# PROCEEDINGS

OF THE

# LOUISIANA

# ENGINEERING SOCIETY

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VOL. XXI, 1935

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BY THE
LOUISIANA ENGINEERING SOCIETY
NEW ORLEANS

PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

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**Society Scholarships for Engineering Students.** We wish to call attention to the fact that each year the Louisiana Engineering Society awards one scholarship at Tulane University and one scholarship at Louisiana State University to deserving students in engineering. The rules for making awards were amended some time ago and we print below the amended rules:

1. The announcement of the Scholarship Award shall be set up and carried in the *Proceedings.*

2. The cards sent out by the Secretary for the notice of the April meeting shall include a statement relative to the Scholarship Award and request members to make recommendations or nominations. The April issue of the *Proceedings* shall also carry an article on the Award.

3. The scholarships shall be set up as honor awards to the children of the members of the Society or to other worthy students who are financially unable to begin or continue their Engineering studies. Awards shall be made, preferably, to a dependent of a member of the Society or of an Engineer.

4. The scholarships shall be awarded in the Colleges of Engineering for undergraduate study only. The scholarships awarded to a student in Tulane University will be $125.00 per annum, and to a student in Louisiana State University $40.00 per annum.

5. The Award shall be made for one year and may be renewed annually until the undergraduate course of study has been completed, provided proper scholastic grades have been maintained in accordance with the regulations set up by the Universities for the annual renewal of scholarships.

6. An Awards Committee consisting of three members of the Society shall be appointed annually by the President.

7. Applications for Scholarship appointments shall be made to the Awards Committee. In the event that no award is made by the Awards Committee, the Dean of the College in question shall be requested to nominate a candidate for the scholarship.

8. All applications shall be referred to the dean of the College of Engineering of the proper university. The dean shall rate the applications and submit the entire list to the Awards Committee together with all available information and such recommendations as he may deem fit.

9. The President shall make the award on the recommendation of the Awards Committee.

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(Reprinted from April, 1934, Proceedings Louisiana Engineering Society.)

# DIRECTORY

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New Orleans.

PRESIDENT EDWARD S. BRES

PROCEEDINGS
OF THE
# LOUISIANA ENGINEERING SOCIETY

VOL. XXI. FEBRUARY, 1935 NO. 1

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## EDITORIAL NOTES AND COMMENT

**Our New President.** Colonel Edward Sedley Bres was born in New Orleans, September 15, 1888. After receiving his primary education in the private schools of New Orleans, he entered Tulane University, where he received the degree of Bachelor of Engineering in Civil Engineering in 1910. He was awarded the advanced degree of Civil Engineer in 1931.

During his undergraduate days, he was a member of the varsity track team, the Delta Kappa Epsilon, the Theta Nu

Epsilon, and Kappa Delta Phi fraternities. As a member of the executive committee, and later as secretary of the Tulane Alumni Association, and chairman of the membership committee, he initiated the plan which was finally adopted for life membership in the Association.

In 1917, he entered the first officers' training school. Later, he saw overseas service as Engineer Officer, First Army Corps, A. E. F., in the Meuse-Argonne offensive. He is now Colonel, Corps of Engineers, commanding the 312th Engineer Combat Regiment. He is also Division Engineer and member of the staff of the Commanding General, 87th Division. His military activities have been numerous, and include the organizing of officer personnel and commanding of the first Louisiana Citizens' Military Training Camp at Camp Beauregard in 1931. He also served as President of the New Orleans chapter, Reserve Officers' Association, President, Louisiana Department Reserve Officers' Association in 1933, President of the New Orleans Army and Navy Club 1934, and as general chairman, Armistice Day ceremonies.

