July 1946 to date. Licensed C.E., La.

WILLIAM T. TURNER, JR., Winnsboro; age 20; (JUNIOR MEMBERSHIP AWARD). Graduate of Louisiana Polytechnic Institute in Chemical Engineeding, 1948.

ROBERT LOUIS VACCARO, New Orleans; age 24. Endorsed: W. E. Blessey, F. H. Fox, F. W. Macdonald. Graduate of Tulane University in Civil En-Engineering, June 1948.

RODNEY M. VINCENT, New Orleans; age 22. Endorsed: W. E. Blessey, F. H. Fox, F. W. Macdonald. Graduate of Tulane University in Civil Engineering, June 1948.

JOHN EDWARD WALKER, New Orleans; age 21. Endorsed: J. W. Allee, W. E. Blessey, J. P. Fernandez. Graduate of Tulane University in Civil gineering, June 1948.

For Transfer from Student to Junior Member

FARRELL W. ADAMS, graduate in Mechanical Engineering, Louisiana State University.

JOHN J. FINEGAN, JR., graduate in Electrical Engineering, Tulane University.

ROBERT L. PONS, graduate in Mechanical Engineering, Tulane University.

FREDERICK W. WEISSBORN, JR., graduate in Mechanical Engineering, Tulane University.

For Student Member

J. A. MATHERNE, JR., LIONEL J. BABIN, JR., Mechanical Engineering students at Louisiana State University.

VAL D. BREAUX, JR., RALPH CAFFERY, JOHN F. DIAMOND, EMERY DOMINGUE, FRANCIS M. ROBERTS, JOHNNY B. SELLERS, Civil Engineering students at Southwestern Louisiana Institute.

JOHN A. JUDICE, Chemical Engineering student at Southwestern Louisiana Institute.

MALCOLM BIENVENU, SIDNEY I. DAIGLE, KENNEDY J. DUGAS, ARTHUR E. FAULK, JR., HAROLD N. FORD, LLOYD D. HIGGINBOTHAM, GODFREY L. MARINE, EMMETT L. MATHEWS, JR., FRED W. THOMASON, RALEIGH L. WYBLE, JR., Electrical Engineering students at Southwestern Louisiana Institute.

RAYMOND W BABAZ, FELIX J. BLANCHARD, JOHN R. BREEDEN, ROBERT R. CHAPMAN, RENE F. DELAHOUSSAYE, MAURICE B. FOURNET, JR., JOSEPH D'L. GARON, LLOYD ANTHONY HYMEL, ROY LEE JONES, WENDEL GEORGE LEIBE, ANTHONY J. LUNGANO, FRANK J. MIANO, CHARLES F. NEGLEY, JULES G. PATOUT, SAM B. SMART, JR., FRANK J. TARANTOLO, JAMES A. TOCHO, JOHN R. TOCHO, JR., ALLEN VAUGHAN, Mechncial Engineering students at Southwestern Louisiana Institute.

PERSONALS

L.E.S. members will be pleased to learn that James M. Todd, past president of our Society, has been nominated as National President of the American Society of Mechancial Engineers. Mr. Todd has done much in assisting in the activities of various local engineering groups, and is well qualified for this important national office.

M. C. Abrahm was recently elected chairman of the New Orleans Section, American Society of Mechanical Engineers; R. M. Seago, vice-Chairman, and Waldemar S. Nelson, Secretary-Treasurer. All of these engineers are L.E.S. members.

James S. Janssen has been elected Secretary-Treasurer of the New Orleans Chapter of the American Public Works Association.

Arthur J. Naquin was recently selected as Chairman of the Engineering Section, Delta Society of Safety Engineers.

Student Member Pons recently won a Lincoln Arc Welding Award of a little over $100, based upon a yoke design submitted by him.

CORRECTION

In last month's issue of the "Proceedings" a list of donors of prizes at the annual golf tournament was printed. Through error, the name of A. M. Lockett Co was omitted. They have always given most generously, and it was an oversight that the silver tray which was their contribution, was not listed.

THE MAN WHO WINS

The man who wins is an average man,
Not built on any peculiar plan
Nor blest with any peculiar luck—
Just steady and earnest and full of pluck.

When asked a question, he does not guess,
He knows and answers "No" or "Yes."
When set a task the rest can't do
He buckles down till he pulls it through.

So he works and waits till one fine day
There's a better job with bigger pay
And the men who shirked whenever they could
Are bossed by the man whose work made good.

For the man who wins is the man who works,
Who neither labor nor trouble shirks,
Who uses his hands, his head, his eyes—
The man who wins is the man who tries.

—AUTHOR UNKNOWN.

ENGINEERING BRIEFS

Tank Car of Shale Oil Shipped. A railroad tank car of more than 6,000 gallons of crude shale oil—the first bulk shipment of oil from the Bureau of Mines' new oil shale demonstration plant near Rifle, Colorado—is undergoing preliminary tests in the laboratories of a private oil company at Riverside, Ill., according to James Boyd, Director of the Bureau.

The shale oil will be "fractionated," or separated into the various grades of crude oil, by the Universal Oil Products Company at Riverside, after which the Union Oil Company will conduct cracking and other refining studies in its California laboratories.

Although smaller lots of shale oil have been sent previously to research laboratories, the tank car of 6,369 gallons leaving Rifle on May 18 was the first shipment of its kind.

The Bureau's oil shale demonstration plant, a part of the long-range $60,000,000 synthetic fuels research and demonstration program, has been in operation several months. Shale is mined in the cliffs of Anvil Points, near Rifle, Colorado, transported down a winding road cut out of the mountainside, and the oil is extracted in retorts at the demonstration plant on a nearby plateau.—Power Notes.

Cold Rubber. A new production method may drastically alter the long-range outlook for synthetic rubber. Basically, the change involves the use of new "speed-up" chemicals to permit the rubber's raw materials to combine at temperatures from 0° to 41°F., instead of at 122°F. Recent legislation has insured that synthetic rubber will continue to be produced and used in large volume; the new process may allow synthetic to compete with natural on the basis of quality.

Many rubber technologists think that tire tread stocks made from the new synthetic are superior to natural rubber. Exhaustive tests have already proved that treads using the low-temperature product are 30 to 40 per cent better under the test conditions than any previous synthetic. Finished stock of the new rubber has exceptionally high wear and abrasion resistance without excessive tread cracking. These improvements seem to come from the fact that, in the cold rubber, most of the molecules are of a more favorable size and composition, while in the older synthetic, a large share ignored the chemist's directions.

Important as the development may be in itself, from the long-range standpoint it signifies that improvement on the old GR-S general-purpose synthetic is possible, and hence might continue.

On this basis, private industry will take greater interest in its industrial possibilities. Many factors in production of the new "cold" rubber itself are currently being further investigated. Two Government-owned plants operated by rubber companies are producing the new material; use in tire tread stocks this year is expected, but not in large volume. A bottleneck in applying the method on a large scale is the scarcity of refrigeration equipment to attain and hold the low temperatures.

Although the new "Rubber Act of 1948" declares that eventual private control of the rubber industry is desirable, it continues government ownership until 1950, pending development of a policy toward transferring ownership. The Reconstruction Finance Corporation will be responsible for all operations and continued improvement of synthetic rubber. The Commerce Department will control imports, exports, and require use of natural and synthetic rubber. The new legislation requires the government to keep in operation or stand-by condition plants with an annual production capacity of 600,000 long tons of general-purpose rubber and 65,000 long tons of special rubbers. Of this total, manufacturers must use at least 200,000 tons of the general-purpose and 22,000 tons of the special synthetic. Actually, it is expected that production and consumption of all types of synthetic will be about 392,000 long tons in 1948; for the first quarter of 1948, production was at the rate of 430,000 tons a year. In 1947, before natural rubber was freely available, the United States used 560,000 tons of synthetic and 563,000 tons of natural rubber. Capacity for 100,000 tons of general-purpose rubber above the 600,000-ton minimum is owned by the Government; these plants can be privately purchased if the National Security Resources Board approves. The Act also authorizes negotiations to modify the rubber companies' wartime patent pool, thus opening the way for competitive research.

Synthetic for Tires. At present, synthetic rubber at 18.5 cents is about four cents a pound cheaper than the natural product. At this price, GR-S will be favored for tire treads, particularly if government stockpiling boosts the price of natural rubber. One form of cold rubber is reported to be exceptionall promising for tire carcasses, where previous synthetics have been at a disadvantage because of poor adhesiveness. Such factors as the volume of tire production and improved quality will affect the rate at which general-purpose synthetic supplants natural rubber. It now appears that GR-S in some modification may eventually replace natural rubber.