The activities of Colonel Bres in behalf of the profession of Engineering have been numerous. In 1925 he served as President of the Louisiana Section of the American Society of Civil Engineers, and from 1926 to date, as Chairman of its Aims and Activities Committee. During his incumbency, he initiated and was active in establishing membership awards in the American Society of Civil Engineers to outstanding graduates of Tulane and Louisiana universities. He also initiated the award of engineering scholarships to worthy students of Tulane and L. S. U. This action was the forerunner of similar awards by other societies. He also actively sponsored the establishment of the Tulane section of The American Society of Civil Engineers. He was elected to the Board of Directors of the Louisiana Engineering Society in 1929 and has served continuously. In 1934 he served as Vice-president. During his incumbency, he has been active in the constructive development of interior economy of the society. As a member of the legislative committee he appeared before the House and Senate committees of the Louisiana Legislature in 1930, '32, and '34, in behalf of the amended Engineering Bill. The bill was

passed by both these bodies, but later defeated by gubernatorial veto. In 1934, he initiated the project and, as committee chairman, was successful in arranging for the present quarters of the Society in the St. Charles Hotel.

In 1932 and '33, Colonel Bres served as chairman of the Louisiana Committee for Trade Recovery. Similar committees in each state were sponsored by the Construction League of the United States. These committees prepared programs of public works for the United States, and based on these estimates President Roosevelt computed the required budget for the various works program. The report for Louisiana was cited as one of the five foremost of the United States. Projects reported have been used as bases for E. R. A., C. W. A., and P. W. A. activities in Louisiana, and have afforded work to thousands of unemployed.

The professional work of Colonel Bres has been principally on levees, docks, and wharves, rivers and harbors, and highways. Prior to 1917, he was employed by the Dock Board, Board of State Engineers, Orleans Levee Board, and City of New Orleans on such work. Since 1921, he has practised civil and consulting engineering and is a member of the firm of Scott and Bres, contracting engineers.

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**Other Officers for 1935.** Mr. Allen S. Hackett was elected Vice-president for 1935 and Mr. Bernard H. Grehan was elected on the Board of Direction to serve three years. Messrs. Frank A. Muth and Walter B. Moses were elected Secretary and Treasurer respectively. Mr. Paul F. Hoots and Professor Claire W. Ricker are the other elective members of the Board who hold over for one and two years respectively.

Professor A. Lee Dunlap, as retiring President, automatically becomes a member of the board, taking thereon the place of the preceeding retiring President, Mr. John H. O'Neill. A complete list of the standing committees of the Society is given on the title page of the *Proceedings.*

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**The Annual Report.** The annual report of the Board of Direction is printed in this issue for the information of the membership. In the interest of printing economy, the lengthy

report of the Treasurer is consolidated in the financial statement which is also printed in this issue. The financial statement is a summary of the Treasurer's report and clearly shows the financial condition of the Society without including the items in detail. The original report is on file with the Secretary and, of course, is available to members.

The high points of the Secretary's report show that throughout the year we had an average attendance at regular meetings of 89, with a maximum of 159 and a minimum of 52. While a number of new members were elected during the year, the net decrease in membership is 26, owing to death, resignations, and the present financial condition. The total number of members now on the roll is 320. Members are urged to read the report of the Board of Direction and the financial statement very carefully. An earnest perusal will give some idea of the problems facing the Board of Direction in the operation of the Society and the immediate funds available for the solution of these problems. If the Society is to continue the good work and prosper, an increase in membership is imperative. It is extremely desirable that each member will consider himself a committee of one to bring in one new member during the year.

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**The Annual Meeting and Dinner Dance.** Again it is our opportunity to record a delightful evening. The business part of the evening began with a call to order at 8:30 P. M. in Room A, St. Charles Hotel. One hundred and twenty-two members and guests were present at this annual meeting, President Dunlap in the chair. After dispensing with most of the routine business, the President announced that the tellers had reported the election of Colonel Bres as President and the other officers as mentioned elsewhere in this issue. The new President was then escorted to the chair and the business of the evening was over.

The remainder of the evening was devoted to a dinner dance, which was enjoyed by all. Colonel Bres introduced Mr. A. N. Fromherz as the toastmaster of the evening. From then until the early morning, there was not a moment which was not packed with interest and pleasure for all present.

**District Contact Representatives.** An innovation put into effect by our new President, Colonel Bres, was the appointment of members throughout the state as District Contact Representatives. It must not be forgotten that the Louisiana Engineering Society is not a local organization, but a state-wide organization representing the profession of engineering throughout the whole state of Louisiana. To this end, therefore, the President has appointed members in different locations around the state as representatives to establish contact between the Engineering Society and the engineering profession within the vicinity of each representative. In this way, an engineer located in some out-of-the-way place in Louisiana, far from New Orleans, will be geographically close to some representative of the Society, and will be in much closer contact with the Society as a whole than heretofore. No member of the engineering profession in Louisiana need feel now that the Society has no interest in him because he is too far from the headquarters of the organization. The district contact representatives appointed for 1935 are as follows:

Third District.....T. Baker Smith, Houma, La.
Fourth District.....J. T. Bullen, Shreveport, La.
Fifth District.....Berny Oakland, Monroe, La.
Sixth District.....Harry B. Henderlite, Baton Rouge, La.
Seventh District.....Merrill Bernard, Crowley, La.
Eighth District.....Ira W. Sylvester, Alexandria, La.

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**The Importance of Counsel in Lumber Specification.** Elsewhere in this issue is an article by the secretary-manager of Long Leaf Yellow Pine Incorporated. For the engineer who has to write lumber specifications, it is well worth reading. In these days of specialization, the engineer who is without specialized knowledge finds himself at a disadvantage. This is particularly true in writing specifications. Only too frequently the engineer writes specifications with a certain result in mind. The method of obtaining that result, however, may not be so clear to him, and, in order to make up for his deficiency in knowledge, he hedges his specifications around with all sorts of impossible, or at least arduous, conditions. This can result only in an increased cost to his client.

In writing specifications for materials, therefore, the engineer should not hesitate to consult those most familiar with the materials in question. Quite frequently slight changes in specifications might result in much greater economy with no diminution of effectiveness of the work in hand. This is particularly true of lumber specifications. The expert lumberman should always be consulted by the engineer when he is writing specifications for lumber products. As an example, this writer once saw a set of specifications for creosoting timber in which the treatment was specified. The specifications also required that the lumber be delivered to the creosoter in rafts. The specifications further required that after creosoting the material was to be dumped overboard, made up into a raft, and floated to the job. These specifications were actually printed and sent out. It so happened, however, that on further scrutiny of the specifications it was found that if the treatment specified were given to the timber, it would not float when thrown overboard. Of course, this is a case of not thinking clearly on the part of the engineer; but, if he had submitted these specifications to a creosoting man before having them printed, the error would readily have been discovered.

A great deal of work has been done in the last few years in an attempt to develop the full strength of lumber in the joint. The weak part of all timber construction is in the connection. The recent development of timber connectors is an outgrowth of war necessity in the central countries of Europe. Mr. Cloud's article is well worth reading.

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**Meeting Attendance Prizes.** A new feature of our regular monthly meetings, inaugurated by the Entertainment Committee, is the awarding of prizes for attendance at meetings. The first of these awards was made at the February meeting.

Upon entering the meeting, each member in attendance signs a card and hands it to the Secretary. After the meeting and while the collation is in progress in the library of the Society, the Chairman of the Entertainment Committee holds a drawing from these cards. The winners are then given prizes which have been generously donated by friends of the Society. There is no requirement other than attendance at the meeting

and signing the attendance card on arrival. Several attractive prizes were awarded at the February meeting and the distribution of these prizes will be a feature of each meeting in the future.