The special-purpose rubbers are already firmly established in their own fields. Butyl rubber, for instance, retains air and other

gases much better than natural rubber, and is preferred for tire tubes and small balloon-type uses. Other rubbers are equally apt for special fabric- and wire-coating jobs and where oil resistance is needed.—Arthur D. Little, "Industrial Bulletin."

Strange Behavior of Metals at Near Absolute Zero Includes Loss of Electrical Resistance. Strange behavior of metals and other substances at near absolute zero temperature (approximately 460 degrees below zero Fahrenheit) were described recently by Dr. S. C. Collins of Massachusetts Institute of Technology.

Dr. Collins stated that metals, when cooled to close to absolute zero, lose practically all resistance to electric currents. He also revealed that more than a dozen laboratories in the United States are now actively engaged in research extending into the liquid helium range, which is close to absolute zero.

The initial interest in very low temperatures was created chiefly by the desire to liquefy such gases as nitrogen, oxygen, hydrogen, and helium. Helium, the last to yield, was reduced to a liquid state in 1908.

The equipment used in some of the laboratories to obtain very low temperatures is a complicated machine known as a Collins helium cryostat, a device that makes it possible to obtain very low temperatures easier than could be obtained heretofore.

It has been known, since the discovery by Kamerlingh Onnes in 1911, that certain metals lose their electrical resistance when cooled to near absolute zero temperatures. Scientists say they then have superconductivity. A satisfactory complete theory of superconductivity has not yet been advanced, according to Dr. Collins.

An electric current, once started in a superconducting circuit, continues to flow without help from an electric cell or other source of potential. Such currents may be started in a ring of the material by electromagnetic induction. Currents flowing in a superconductor are generally confined to a very thin surface layer.—Aminco Laboratory News.

Dakota Lignite Pilot Plant Operation. Experimental work just completed by the Bureau of Mines in a pilot plant at Grand Forks, North Dakota, shows that more than 900 billion tons of lignite in three Western states is a potential source of fuel gas for beneficiating iron ore, making hydrogen, and other industrial uses, according to James Boyd, Bureau Director.

This represents the first full-scale successful attempt to manufacture water gas from lignite and subbituminous coal by a continuous process in an annular vertical metal retort, Director Boyd

said, A report describing in detail the design, construction, and operation of the plant is available to the public.

Water gas with a heating value of 300 B.t.u.'s per cubic foot was produced from natural lignite, the report shows, this being considered a satisfactory yield from such low-rank solid fuel. The overall efficiency of the pilot plant was 72 percent extraction of the total fuel energy in the lignite processed. Final determination of the economic practicability of the Bureau-developed technique will depend upon further research.

Lignite reserves of North Dakota, Montana, and South Dakota add up to about 915 billion tons and constitute about 98 percent of the country's total lignite reserves. Lignite itself represents nearly one-third of America's total solid fuel reserves, which include all grades of bituminous and anthracitic coal.

Difficulties of using lignite as a fuel have resulted in a low annual production rate, Director Boyd stated. Only 2,668,310 tons of lignite were mined in the United States in 1945, Bureau statistics show, of which 2,522,319 tons came from North Dakota. Most of this was mined by open-pit, or stripping, methods. Lignite generally contains 30 to 40 percent moisture, and when dried in air, the coal slacks and ignites, making it difficult to store for long periods or to ship to distant points of consumption. Lignite usually has a heating value about half of that of the best bituminous coal.

For a number of years the Bureau of Mines has been interested in developing new uses for lignite to conserve high-rank coals and to promote the industrial development of the Great Plains states. The Grand Forks gasification pilot plant was put into operation following similar experiments on a smaller scale at a pilot plant at Golden, Colorado. The current report released by the Bureau covers operations at both pilot plants and draws a comparison between small and large pilot plants.

In reviewing the experiments, the publication points out that water gases capable of meeting a wide variety of industrial needs can be obtained by controlling the rate of internal steaming and the temperature around the externally heated retort. The investigations also confirmed results obtained during the operation of the smaller plant by proving that 50 to 90 percent of the carbon in natural lignite can be converted to water gas in a single pass through the retort.

The cost of producing industrial gas from lignite by the new process compares favorably with that of other competitive processes, the report emphasizes, and under normal operating conditions a metal alloy retort should last from 10,000 to 20,000 hours.

A copy of Report of Investigations 4128, "Gasification of Lignite and Subbituminous Coal, Progress Report for 1945-46" can be obtained by writing to the Bureau of Mines, Publications Section, 4800 Forbes Street, Pittsburgh, Pa.—Power Notes.

Quadruple Power Output Rise by Reclamation Bureau. The U. S. Bureau of Reclamation, already the largest single producer of electric power in the west ,is now planning to quadruple its generating capacity and increase its investment in power equipment nearly tenfold by June 30, 1957.

Almost by accident, details of the bureau's tremendous power construction program were revealed by the Publicity and Propaganda Subcommittee of the House Committee on Executive Expenditures. The subcommittee, headed by Rep. Forest A. Harness, heard of a report prepared by the agency on its 1948-57 program while probing bureau activities. It placed the report, which had been withheld from distribution outside the Interior Department since last April, in the record.

The report indicates total expenditures of $1,416,993,127 for power installations during the 10-year period. This total includes estimates of costs, at 1947 price levels, of strictly power features of reclamation projects—turbines, generators and transmission equipment. No estimate is made on costs of joint power-irrigation facilities, such as storage reservoirs.

Great Increase In Power

The program, if funds are advanced by Congress, will increase the total generating capacity of plants owned by the bureau and those from which it markets energy from 2,202,400 to 9,595,000 kw. The latter includes generating facilities being installed in the Missouri basin by the Army Engineers.

In addition, the bureau proposes to increase the total mileage of its transmission lines from 2,579 to 22,294. Expenditures for the lines will total $560,761,327, as against a total investment of $856,-231,800 in new generating facilities. The bureau's investment in power plant is now reported as $2,202,400.

The bureau expects to start work on power facilities which to complete will cost an additional $393,355,787 after 1957. Of this sum, $187,025,427 will be required to finish power plants and $206,-330,360 for transmission lines.—Engineering News-Record.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction held at Arnaud's Restaurant July 12, 1948

The meeting was called to order by President Leake with Messrs. Lehmann, Macdonald, Cucullu, Mire and Fernandez present. Messrs. Charles M. Kerr and Louis Duclos also were present by invitation. Minutes of the preceding meeting were accepted as read.

The legislation of the proposed Engineers' Registration Bill was discussed.

The Secretary reported that 234 ballots were returned in the quarterly election and that all applicants named in the ballot were elected.

The Treasurer's report for the second quarter of 1948 was presented, and the Auditor's report for 1947 was accepted.

President Leake reported upon a communication from General Edward S. Bres concerning honorary membership in the Society.

Mr. Cucullu moved that the Society of Plastics Engineers be listed in the Society's Proceedings, and that the question of holding joint meetings with that organization be referred to the Technical Papers Committee. The motion was seconded by Mr. Mire and passed.

The President announced hte appointment of Mr. Nairne to investigate the possibility of obtaining the present quarters of the Army and Navy Club in the St. Charles Hotel for the Society's headquarters.

Mr. Lehmann moved that Mr. J. H. Collins, Sr. be appointed General Chairman of the 1949 Annual Meeting. The motion was seconded by Mr. Mire and carried.

Mr. Cucullu moved that Mr. John V. Dugan, Jr., be appointed Vice-Chairman, seconded by Mr. Macdonald and carried.

JOHN P. FERNANDEZ, **Secretary-Treasurer**

Minutes of Joint Meeting of the Louisiana Engineering Society with the Louisiana Post, S. A. M. E. held in the Jackson Room of the St. Charles Hotel July 12, 1948

The meeting was called to order by President Leake, with approximately 130 members and guests present. Reading of minutes of the preceding meeting was dispensed with.

President Leake announced that the Registration Bill for Engineers had been vetoed by Governor Long, but that there still was a possibility that the governor might rescind his action, and urged all members of the Society who could do so to appeal to the governor for his support of the bill.

The meeting then was turned over to Mr. Otis M. Jernigan, Chairman of the S. A. M. E., who conducted the business of that organization and then introduced the speaker of the evening, Mr. Herman A. Huesmann, who gave a most interesting illustrated lecture on "Application of Soil Mechanics to Engineering Design and Embankment Construction."

The chair then was returned to President Leake, who closed the meeting with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, **Secretary-Treasurer**

Minutes of Meeting of the Board of Direction Held at Arnaud's Restaurant on August 9, 1948

The meeting was called to order by President Leake with Messrs Cucullu, Lehmann, Macdonald, Mire, Nairne, Newton and Fernandez present. Minutes of the preceding meeting were accepted and read.

The Engineers' Registration Bill was discussed, and a letter addressed to the Governor by Mr. Soule Butler was read. Mr. Lehmann moved that the revised bill for services submitted by Richard C. Cadwallader, the attorney who handled the legal work in connection with the proposed act, be paid. The motion was seconded by Mr. Mire and passed.