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**Discussion After Meetings.** Taking part in the discussion of technical papers is one of the most valuable features of our meeting. A paper, of necessity, is more or less formal in its presentation, but the informal discussion which takes place at the end of the paper permits of a ready interchange of ideas which are valuable indeed. In a society as large as ours, a cross section of the membership will reveal the fact that there is always someone competent to discuss almost any question under consideration. Members should consider it a valuable privilege to be able to take part in the discussion. We have noted of late a greater number of members joining in the discussion of the papers presented, and every encouragement should be given to an even greater discussion by the membership. Incidentally, it offers a valuable opportunity for the members to practice thinking and talking on their feet, an accomplishment in which engineers in general are woefully and notoriously lacking. Let's have more discussion by members.

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**Papers and the Remission of Dues.** We wish again to call attention to the action of the Board of Direction regarding the remission of dues for members who read papers. This action has been in effect for some time and its purpose is to encourage the presentation of papers by members of the Society. We are glad to note that during the past year two members have had their dues remitted for the above reason. It must be noted with disappointment, however, that there were (out of a total of nine papers presented to the Society last year) only two papers by members. The other seven papers had to come from outside the membership.

The Board of Direction fully realizes that the remission of one year's dues does not pay, on a commercial basis, for the time and energy put in the preparation of a really good paper. It has offered this inducement, therefore, not as compensation for the preparation of a paper, but as a little extra reward

for those members who feel that the privilege of presenting a paper is all the compensation necessary. Say what you will, the remission of a year's dues is always a pleasant thing to receive when you have not worked with that specifically in mind.

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**American Institute of Chemical Engineers, Louisiana-Mississippi Section.** Again we welcome a local section to our pages. This time, it is the Louisiana-Mississippi section of the American Institute of Chemical Engineers. It is the earnest aim of this publication not only to be the mouthpiece of the Louisiana Engineering Society, but also to represent as fully as is possible the activities of all of the engineering organizations in this part of the country. The Louisiana section of the American Society of Civil Engineers has been represented in these pages for some time, and with the advent of the Chemical Engineers, we are encouraged to hope and believe that it will only be a matter of a short time before the remaining local sections are regularly represented in these pages. Again, we welcome the Louisiana-Mississippi Section of the American Institute of Chemical Engineers.

# OBITUARY

## BRYSON VALLAS

Died, December 26th, 1934.

Bryson Vallas was born in New Orleans on March 28th, 1888. He was the son of Kate Halliday and the late Horace Vallas.

He was prepared for college in the public schools of his native city, and took the course in Civil Engineering at Tulane University. In 1914 ,when he left Tulane, he entered the service of the city of New Orleans, where he served continuously, with the exception of one year, during which he was in the employ of the Louisiana Highway Commission.

He became City Engineer in May, 1925, and resigned in April, 1931, to become General Superintendent of the Sewerage and Water Board of New Orleans, which position he held at the time of his death.

He was married in February, 1914, to Ruby Josephine Bond, who survives him with four children.

Bryson Vallas had many fine business and professional qualities. Those who knew him always retained a high regard for his clear-sighted analysis of conditions; his high standard of fair dealing; his integrity, and his tactful treatment of all questions submitted to him. He was an engineer of unquestioned ability, active, energetic, and he had endeared himself to all who knew him.

He was a member and Vice-president of the American Society of Municipal Engineers, President of its New Orleans Chapter; a member of the American Road Builders Association, and a member of the Louisiana Engineering Society.

In his death, the city, the community, and the engineering profession, suffer a serious loss.

ALF. F. THEARD,
JOHN KLORER,
F. N. BILLINGSLEY.

# PAPERS AND DISCUSSIONS

## THE IMPORTANCE OF COUNSEL IN LUMBER SPECIFICATIONS

O. N. Cloud *

Read before the Society, December 12, 1934.