Mr. Mire moved that the President of the Society write a letter to the Governor inquiring what features of the bill are objectionable, so that it may be re-submitted at a future date. Motion seconded by Mr. Cucullu and carried.

Mr. Nairne reported that the quarters in the St. Charles Hotel soon to be vacated by the Army and Navy Club are not available to the Society, having been assigned to the "T" Club.

A letter from Mr. F. W. Macdonald, Assistant Secretary, State Board of Engineering Examiners, was read, and the secretary was instructed to write to the Governor recommending that the vacancy now existing on the State Board be filled by one of the following professional engineers:

Leo M. Odom
David W. Godat
Charles M. Kerr
Claiborne Perrilliat

and that part of Mr. Macdonald's letter referring to Mr. Odom's past services as a member of the Board be quoted.

The proposed new constitution and by-laws, prepared by a committee consisting of Messrs. K. P. Kammer, Chairman, F. N. Billingsley, Vice-Chairman, Lyman C. Reed, Wm. H. Rhodes and F. N. Taylor, was accepted and the secretary was instructed to have copies printed and mailed to all voting members for approval.

Mr. Nairne moved that the 1949 Annual Meeting be held on January 13, 14 and 15. The motion was seconded by Mr. Cucullu and carried.

The secretary was authorized to have the Society's typewriter repaired.

Discussion concerning the Society's participation in the forthcoming Community Chest Campaign was had but no action was taken. The meeting then adjourned in order to attend the Society's general meeting which followed.

JOHN P. FERNANDEZ, **Secretary-Treasurer**

Minutes of the Joint Meeting of the Louisiana Engineering Society and the Louisiana Section, ASCE held in the Jackson Room of the St. Charles Hotel on August 9, 1948

The meeting was called to order by President Leake with approximately 100 members and guests present. Reading of minutes of the preceding meeting was dispensed with. President Leake extended a welcome to the members of ASCE and guests, and related the Society's attempt to have the Governor rescind his veto of the Engineers' License Bill.

The meeting then was turned over to Mr. J. M. LeDoux, Chairman of the Louisiana Section, ASCE, who, after conducting the business of that organization, introduced the speaker of the evening, Captain W. B. Howard, C.E.C., U.S.N., Public Works Officer, Eighth Naval District, who gave a most interesting illustrated talk on "Construction Problems in Alaska".

The chair then was returned to President Leake, who closed the meeting with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, **Secretary-Treasurer**

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXXIV DECEMBER, 1948 NO. 6

CONTENTS

EDITORIAL NOTES AND COMMENTS

What Can YOU Do About Inflation and High Prices? Spiraling prices are worrying everybody, and there is real cause for worry. Inflation has ruined many countries—the people see prices rising, they do not realize that money is falling, so the blame is placed on everybody. As a matter of fact, it is the acts of the Government that make money cheap.

We do not begin to have the answers to inflation, but a few things should be obvious to everyone. For instance, the Government cannot support the price of foodstuffs to the farmer and at the same time expect the price to the consumer to go down. Bumper crops are expected this year, but the law of supply and demand cannot work with supported prices and the Government subsidizing everybody out of everybody's pocket.

Our Federal debt is a quarter of a trillion dollars. Who has to pay for this?—you and I, of course. The President called a special session of Congress for the avowed purpose of enacting legislation to combat high prices and inflation. This program contained a series of proposals which in themselves were inflationary due to his request for huge spending in many directions. The program was not aimed to reduce purchasing power by increasing income taxes, by lowering or abolishing the support of farm prices, or by

reducing government expenditures—any or all of these moves would help in fighting inflation.

We should all bend our efforts to stop inflation before it is too late and before the consequences engulf us. Congress should do this on a bipartisan basis, as they have handled our foreign relations. They might well call to Washington the best brains of the country, without regard to politics, to help solve this problem. This was done in wartime and it could just as well be done now.

What can you and I do about inflation? We can write our Representatives and Senators in Washington and tell them to support the efforts of Senator Byrd and those other real patriotic men in Congress who are not worrying about being reelected but who are valiantly fighting to bring about economy in government and a reduction of the lavish spending which is still the order of the day. Ask them to throw the Pork Barrel out of the window for the good of the country, and do it now.—*Power Notes.*

Traffic Safety Education. In 1948 the City of New Orleans, in line with many other communities, embarked upon an educational campaign to aid in reducing traffic accidents. Observance of the traffic rules by both pedestrians and motorists would save tens of thousands of lives annually. Accidents are costly in time, life, money and suffering. Here are some figures from an article on Accident Costs by Henry K. Evans, Director Traffic Engineering Division, National Conservation Bureau.

Cost of Auto Accidents Comes High. How much does it cost to have an accident this year? What's the over-the-counter price for a medium-sized smashup?

The answer comes from a survey made in the city of Lansing, Mich., by the traffic engineering division of the National Conservation Bureau, which offers the following price list for persons involved in an accident:

1) Average injured pedestrian: $468.
2) Average injured drvier: $408.
3) Average injured passenger: $206.
4) Average uninjured driver: $73.

Lansing figures indicate that the average accident victim pays $170 in salary, another $92 in doctor and hospital bills, $26 for miscellany such as attorney fees, fines, claim settlements, etc., and, if he is a car owner, shells out $200 for auto repairs.

With only a trivial variation of figures, it is probable that the Lansing report would be applicable to the citizens of Louisiana or any other state. State and city officials admit that they know where the hazards are but they ask the question:

"How much do Louisiana citizens think it's worth to make the state safe?"

It is a known fact that city officials will spend public funds in accordance with the wishes of the people, and to demonstrate the value of expenditures made for traffic engineering projects. A summation was recently made by National Conservation Bureau of 54 case histories of traffic engineering problems in every part of the country. Each case involved death or injury and showed that application of remedial traffic engineering such as traffic signals, road markers, overpasses and the like, brought about a 94 per cent reduction of traffic deaths, and 88 per cent reduction of traffic injuries and a 94 per cent reduction of accident cost.

Accident prevention organizations have long been stressing the fact that highway safety is an entirely personal affair and individuals are urged to question the expenditures of public funds since taxation is calculated to support the most effective methods of highway safety available.

New Members. The continued growth of the Society is evidenced by the impressive list of new members who were elected on a recent ballot. We welcome them into the society.

For Member

WARREN KERMIT BANKSTON, New Orleans; age 35. Endorsed: D. Moodie, H. J. Patterson, D. W. Stewart. Louisiana State University Eng. School, 2 yrs. I.C.S. course in Electrical Engineering, 3 yrs. Engineering Specialty & Mfg. Co., Sales Engineer, 4 yrs. U.S. Army, Military Engr., 4 yrs. Ebasco Services, Electrical Engr., 2½ yrs.

ARTHUR E. BIGLER, New Orleans; age 34. Endorsed: J. W. Allee, A. W. Durning, W. T. Hess. La. State University, B.S.E.E., 1938. La. Power & Light Co., 1939 to date, except 1941-45 on active duty U.S. Army. Present position, Office Engineer, Southeastern Div.

HENRY NEWTON BROWN, Bossier City; age 45. Endorsed: H. L. Lehman, R. H. Vaughan, E. R. Woodman. Louisiana State University, B.A., 1927; 1 yr. law. La. Dept. Hwys., Rodman, Inspector, Office & Field Instrumentman, 1928-33. C.W.A., W.P.A., Instrumentman, Party Chief, Asst. Parish Supervisor, 1933-34. U. S. Govt., Instrumentman, 1935-44. La. Dept. of Highways, Project Engineer, 1944-present.

A. R. CHOPPIN, Baton Rouge; age 51. Endorsed: L. J. Cucullu, H. L. Lehman, L. J. Lasalle. La. State University, B. A., 1918; M. S., 1925. Ohio State University, Ph. D., 1929. University of Wisconsin, Post-doctorate work, 1935. High school teacher, 1919-23. La. State University, 1924 to present, now Dean of the College of Chemistry and Physics and Head of Dept. of Chemistry. Member American Chemical Society, Alpha Chi Sigma, Phi Lambda Upsilon, Sigma Xi, A.A.A.S., Phi Kappa Phi.

JAMES HARRISON DRAKE, Monroe; age 35. Marion Military Institute, 1929-30. La. State University, 1930-31. La. Dept. of Highways, Sr. Instrumentman, highway construction, 1932-41; Project Engineer, 1941-43. U.S. Navy Construction Battalion, 1943-45. La. Dept. of Highways, Project Engr., 1945-47; Asst. to Dist. Engineer, 1947 to date.

RUSSELL C. FYE, Shreveport; age 49. Endorsed: B. M. Dornblatt, W. H. Root, O. W. Crowley. Iowa State College, B.S.C.E., 1939. Iowa State Hwy. Comm., 12 yrs., Res. Eng., Mtce. Office Engr. Keouk County, Iowa, County Engr., 9 yrs. 23rd U.S. Naval Construction Battalion, 3½ yrs., retiring rank Lt. Comdr. Hq. Air Training Command, Barksdale Field, La., Chief Operations Branch Air Installations Div., 1946 to date. Member ASCE. Licensed C.E., Iowa, since 1922.

ALLEN T. GIVENS, Monroe; age 44. Endorsed: S. E. Huey, W. S. Leake, R. T. Sessums. La. Polytechnic Institute, B.S.M.E., 1928. Construction Southern Advance Paper & Bag Co., Hodge, La., 1928 Columbia Gas Corp., Monroe, Supervisor Eng. Dept., 1929-40. Coltexo Corp., Monroe, Supt., 1940. Southern Gas Line, Inc., Supt., 1943. Southern Carbon Co., Supt.

Gas Operations, 1942. Pineville Gas Co., Inc., Supt., 1943. (All superintendent positions still retained).

MARION D. HEATH, Baton Rouge; age 47. Endorsed: N. E. Lant, H. L. Lehmann, L. R. Kirst. Correspondence courses in C.E. and Arch. U. S. Naval Station, Ship Draftsman, 1917-19. U.S. Navy Yard, Ship Draftsman, 1919-21. City Engr. Office, N.O., Field Inspector, 1921-23. La. Hwy. Comm., Bridge Draftsman, 1923-25. Lockett & Chachere, Architects, Structural Designer and Architectural Draftsman, 1925-29. Virginia Bridge Co., Structural Steel Detailer, 1929-31. La. Hwy. Comm., Bridge Detailer, 1931-41. J. G. White Eng. Corp., Structural Designer, 1941. Delta Shipbuilding Co., Chief Engr., 1941-45. La. Dept. Public Works, Civil Engr., 1945-date. Registered C.E., La.

ERNEST W. McNEIL, JR., Baton Rouge; age 30. Endorsed: W. A. Whitaker, R. N. Reed, T. L. Wilson. La. State University, B.S.E.E., 1937. Carnegie-Ill. Steel Corp., Pittsburgh, Head Elect. Drafting Dept., 1937-40 Westinghouse Elect. Corp., E. Pittsburgh, edited and wrote technical papers for trade magazines on electrical equipment and application, 1940-41. U. S. Army Corps of Engineers, 1941-46, retiring rank Lt. Col. Standard Oil of N. J., La. Div., Electrical Engineer, Mech. Eng. Dept., Baton Rouge, 1946-present. Member Tau Beta Pi.

OSKAR RANDOLPH MENTON, Baton Rouge; age 30. Endorsed: F. A. Hannaman, T. E. Peak, W. A. Whitaker. La. State University, B.S.E.E., 1938. Field and Resident Engr., Rural Electrification Projects, 1938-40. Standard Oil Co. of N.J., La. Div., Mech. Eng. Dept., 1940-48, now Asst. Head of Dept.

JOHN FRANCIS VOGT, JR., New Orleans; age 32. Endorsed: M. C. Abrahm, L. J. Cucullu, D. W. Stewart. Tulane University, B.E. in E.E., 1938. Eng. Field Research Corp., Field Engr., 1938-39. N. O. Public Service Inc., 1939-present, Mechanical Engr., supervision of new power plant construction. Member Tau Beta Pi.

JOHN WRIGHT WOOD, Maplewood; age 31. Texas A & M College, B.S.M.E., 1940. U. S. Engineer Dept., Little Rock Dist., Assoc. Mech. Eng., 1940-42. U.S. Army Air Corps., Meteorology Cadet, M. S. Meterology, Cal. Tech., 1943, discharged as Captain, 1946. Cities Service Rfg. Corp., Mech. Engr., May 1946 to date. Former member A.S.M.E.

GORDON B. WOOSTER, Sulphur; age 43. Endorsed: R. E. Burgess, Tom Kirby, W. D. Nelson. University of Missouri, C.E., 1930. Empire Oil & Ref. Co., Bartlesville, Okla., 1930-33. Cities Service Oil Co., construction work, 1934; Asst. Supt. Natural Gasoline Plant, 1935-36; Supt., 1937-40; Supt. Crude Formaldehyde & Zinc Alcohol Plant, 1941-42. Chemical Construction Co., Construction Work, 1942-43. Matheison Alkali Works, Magnesium Plant, Day Forman, 1943. Cities Service Ref. Co., Asst. Supt. Butadeine Plant, 1944-present.

For Affiliate Member

CAMIEL HOCTEL, JR., New Orleans; age 30. Endorsed: C. A. Burton, A. R. Keiler, J. M. Semmes. I.C.S. Machine and Tool Design, 1938. O.C.S. Maritime Trainng School, 1943. Strauss Marine Engineering School, 1945. Now taking correspondence courses, L.S.U. and Indiana State U. 3rd Asst. Engineer's license, National Board Boiler and Pressure Vessel Inspector's license. Allis Chalmers Mfg. Co., Machinist, boiler and engine room maintenance, 3 yrs. 2nd and 3rd Asst. Engr. aboard Liberty and Turbo-electric vessels. Presently employed Phoenix-London Group, Safety and Eng. Dept., District Supervisor, 3 years.

JAMES G. NELSON, Maplewood; age 42. Endorsed: S. D. Nolan, C. W. Stokes, J. D. Wyman. Croft-Rushworth & Co., Lake Charles, electrical apprentice, completed course in mechanical refrigeration and air conditioning, serviced and installed electric refrigerators, 1927-29. Humble Oil & Ref. Co., Bayton, Tex., Power Dept., charge of all refrig., air, water and steam lines, 1929. Lee Junior College, power engineering, 2 yrs. Texas A & M. course in water works, sewer sanitation. Cities Service Refinery, Power Plant Shift Foreman, 1943-present.

HARRY SCHAFER, New Orleans; age 51. Endorsed: S. V. Massimini, L. E. Savage, R. L. Gilbert. Marine Engineering, Chief Engineer's License Unlimited. Steam Engines, N. Y. City Stationery Engineer's License. Port Engineer, Waterman S/S Corp., Mobile, 1937-42. Asst. General Supt., Boland Machine & Mfg. Co. Strachan Shipping Co., Marine Supt., present position. Member Society of Naval Architects & Marine Engineers.

For Reinstatement to Membership

FRED N. SHUTTS, Lake Charles; age 50. Endorsed: F. T. Clarke, E. H. Goodloe, H. H. Shutts. Active practice of Civil Engineering and Surveying since 1908. Licensed C. E., La., since 1915. Surveys, highway design, maintenance and construction, drainage, harbor and terminal railroads, navigation channels, etc.

For Transfer from Jr. to Full Member

H. DICK GOLDING, Baton Rouge; age 42. Louisiana State University, B.S.M.E., M.S.M.E. Sugar Engineer, Louisiana, 1925-30. Paramount Chemical Co., La. Div., Sales Engineer, 1930-33. Trade Associations Inc., Houston, President & Technical Advisor, 1933-42. Marine Engineer, Federal License Unlimited, War Shipping Admin., United States Lines, American President Lines, 1943-46. Research Project, Louisiana State University, 1947-48. Presently specializing as a Plant Location Engineer.

For Junior Member

MACK ABRAHAM, Lake Charles; age 23. Endorsed: W. M. Davis, G. H. Hill, V. E. Sicks. Louisiana State University, B.S.M.E. Cities Service Ref. Corp., Junior Engineer, 1946-date.

ROY GLENN CAPPEL, New Orleans; age 24. Endorsed: R. E. Gosa, C. G. Melville, J. K. Woolf. Louisiana State University, B.S.C.E., 1948.

CHARLES N. KAHN, JR., New Orleans; age 23. Endorsed. A. Abramson, A. J. Arnold, M. E. Kirkpatrick. Tulane University, B.E. in M.E. U. S. Navy, Eng. Officer aboard Patrol Craft, 1 yr. Petrolane Gas Co., Inc., Plant and Field Engr., 2 yrs.

BERNARD LOUVIERE, New Orleans; age 23. Endorsed: A. W. Betz, A. M. Hill, R. L. Gilbert. Tulane University, Mech. Engineering, 3 yrs. U. S. Navy, engineering service aboard Liberty and Turbo-electric vessels, 1 year. Gulf Engineering Co., Sales Engineer, 1½ years (present position).

JAMES CRITINGTON RACHAL, Pensacola, Fla.; age 32. Endorsed: B. M. Dornblatt, R. T. Sessums, R. S. Wynn. Louisiana Polytechnic Institute, B.S.E.E., 1947. City of Pensacola, charge of survey work, assist in designing, drafting of streets and sewers, construction of municipal projects, August 1947 to date.