The title under which this paper is written is not intended to imply that engineers do not know how to write lumber specifications. As a general thing specifiers know what they want for the purpose to be served. It sometimes happens, however, particularly in writing special grades, that lumber is written out of the picture by the manner in which it is written into the specifications. This is not intentional of course. It happens in some cases through effort at exemption from the abuse of substitution, while on others because of inexperience with forest products for special purposes. In such circumstances the professional man might do well to counsel with the practical lumberman, not so much for technical help, but for counsel in the practical thing of price comparisons on interchangeable grades and sizes, availability, time required for delivery, etc. In this way savings can be effected in places of relative importance, employed at others more fully carrying out the wishes of the designer, and at the same time stay within the limits of budgeted allotments where such conditions are a part of the contract.

Standardization Necessitated Many Changes in Grades: The program of standardization sponsored by Mr. Hoover while Secretary of Commerce, resulted in a great many changes in the structure of lumber and timber classifications in effect at that time. The movement also necessitated many adjustments not only as between the various species of lumber, but as between organized divisions of the lumber industry under whose sponsorship grading rules and their application to lumber were administered.

In addition to the adjustment of intra and inter-divisional differences it was necessary to relate the changes in so far as pos-

* Secretary-Manager, Long Leaf Yellow Pine, Inc.

sible to the work of the engineering profession as represented by the American Society for Testing Materials, governmental agencies and others, to say nothing of the special grades that had been developed by many of the industrial users, such as railroads, automobiles, furniture manufacturers, and other large consumers.

The changes necessary to the measure of success that has been attained in the program of standardization has resulted in some confusion, but the technical professions have at last the advantage of all that is afforded under American Lumber Standards, to which the various grades of different regions have been quite equitably adjusted.

Lumber and Timber Classification Not An Exact Science: It is recognized even by those of us engaged in the lumber business that in many cases the technical profession has some difficulty in making proper use and application of the grades that we have set up. This is in part due to several causes, none of which can be overcome in their entirety. In the first place, the characteristics of wood in general are at fault. All species contain defects that have to be dealt with either through elimination in manufacturing processes, or limitation as to number, extent, and location, particularly as applied to structural requirements.

It has been found in practical experience that the professional man usually knows not only what he wants to do, but how he wants to do it, and when our promotional representatives have confined their work to an intelligent interpretation of the raw material with which the engineer's requirements are met and the facilities employed for its conversion and refinement, our efforts in promoting the use of timber products have been decidedly more fruitful. Such counsel, or advisors upon the practical points of lumber production and grading do not necessarily invade the realm of technical consideration. Sufficient experience has resulted from practical promotional effort serving as an interpreter to the engineering professions to warrant the belief that as time goes by more and more promotional activity will be conducted upon this basis. Expressed in more specific language, the promoter will become the practical advisor to the professional

man in the determination and relation of lumber and timber products to a satisfactory accommodation of engineering design.

STANDARD GRADES AND THEIR ADAPTATION FOR STRUCTURAL PURPOSES: In the refinement of our grades the lumber industry has sought, and with the advice and counsel of the architectural and engineering professions, has in large measure succeeded in providing a standard specification for practically every purpose necessary to the builder's requirements. There are many advantages not only to the designer but to the builder in the adoption, in so far as possible, of these standard grades in the preparation of their lumber specifications.

In the first instance, they are more readily available from a broader source of supply, thereby avoiding delay in deliveries and in some instances interruption in construction progress after work on the project has been started. Standard grades are less susceptible to the misunderstanding that results from differences of opinion in the matter of grade interpretation. They are more economical because of decreased manufacturing cost, and, through proper selectivity, can be made to serve most requirements with full protection to the factor of safety involved in the various types of construction where lumber and timber products are used.

Reverting once more to the matter of availability, which is more important than is generally appreciated, it enables the builder to draw upon local sources of supply, whereas special grades, except as they may be picked from standard grades, have to be ordered from the producers with the necessary time required for production and delivery. In some instances, where standard grades cannot be adapted to peculiar requirements, the manufacturing division of the industry is always willing to provide such materials if possible for them to do so. If such requirements could be anticipated it would be helpful to the mills in meeting demands for delivery. Otherwise, the fulfillment of such orders results in sacrifices to the producer, or extra cost to the consumer. In either event it resolves itself to a matter of common interest which, if approached as suggested, can be met in a way that will be of mutual benefit.