PAUL S. STUART, JR., New Orlenas; age 26. Endorsed: C. J. Kelly, J. K. Mayer, J. P. Fernandez. Tulane University, B.E. in M.E., 1947. U. S. Navy, Engineering Officer, 1944-46. City Engineer's Office, N. O., Surveyor, 1942. Sewerage & Water Board Mechanical Engineer, 1947 to date.

CHARLES WADE TONKIN, JR., Baton Rouge; age 27. Endorsed: F. A. Hannaman, W. A. Whitaker, E. R. Wilkinson. University of Virginia, B.S.M.E., 1947. National Advisory Committee for Aeronautics, 2 yrs. University of Virginia, Dept. of Engineering, 2 years. U. S. Army, fighter pilot, 4 years. Standard Oil Co. of N. J., Engineer, ½ year.

CHARLES WILLIAM WALL, Baton Rouge; age 25. Endorsed: J. B. Arbour, D. H. Brown, F. A. Hannaman. Louisiana State University, B.S.M.E., 1943. Esso Standard Oil Co., La. Div., Coordinator Mech. Eng. Dept., 1946 to date.

For Transfer from Student to Junior Member

LIONEL J. BABIN, JR., graduate in Mechancial Engineering, Louisinaa State University.

ARTHUR E. FAULK, JR., graduate in Electrical Engineering, Southwestern La. Institute.

JOHN A. JUDICE, graduate in Chemical Engineering, Southwestern Louisiana Institute.

WENDEL G. LEIBE, graduate in Mechanical Engineering, Southwestern Louisiana Institute.

C. A. MATHERNE, JR., graduate in Mechanical Engineering, Louisiana State University.

JOHN M. MORRISON, graduate in Mechanical Engineering, Louisiana State University.

JOHN H. SCHLUTER, graduate in Mechanical Engineering, Louisiana State University.

PAUL S. TARANTOLO, graduate in Mechanical Engineering, Southwestern Louisiana Institute.

Our Annual Meeting. The following program has been arranged for our annual meeting in January 1949. The dates are January 13, 14, 15. This splendid program deserves your support and attendance.

Keynote Address:

By Mr. Mike Mora, Director, World Trade Development Committee, International House. Subject: "World Trade and Its Impact on Louisiana.

General Interest Program:

By Mr. W. L. Lawrence, R.C.A.-Victor Company, Camden, New Jersey. Subject: "Television, Its Mechanisms and Promise".

Friday Luncheon:

By Dr. Joseph C. Morris, Head of Physics Dept., College of Arts and Sciences, Tulane University. Subject: "Atomic Energy for Engineering Purposes?"

Technical Sessions:

(Thursday) Dr. I. W. Krebs, Assistant of the Esso Laboratories, Louisiana Division. Subject: "Applications of the Fluid Catalyst Technique to Catalytic Cracking and Hydrocarbon Synthesis".

(Friday) Mr. S. B. Williams, Manager of Customer Relations, Sylvania Electric Products, Inc., Boston, Mass. Subject: "New Social Concepts for the Engineer".

(Friday) Mr. Vertress Young, Vice-President, Gaylord Container Corporation, Bogalusa, La. Subject: "Woodlands Picture of Gaylord Container Corporation".

(Friday) Mr. Esmond J. Keating, U. S. Southern Research Laboratory, New Orleans. Subject: "Some Aspects of the Application of Plastics to Textiles".

(Saturday) Mr. Jack S. Toler, Assistant Division Civil Engineer, Louisiana Division, Humble Oil & Refining Co., New Orleans. Subject: "Off-Shore Construction."

(Saturday) Mr. Bruce A. Jacobi, Chief Engineer, Lerner Stores, Inc., New York. Subject: "Chain Store Air Conditioning".

(Saturday) Mr. James T. McKenzie, Technical Director, American Cast Iron Pipe Co., Birmingham, Ala. Title: "The Engineering Properties of Cast Iron".

Professor Derickson Honored. Recent elections to honorary membership in the American Society of Civil Engineers were Professor Donald Derickson, General Lucius D. Clay, military governor of the U. S. zone in Germany, Charles H. Buford, Gano Dunn and Andrew Weiss.

Professor Donald Derickson, well known as an engineering educator, retired in 1946 as professor of civil engineering and head of the Civil Engineering School at Tulane University, New Orleans, La. Author of widely used college texts on the design of reinforced concrete and joint author of the New Orleans Building Code, Professor Derickson has had papers published in the ASCE Transactions and other technical journals. He is interested in the professional problems of the younger engineer and has served on engineering education committees of the Society, the Louisiana Section, and other professional organizations. Professor Derickson is a Life Member of the Louisiana Engineering Society.

PAPERS AND DISCUSSIONS

ELECTRONICS IN MEDICINE

By James A. Cronvich *

Associate Professor of Electrical Engineering and Associate Professor of Biophysics in the Department of Medicine, Tulane University

From my association during the past three years with a research group in the Department of Medicine of the Tulane Medical School, I knew that the title of this paper would permit an almost unlimited range of subject material. X-ray tubes, electron microscopes, Geiger counters, cathode ray oscilloscopes, mass spectrometers, million-volt generators, spectrophotometers, photoelectric colorimeters, electroencephalographs, to name a few, are all used in medicine and all are electronic devices. Therefore, to keep this discussion from being too long, I have limited it to those phases of electronics in medicine with which I have been most closely associated—the use of the cathode ray tube in a phase of electrocardiography known as vectorcardiography, and radioactive tracer techniques.

Electrocardiography

Modern electrocardiography had its beginning with the work of the great Dutch scientist, Einthoven, who in 1903 invented the extremely sensitive string galvanometer and applied it to the measurement of the minute potential differences produced on the surface of the body by the electrical effects accompanying the activity of the heart. A standard electrocardiogram consists of three amplitude-time recordings: (I) between electrodes on the right and left arms, (II) between electrodes on the right arm and left foot, and (III) between electrodes on the left arm and left foot. A typical electrocardiogram is shown in Fig. 1. Each cycle consists of a series of waves arbitrarily designated by Einthoven the P-wave, the QRS complex, and the T-wave. Other waves are sometimes noted. The P-wave is a manifestation of the electrical depolarization of the auricles of the heart which occurs before these muscles contract. The QRS complex is a manifestation of the electrical depolarization of the ventricles of the heart which also occurs before these muscles contract. The repolarization wave of the auricles is usually hidden within the QRS complex, but the T-wave is the repolarization wave of the ventricles.

The accepted theory regarding the electrical activity of the heart is briefly as follows: In the completely popularized state at the

* Presented to a joint meeting of the Louisiana Engineering Society and the New Orleans Section of the American Institute of Electrical Engineers, September 13, 1948.

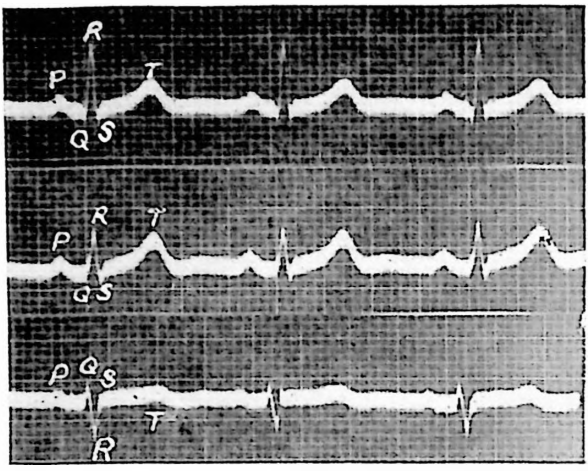

Fig. I.—Standard Electrocardiogram

beginning of the P-wave, the surfaces of the cells of the auricles and ventricles are covered with positive ions which are electrically balanced by equal negative charges within the surface. The electrocardiograms, therefore, indicate zero potential difference. By chemical action at the SA (sinoauricular) node in the upper part of the auricles, the depolarization process is started—the positive and negative charges migrate towards each other. This charge motion produces potential differences which are recorded on the electrocardiogram, and are maximal when approximately one-half of the auricular surface is depolarized, and then drop to zero as the depolarization continues to completion. Diseased tissue in the auricles does not polarize, and the wave of depolarization would be delayed by having to move around this tissue. As the depolarization reaches the AV (atrioventricular) node beneath the auricles, it is delayed so that the auricular and ventricular contractions will be properly phased for most efficient pumping of the blood. The depolarization is then carried along a group of nerve fibers called right and left bundle branches into the ventricles to start the depolarization of the latter. In both auricles the depolarized condition remains for a while and then repolarization begins.