Results of Research and Laboratory Investigation Are Available: The new products with which lumber found competition after the war aroused the industry to the necessity of determining just what lumber had upon which to base an intelligent argument for the continued patronage the industry had enjoyed in practically all divisions of the construction industry. Not only was the lumber industry confronted with the result of research as applied to its old competitors, such as steel, brick, and cement, but the stimulation given to laboratory work during the war, when directed in peaceful pursuits, brought forth a group of new contenders for the consumer building dollar. Finally awakening to the seriousness of the threat of further losses in markets, lumber decided upon a program of research and laboratory investigation in order to determine scientifically and with a greater degree of accuracy the things in favor of lumber that had been developed through the centuries of its usage. The result of all this research has been translated very largely into manuals of wood construction, regional association grading rules, the recommended practices of the American Society for Testing Materials, and various others.

The following booklets on industrial construction are available from the National Lumber Manufacturers Association at Washington, or their district representatives: "Choosing the Industrial Building", "Heavy Timber Mill Construction Details", "Fire-Safe Industrial Buildings", "Maximum Spans for Joists and Rafters", "Modern Connectors for Timber Construction", and others.

From the Southern Pine Association, New Orleans: "A Manual of Timber Construction", "Southern Pine Through the Laboratory", and various other technical bulletins, and particularly Southern Pine Association grading rules which contain approved recommendations for stress assignments to the various structural grades.

In addition to the above the Federal government, through the Forest Products Laboratory at Madison, Wis., and the National Committee of Wood Utilization of the Department of Commerce, has made available a variety of pamphlets covering practically every phase of wood construction. Similar booklets on residential building have had wide distribution among architects and

engineers in which the results of research in framing, bracing, insulation, etc., have been placed in useful arrangement for the benefit of our friends in the architectural and engineering professions. They are commended for your careful study and consideration, and such constructive criticism as you may have occasion to make, in the light of practical experience in their usage, is always appreciated and urgently solicited.

SOME THINGS DEVELOPED OR CONFIRMED THROUGH RESEARCH: Through research activities new things about lumber and its use in most all types of construction were developed, and many of its possibilities which we had accepted as a matter of course were found to be more valuable than generally understood, except, perhaps, among men whose training enables them to appreciate these qualities. For example:

(1). It has been found that for every purpose a wood is available that lends itself to practicable workability.

(2). The variety of sizes, lengths, and specifications provides accommodation for most every requirement of the building public.

(3). There is less contraction and expansion with varying degrees of temperature than many other materials.

(4). Wood is a natural insulation against sound, heat and cold, does not rust or corrode, and is a non-conductor of electricity.

(5). Unlike a great many of the other materials it is not so difficult to shape and fabricate into the finished product.

(6). It combines lightness and lasting qualities with strength, which is a combination not found in a great many other materials.

(7). Its response to finish and decorative effects is superior and more natural than that of many other materials.

(8). It is flexible and adjustable in matters of design, and with it all there can be retained the natural aesthetic qualities of the material for which there is no satisfying substitute.

(9). It is a product with which additions can be made, preserving the natural and original lines of architecture but with modern appearance in every detail.

(10). In addition to its superior strength and resistance to external forces, it has lasting qualities—and especially when treated—definitely established in comparison with substitute materials yet in the experimental stage.

(11). Lumber is a product with which the building world has been familiar from time immemorial. It enjoys a reputation and good-will that is invaluable.

(12).It has an established service record dating throughout centuries. It provides a warmth and friendliness in its finished form that is not approached by many of its competitors.

(13). Lumber is not an old-fashioned product. As a matter of fact, lumber lends itself as much to modern application as most other building materials.

(14). Among other things it has the important advantages of low initial cost, inexpensive fabrication, with nominal expense in up-keep.