The electrical effects of polarization and depolarization are conveniently represented by a vector whose direction is the instantaneous average direction of motion of the positive ions and whose length is dependent on the quantity of charge moving in this direction. The locus of this vector as it swings about an arbitrary point in space has become of interest to electrocardiographers because such a vectorcardiogram can convey all of the

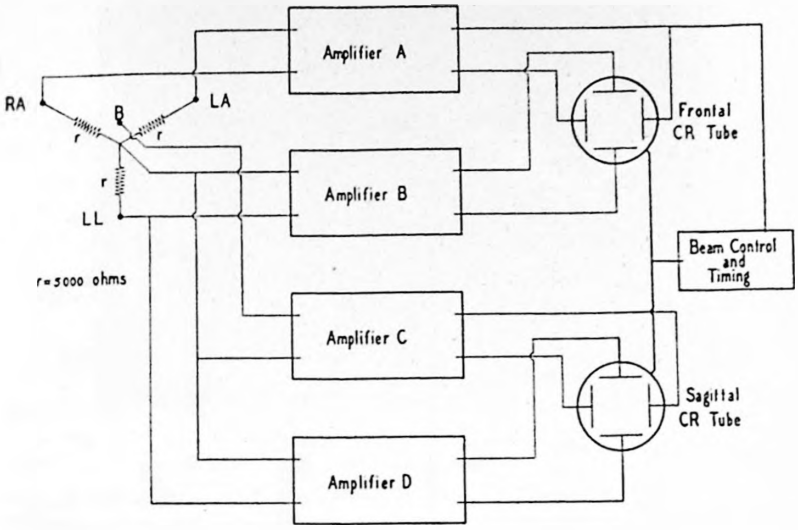

Fig. II.—Apparatus for Obtaining Vectorcardiogram

information of several electrocardiographic tracings at once. The cathode ray oscillograph has been employed to obtain these vectorcardiograms.

A schematic diagram of the electronic apparatus which we are using to obtain vectorcardiograms is shown in Fig. 2. To obtain the vectorcardiogram in the frontal plane, one potential difference is derived from electrodes R and L on the right and left arms respectively. This is amplified by a four-stage, resistance-capacitance coupled, push-pull amplifier and applied to the horizontal-deflecting plates of the frontal plane cathode ray tube. The other potential difference is derived from the terminal C and electrode F on the left leg, amplified, and applied to the vertical-deflecting plates of the tube. The electrical arrangement of the limb electrodes is analogous to a 3-phase delta electrical network, the central terminal to limb arrangement is analogous to a 3-phase wye net work, and the arrangement employed is analogous to the Scott connection for transforming from 3-phase to 2-phase. The cathode ray tube combines the instantaneous effects of the horizontal and vertical potential differences. This deflects the electron beam and its resultant fluorescent spot to a position from the zero potential point which corresponds to the length and direction of the instantaneous electric vector of the heart as projected onto the front surface of the body. The locus of the fluorescent spot during the heart cycle is the frontal plane vectorcardiogram. The sagittal vector-

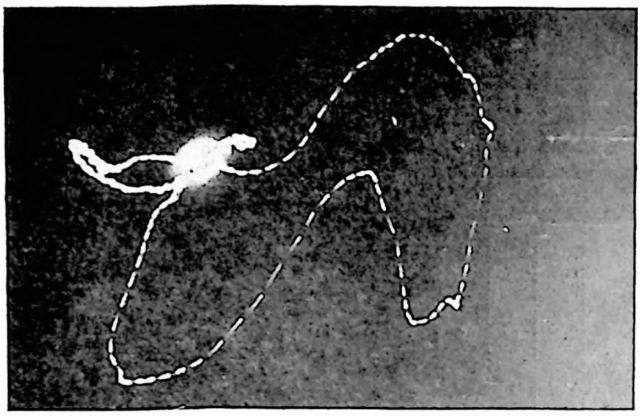

Fig. III.—A Vectorcardiogram

cardiogram is obtained by combining the vertical deflection with a horizontal deflection produced by the potential difference between terminal C and the back electrode B.

The maximum potential differences obtained at the electrodes are approximately 0.001 volt, so the aplifiers must aplify between 100,000 and 200,000 times to produce sufficient deflection of the electron beam of the cathode ray tube. To reproduce the low frequency characteristics of the electrocardigoram with reasonable fidelity, the frequency characteristics of the amplifiers are flat to 0.5 cycle.

A typical vectorcardiogram obtained photographically by single heart cycle exposure is shown in Fig. 3. The dashed line trace is obtained by modulating the intensity of the electron beam of the cathode ray tube. This makes available a time scale on the recording and permits determination of the instantaneous direction of the fluorescent spot. Vectorcardiography is still in the laboratory stage. Perhaps it will never be used clinically, but it is an aid to better understanding of the electrical activity of the heart.

Radioactive Tracer Studies

In congestive heart failure there is a marked increase in the amount of intra- and extra-cellular body fluid. This increase is in turn closely related to the diffusion of sodium through the many membranes of the body. It is very difficult to study the movement of sodium in the body by following ordinary sodium Na^{23}. But, by injecting a radiocative isotope of sodium such as Na^{22} or Na^{24}, the movement of the radiocative isotope can be followed readily with Geiger counters. Chemically, Na^{23} and the radioactive isotopes of sodium behave alike, and their atomic masses are sufficiently

equal to have negligible effect on the physical processes within the body. Consequently, the study of the behavior of the radioactive isotope is in effect a study of the behavior of ordinary sodium in the body.

Radioactive isotopes decay with the emission of high energy particles which can produce ionization of gases. If this ionization occurs between charged electrodes, the radioactive decay can be detected. The Geiger tube consists usually of coaxial cylindrical and fine wire electrodes sealed off at a gas pressure of about 10 cm. of mercury with one of the rare gases, alcohol vapor, methane, propane, or similar gas. The wire is made highly positive, usually about 1000 volts with respect to the cylinder. When a radioactive decay particle enters the space between the electrodes, some of its energy produces ionization of the gas. The resulting electron moves toward the positive wire and the positive gas ion moves toward the negative cylinder. In their motion they produce other electrons and ions by collision with other gas atoms. The process is cumulative with the result that a large pulse of current flows. By appropriate amplifiers and electronic sealing circuits these pulses may be made to operate electrical registers or counters so that the number of disintegration particles entering the Geiger tube in a given time can be determined.

In a typical study with radioactive sodium a solution containing a suitable amount of the radioactive element is injected into the vein of one arm. Before the injection and periodically thereafter, samples of blood, urine, sweat, tears and fluid of edema, if present, are collected and placed in equal volumes on slides under the Geiger tube to determine the rate of radioactive disintegration. The rate of disintegration is proportional to the number of radioactive atoms in the sample. Consequently, the movement of the radioactive material into the many fluids and compartments of the body is readily determined.

The radioactive tracer studies have been extended into the field of mercurial diuretics which facilitate the elimination of the edema fluid usually accompanying congestive heart failure. Diuretics containing radioactive mercury have been prepared and administered to both normal and diseased subjects.

The availability of radioactive isotopes as by-products of the uranium piles at Oak Ridge has facilitated tracer studies. Medical groups all over the world are now working with radioactive isotopes. Geiger counters, amplifiers and electronic sealing circuits are standard items of equipment in nearly every large medical center.

Electronics is certainly an integral part of medicine, and, if a new electronic device is invented, you may be sure that it will in some way be employed in the study of the cause and cure of disease.

ENGINEERING BRIEFS

Parking Problems. Parking problems constituted the leading topic of discussion at the recent conference of planning technicians at Long Beach, California, attended by about 460 members of the American Institute of Planners and the California Planners Institute—now merged with the national body.

Speakers pointed out that California probably has gone further in the development of supermarkets and high neighborhood service stations with their provision for off-street parking, usually in front of the stores, than have many other sections.

The trend toward establishing off-street parking through zoning ordinances was found to be marked and the parking meter was called a great help. The requirement in zoning ordinances that every family, business and institution that create congestion solve its own problem is proving successful.

A number of cities have made careful surveys of the parking area requirements of supermarkets, restaurants, taverns, banks, theaters, hospitals, and churches; their ordinances or amendments to existing zoning ordinances are based on these actual survey figures.

Delegates discussed the interregional or interstate highways, and of depressed, limited access expressways and their effect on cities by running these expressways directly into and through business centers. The insistence on the part of highway departments, apparently approved by federal authorities, to enter cities and locate highways by the old line and grade formulas which had proved so effective in open country, was deplored. In the location of a freeway into a city there are considerations other than line and grade. Highway engineers are expert in the engineering details of highway construction, but the location of these highways may be in error.

The gradual loss of parking lot areas as they are required for new buildings was a problem presented by a number of cities, and the need for permanent parking areas in order to stabilize business property values and business locations was cited.

Merchants have sometimes given free parking for one or two hours to customers making purchases. Sacramento, California, has reversed this process and gives free tokens to those customers who come downtown between 10:00 a.m. and 4:00 p.m. using rapid transit, which, in Sacramento, is all buses.