All of these things work advantageously to some degree into practically all types of lumber and timber construction. In addition to a more accurate determination and appraisal of lumber and its structural possibilities in the sense that they have been employed in the past, several new processes in treatment have been developed, and at least one outstanding engineering formula has received the approval of the profession both in this country and abroad where they were developed—Modern Timber Connectors.

Modern Connectors in Wood Construction: Modern connectors were developed during the war, chiefly among the Central Powers and the Scandinavian countries. The heavy demands for iron and steel necessitated the fullest possible use of other materials, particularly forest products, for construction purposes. With embargoes against the importation of lumber from other countries it was necessary to make maximum use of small and second growth timber. The necessity for taking full advantage of such woods as were available led to an examination of the weak points in timber as a structural material.

It is well known to the engineering profession that joints have always been the weak spots in timber construction. Research was directed, therefore, to a strengthening of connections,

which led to consideration of the most effective means of transmitting loads from one structural member to another. This has been accomplished through the use of plates, or connectors, of which there are four types: (1) plates with teeth, or corrugations, (2) plain rings which fit into pre-cut grooves, (3) toothed rings, (4) disks that taper from the center to the edges. The corrugated plate connectors and the toothed rings are pressed into the sides of structural members through the device of bolts running through the center of the connectors. This same process is employed in plain rings and disk type of connectors, for the purpose of holding them in place in the same manner as the corrugated plates and toothed rings.

More than sixty different types of connectors have resulted from experimentation, and about fifteen have been approved by such agencies as the Forest Products Laboratory at Madison, Wis., and other engineering laboratories, as having practical adaptation to the construction of factory buildings, bridges, radio towers, and many other purposes of that character. Contracts have been entered into between the National Lumber Manufacturers Assocaition and the owners in foreign countries where these timber connectors are patented. They are being introduced in this country through the Timber Engineering Company, a subsidiary of the National Lumber Manufacturers Association, organized for the specific purpose of promoting modern timber connectors.

Pioneering in fields of this kind is always slow and to some extent expensive. It is believed by many of those who have had experience with these connectors that once the program has progressed beyond the experimental stages, as has been done in some European countries, that this type of construction will be found of such practical benefit from the viewpoint of economy that it will have a popular appeal not only to the engineering profession, but particularly to consumers who should benefit through the savings claimed for the process. Quite naturally the lumber industry is anxious to see the fullest development of modern connector possibilities, as our industry must depend to a large extent upon the market opportunities revealed through research to offset losses at other points where other materials are being used.

High Standards of Quality and Grade Certification: It has been found that many of the special grades that the manufacturers have been called upon to produce have resulted from unpleasant experience on the part of specifications men through substitution, or failure for some other cause to receive standards of quality in keeping with their specifications. Not unlike many other materials, lumber is a material that is subject to the evils of substitution. The extensive use of Southern yellow pine as an industrial building material served to emphasize the importance of strict compliance with engineering specifications. Therefore, the merchandising forces of the Southern Pine Industry engaged in promotional work concern themselves not only with technical assistance in trade extension activities, looking to the utilization of Southern yellow pine, but make available as a safeguard to the consumers of their products official inspection supervision, which guarantees delivery of material in accordance with the designer's specifications. This lends a very practical aspect to market extension work, and has figured conspicuously in the continued use of Southern yellow pine products for industrial purposes throughout a period of most intensive and scientific competition by all the materials with which we are competitive.

# MEMBERSHIP LIST

## HONORARY MEMBERS

J. F. COLEMAN, (C. M. and H. M.), of J. F. Coleman Engineering Co., Consulting Engineer, 1013 Carondelet Bldg., New Orleans.

WALTER H. HOFFMAN, (C. M. and H. M.), Civil Engineer, 1518 State St., New Orleans.

GERVAIS LOMBARD, (C. M. and H. M.), Civil Engineer, 574 Walnut St., New Orleans.

ALFRED F. THEARD, (C. M. and H. M.), Drainage Engineer, Sewerage and Water Board Bldg., New Orleans.