Presiding at this conference was Frederick J. Adams, professor of city and regional planning, Massachusetts Institute of Technology.

Other recent parking developments are:

According to the "Tribune" of Tampa, Florida, that city's failure to solve its downtown parking problem is costing it thousands of dollars a day.

Minneapolis, Minnesota is increasing parking meter space from 19 to 22 feet to accommodate longer cars and to facilitate parking. This is at no increased cost to parkers but about one meter space per block is lost in the "stretching" process.

Mayor Al Feeney of Indianapolis, Indiana, has appointed a committee of 16 to study the city's parking problems.

Buffalo, New York, is considering plans for off-street parking in the downtown apartment house section.

New parking meter installations are: Kendallville, Indiana, 225; Cuyahoga Falls, Ohio, 250; Akron, Ohio, 700; Youngstown, Ohio, 425; Boston, Massachusetts, 2,000; and Decatur, Indiana, 150.

—Engineering News-Record.

Methanol Produced at Sterlington, Louisiana. A new unit of Commercial Solvent's Dixie Plant at Sterlington is now producing methanol at the rate of 45,000 gallons daily. Beginning of production marks the completion of Commercial Solvent's $5,000,000 expansion at this plant, according to an announcement by C. C. Boardman, Resident Manager of the company. The present expansion increases about 50% the previous plant production capacity. Part of the current output is being used in the making of methanol antifreeze as well as formaldehyde, amines and other chemical products of the company.

Built originally by the government during the war, it was known as the Dixie Ordance Works until the end of the war when Commercial Solvents purchased the plant for the manufacture of ammonia, now being marketed in the fertilizer field.

J. E. Wheeler, plant superintendent, reported that approximately 12,000,000 cubic feet of natural gas per day will be used in the manufacture of methanol, making the plant one of the largest consumers of natural gas in the territory.—News Letter, La. Dept. of Commerce and Industry.

Work Begins on New Utility Units at Baton Rouge to Cost $15,000,000. Additions to existing electric and steam generating units

at the Louisiana station of Gulf States Utilities Company at Baton Rouge costing $15,000,000 got under way on the morning of August 19 when H. C. Leonard, vice-president of the firm, turned a spadeful of earth to signal start of the project. The addition is a part of a vast four-year expansion program in which the company is investing more than $80,000,000 in new generation facilities and transmission lines throughout its system.

The Baton Rouge project calls for installation of two big steam turbine generating units with a rated capacity of 40,000 kilowatts each and three boilers, two rated at 400,000 pounds of steam per hour each and the third rated at 500,000 pounds. Operation of the first of the two steam turbine generating units is expected to begin during the second quarter of 1950 and the second by the first quarter of 1951. The larger boiler is set to be in operation by the second quarter of 1949, Leonard announced.

The two new electric generating units for the Louisiana station, already the company's largest plant, will increase that station's capacity from 108,000 to 188,000 kilowatts. When the entire new program is completed, in 1951, Gulf States system will have a capacity output of 416,000 kilowatts, a little more than doubled the 203,000 kilowatt output at the close of World War II.

Contract for construction was let some time ago to Stone and Webster Engineering Corporation. The local site is in North Baton Rouge in the heart of that city's industrial area. The present plant there now furnishes electric service in a territory of approximately 27,500 square miles. Other major plants are located at Lake Charles, Beaumont, Port Arthur and Orange.

—News Letter, Louisiana Department of Commerce and Industry.

Plan Air Conditioning from Central Station. Reported to be the first project of its kind, air conditioning from a central point is being furnished to the stores, professional offices, and a motion picture theater in the 16-acre shopping center of a multi-million dollar housing project in New York City.

The installation is being made at Fresh Meadows, Queens, where, on a 170-acre tract, New York Life Insurance Company is building a completely integrated community for 10,000 persons. It contains 3,000 apartments, including two 13-story buildings, playgrounds, landscaped lawns, garages, model shopping district, and a new public school.

Chilled water will pass through more than a mile of 12-inch pipe under a 100-psi pressure. Two 600-ton electrically driven centrifu-

gal compressors have been installed in the central power station by Carrier Corp., Syracuse, N. Y.

Architects for the project are Voorhees, Walker, Foley and Smith, of New York, with Meyer, Strong and Jones as consulting mechanical engineers. The general contractor is the George A. Fuller Co.; J. L. Murphy, Inc., was awarded the heating and air conditioning contract. —Engineering News-Record.

Sanitation Engineers Consider Effects of Garbage Disposal Through Sewers. Maryland-Delaware group hears kitchen-sink disposal units might save communities money, but would increase plant problems. If every home in a community possessed a kitchen-sink garbage disposal unit, the community would save some money, although its sewage treatment plant operations would require some readjustment, sanitary engineers were told last week.

Meeting at Baltimore for the 21st annual conference of the Maryland-Delaware Water and Sewage Association, the engineers in a two-day session also heard discussions of water treatment, pollution control, storm sewer design, refuse collection and other matters.

Ralph E. Fuhrman, superintendent of the Blue Plains sewage plant at Washington, D. C., declared himself "puzzled" by the reluctance of many communities to permit the use of home-disposal garbage units, in view of what he called "the practical success and convenience of the machines."

"If all garbage were to be ground," he said, "domestic sewage loads would be increased 30 percent or less on a basis of biochemical oxygen demand, and 50 percent with respect to suspended solids.

"But as a counterbalance to the increased costs of sludge treatment, digester gas production might be expected to rise 50 percent, and for a plant not using the digestion process the greater solids load might aid heat recovery in sludge-incineration processing.

"Water required for grinding is only about 1 gal. per capita per day, "he added." No problem of sewer clogging can arise unless the kitchen grinders are misused to grind china, glass or hard seafood shells.

"With household units in all homes of a community, that community could save money by combined treatment of sewage and garbage. This economy would be achieved by eliminating manual garbage collection (costing $1 to $4 per capita per year)."

Disposal of Mixed Refuge

Disposal of mixed refuse by truck collection and incineration was discussed by C. V. Joyce, refuse engineer, Washington Suburban Sanitary Commission. Contrasting today's methods with the trying

conditions under which the commission started service to its area in Montgomery County, Md., during the war, he described how a crew of five men with an inclosed, self-packing truck covered a route of 500 homes per day, collecting about 7½ tons of refuse and garbage.

Refuse is collected twice weekly, and ashes are picked up separately once a week through the heating season, he reported. More than 17,000 dwelling units of about 65,000 population are served at a charge of $1.50 per month per unit.

Collection trucks deliver to a central incinerator an average hauling distance of 2.7 mi. from the collection areas, he said. The incinerator, completed in 1946 at a cost of $250,000, is of pit and monorail design with two automatic stoking furnaces which can burn more than 50 tons of mixed refuse in 8 hr. The rate charged for disposing of refuse is $2 per ton.

By a constitutional amendment adopted at the meeting, the term of the present officers is extended six months beyond June 30 to cover an interim period in making a changeover to an association year corresponding with the calendar year. The new president elected at the meeting, R. R. C. Willson, superintendent of the water department, Hagerstown, Md., will take office Jan. 1, 1949. Until that date, J. W. Engle, Washington, D. C., will continue in office as president of the organization.—Engineering News-Record.

New Camera Shutter Makes 100,000,000 Frames a Second. The fastest camera shutter known to science, capable of operating at a rate of 100,000,000 frames per second, was revealed recently at the Navy's dedication of the new Michelson laboratory at the Naval Ordnance Test Station, Inyokern, Calif. It is in the Zarem camera (invented by Dr. A. M. Zarem) which is about 25,000 times faster than the fastest motion picture camera commercially available. If motion pictures of a bullet leaving the muzzle of a gun were taken at the rate of 100,000,000 frames per second and projected on a screen at the normal rate, the bullet would appear to travel about four feet per hour.

A so-called Kerr cell, which is the secret of this fast shutter, is a glass tube filled with nitrobenzene in which a pair of electrodes is immersed. The Kerr cell is placed between two polarizing plates so set that the polarized light emitted through the first is in the wrong plane to pass through the second. When high voltage is applied to the electrodes in the Kerr cell, the state of the polarization of the polarized light is immediately altered, allowing the light image of the subject being photographed to pass the second plate and on through the camera lens to the film.

By controlled timing of the voltage, photographic records with an effective exposure time of one hundredth of a millionth of a second have been obtained.

The camera is designed for use in studying certain rapidly changing phenomena which heretofore could not be observed and recorded accurately.

First Gas-turbine Generator Set for an Electrical Utility Ready Soon. A 3500-kw. gas-turbine generator set, now under construction by the General Electric Co., Schenectady, N. Y., to develop electricity for the Oklahoma Gas & Electric Co., will probably be the first gas-turbine used for an electrical utility in this country.

The generator will employ natural gas for fuel, and will require practically no water. In the gas-turbine, the fuel, mixed with air, is burned under pressure in an air-cooled combustion chamber, and the resulting expanded gases are driven against hundreds of vanes on a propeller shaft. Maintenance is low because the gas-turbine has only two major moving parts. Oil may be used for fuel as well as natural gas.—Aminco Laboratory news.

Obituary of

FARRAR PETRIE HAMILTON

Farrar Petrie Hamilton, a former president of this Society, died of coronary thrombosis at the Baptist Hospital in New Orleans on the fifteenth of August, 1948. He was buried in the family plot in the cemetery at Oxford, Mississippi.

Mr. Hamilton was born on February 25th, 1878, in Hinds county, Mississippi, the son of Eva Petrie Hamilton and William Stanley Hamilton. He was the busband of the late Irene Branham of Oxford.

He prepared for college at Pantops Academy in Charlottesville, Virginia and in the autumn of 1893 entered Washington and Lee University where he finished his studies in Civil engineering in 1899. While at the university he became a member of the Sigma Chi fraternity. His education thus begun was continued throughout his life by reading, study and travel.

His professional career began in June, 1899, and until September 1903 he was assistant city engineer of Jackson, Mississippi. He then became a resident engineer on the New Orleans Great Northern Railroad. From that work, in 1906, he went to Saint Louis where for the next four years he was locating engineer and superintendent of construction for C. A. Moreno.

Having been superintendent of street paving for the Gulfport Creosoting Company during the latter part of 1910, Mr. Hamilton then engaged for the following four years in the business of wood block paving, having been consecutively salesman, superintendent, district manager and vice-president of the Cresoted Wood Block Paving Company of New Orleans.

From 1915 to 1917 he was paving engineer for the Southern Pine Association. This was followed by some railway and asphalt paving experience until the beginning of 1918 when he became associated with the Creosoted Materials Companyy of which, through successive positions, he became general manager and vice-president serving in this capacity until 1928 when he became general manager and executive vice-president of the Texas Creosoting Company of Orange, Texas. This engagement terminated in 1931.

Mr. Hamilton's last nine years of active service were with agencies of the Federal Government. Under the WPA he was project supervisor of the Soil and Foundation Survey of New Orleans and vicinity. This undertaking was requested by the Louisiana Engineering Society and resulted in an extensive publication which was favorably received by engineers and others in Europe as well as the Americas. After this he was field engineer and supervisor for other projects of the same agency. During the war years he was with the War Production Board as an industrial specialist. He retired in 1944 to devote the remainder of his life to his own affairs.

Mr. Hamilton became a member of our Society in 1915; in 1926 he was elevated to the presidency and later he became a Life Member. He was a Life Member of the American Society of Civil Engineers and a past president of the Louisiana Section. He was a deacon in the Prytania Street Presbyterian Church of New Orleans.

Mr. Hamilton was a man who lived his religion, kindly and tolerant towards others, he set for himself high standards of personal conduct and in his daily life reflected the fine tradition of the deep South from whence he came and to the soil of which he returned.

He is survived by a son, Mr. Stanley Hamilton of New Orleans, and a sister, Miss Eva P. Hamilton and a brother, Mr. George Julian Hamilton, both residing in Jackson, Mississippi. To them the Louisiana Engineering Society extends its deepest sympathy.

ALLAN T. DUSENBURY,
CHARLES M. KERR,
DONALD DERICKSON, Chairman

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction, Monday, September 13, 1948

The meeting was called to order at Arnaud's Restaurant by First Vice-President Lehmann, with the following members present: Messrs. Cucullu, Macdonald, Mire, Nairne and Fernandez. Minutes of the preceding meeting were accepted as read.

The secretary gave a financial report on the cost of the proposed engineering license law, and also reported upon the progress being made by the Annual Meeting Committees, whose first meeting was held on Thursday, September 9.

A communication from the Engineers' Council for Professional Development, containing their Canon of Ethics, was read, and it was decided to send copies of the code to each member of the Board to be studied at leisure.

A letter from the Citizens' Committee for Air Force day containing an invitation to its luncheon was read, as was a communication from the Home Builders' Association of New Orleans, Inc., inviting members of the Society to attend a meeting with reference to the new F.H.A. regulations. It was decided that both of these invitations would be announced at the regular meeting.

A letter from Mr. H. Dick Golding with reference to the publication of his research project entitled "Some Industrial Engineering aspects of the continuing growth of industries in Louisiana and Texas" was read.

The resignation of Mr. E. H. Flewellen was accepted with regret.

Mr. Carl E. Abrahamson, who had been dropped from membership, was reinstated, his original payment of dues having been lost in transit.

Professor Donald Derickson was named chairman of a committee of his own choice to write an obituary for the late Farrar P. Hamilton, deceased Life Member and Past President of the Society.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Joint Meeting of the Louisiana Engineering Society and the New Orleans Section, American Institute of Electrical Engineers, Held September 13, 1948

The meeting was called to order by First Vice-President Lehmann, with approximately 85 members and guests present. Mr. Lehmann welcomed members of the A.I.E.E. and guests. Mr. Charles P. Knost moved that reading of the minutes be dispensed with, seconded by Mr. Claude J. Kelly and carried.

The secretary announced that a draft of the new Constitution and By-laws was in the mails addressed to all voting members, and urged each one to give careful thought to its contents. He also announced that any desired amendments or changes should be submitted in writing at least ten days before the next regular meeting.

Invitations from the Citizens Committee on Air Force Day to attend a luncheon in honor of that occasion, and from the Home Builders' Association to attend a meeting relative to the new F.H.A. regulations, were read.

The meeting then was turned over to Mr. Mario G. Zervigon, Chairman of the New Orleans Section, A.I.E.E. After the conduct of their business, Mr. James A. Cronvich, Associate Professor of Electrical Engineering at Tulane University, gave a most instructive illustrated lecture on "Electronics in Medicine". Following this, the chair was returned to Mr. Lehmann, who closed the meeting with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Minutes of Meeting of the Board of Direction Held at Arnaud's Restaurant, October 11, 1948

The meeting was called to order by First Vice-President Lehmann, with Messrs. Cucullu, Mire, Newton, Nairne and Fernandez present. Minutes of the preceding meeting were accepted as read.

The Secretary announced that all candidates for membership named in the September ballot were elected; 248 ballots were cast with no dissenting votes.

The Treasurer's financial report for the third quarter of 1948 was presented and accepted.

The resignations of Messrs. H. B. Batchelor and F. M. Heroy, Sr., were accepted with regret.

A letter from Dean G. G. Hughes of Southwestern Louisiana Institute concerning the organization of a student branch of the Society was read. The Secretary was instructed to secure from the students at S.L.I. a petition requesting that they be allowed to organize, as well as a form of constitution and by-laws which they wuold wish to follow.

Mr. Nairne moved that the Canon of Ethics forwarded by the Engineers' Council for Professional Development for approval and acceptance be submitted to the membership for a vote in the December ballot. The motion was seconded by Mr. Newton and carried.

Mr. Claude Kelly was appointed chairman of a committee of his own choice to prepare the obituary of our late member, Nat L. Marks.

The secretary reported that a representative of an insurance company had approached President Leake and himself regarding group insurance for Society members. The Secretary was instructed to secure the proposition in writing before it could be considered.

It was announced that Dixon Hall would not be available for the Thursday night general interest program of the 1949 Annual Meeting. Suggestions for other places were made, to be passed on to the General Chairman of the meeting, Mr. Jeffrey H. Collins, Sr.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ,
Secretary-Treasurer

Regular Meeting of the Louisiana Engineering Society Held Jointly With the American Institute of Chemical Engineers, October 11, 1948

The meeting was called to order by First Vice-President Lehmann, with approximately 100 members a d guests present. Mr. Lehmann welcomed the members and guests of A.I.Ch.E.

Minutes of the preceding meeting were accepted as read. The Secretary asked for any suggestions or questions concerning the revised constitution and by-laws which were forwarded to the membership in September, but none were presented.

Mr. Charles M. Kerr read an obituary of the late Farrar Petrie Hamilton, a past president of the Society, following which a moment of silence was observed in memory of the deceased.

The chair then was relinquished to Mr. J. J. Ganuchau, Acting Chairman of the A.I.Ch.E., and following the business meeting of that organization the main speaker of the evening, Mr. V. V. Jacobini of the Hudson Engineering Corp., Houston, Texas, was introduced. Mr. Jacomini spoke on "The Society of the Fischer-Tropsch Process", which is the development of the technique of converting raw synthetic oil into commercial products.

The chair was returned to Mr. Lehmann following the lecture, and the meeting closed with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ,
Secretary-Treasurer

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