## LIFE MEMBERS

GEORGE G. EARL, (1900), Consulting Engineer, American Bank Bldg., New Orleans.

JOHN T. EASTWOOD, (1901), Consulting Engineer, 1926 Milan St., New Orleans.

JULES GODCHAUX, (1900), Vice-President and Engineer of Operation, Godchaux Sugars, Inc., 1007 Masonic Temple, New Orleans.

ERNEST LEE JAHNCKE, (1900), Jahncke Service, Inc., 814 Howard Ave., New Orleans.

WARREN JOHNSON, (1903), President and General Manager, Johnson Iron Works, Dry Dock and Shipbuilding Company, Inc., P. O. Box 840, New Orleans.

JOHN KLORER, (1898), Chief State Engineer, State Board of Engineers, 8300 Panola St., New Orleans.

G. W. LAWES, (1898), Civil Engineer, 314 Balter Bldg., New Orleans.

A. M. LOCKETT, (1900), President, A. M. Lockett & Co., Queen & Crescent Bldg., New Orleans.

HENRY J. MALOCHEE, (1898), President and Engineer, Buckmaster, Buck and Malochee, Inc., 713 Union St., New Orleans.

F. W. STEVENS, (1909), Manager, New Orleans District Sales Office, Allis-Chalmers Mfg. Co., 1124 Canal Bank Bldg., New Orleans.

IRA W. SYLVESTER, (1901), Consulting Engineer, Rapides Bank Bldg., Alexandria, La.

THOMAS H. TUTWILER, (1898), Retired, 1488 Vinton Ave., Memphis, Tenn.

FRANK H. WADDILL, (1898), Consulting Civil Engineer, 407 Tulane-Newcomb Bldg., New Orleans.

W. S. WHITE, (C. M.), Box 44, Sulphur, La.

BEN WILLARD, (1900), Retired, 1710 Audubon St., New Orleans.

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W. T. HESS, (1933), Engineer, 202 Rosewood Drive, Metairie, New Orleans.

ALVIN E. HOTARD, (1933), Parish Engineer, Jefferson Parish, City Engineer, City of Gretna, 829 Lafayette Ave., Gretna, La.

EDWARD F. HUGHES, (1933), Instrumentman, Sewerage and Water Board, 4502 So. Miro St., New Orleans.

JAMES S. JANSSEN, (1933), Civil Engineer, 1903 Short St., New Orleans.

WILHELM E. KOCH, (1913), Civil Engineer, 2627 Coliseum St., New Orleans.

LOUIS I. KORN, (1933), Engineer, Oil Tester, 6030 Garfield St., New Orleans.

STANLEY M. LECOURT, (1933), Civil Engineer with Theodore Brent, 303 Board of Trade Annex, New Orleans.

ALBERT E. MARKS, (1925), Engineer, 3320 Palmyra St., New Orleans.

GORDON J. McLEAN, (1933), Engineer, Asst. Supervisor, E. R. A., 1544 Henry Clay Ave., New Orleans.

LEAL C. H. McLEAN, (1933), Engineer, Jones & Laughlin Steel Corp., 1544 Henry Clay Ave., New Orleans.

JOHN K. MAYER, (1933), Instructor in Engineering Laboratories, Tulane University, 1738 Carrollton Ave., New Orleans.

A. J. MEYERS, (1933), Engineer, 5517 Prytania St., New Orleans.

HU. B. MYERS, JR., (1929), Civil Engineer, 2438 Palmer Ave., New Orleans.

F. ROBERT MENDOW, (1930), Engineer, A. M. Lockett Co., 2927 Pine St., New Orleans.

CLAYTON L. NAIRNE, (1929), with New Orleans Public Service Inc., 1219 Valence St., New Orleans.

J. CHRIS NIELSEN, JR., (1933), Surveying (Transitman), 2118 Dublin St., New Orleans.

MYRTIS M. NORTON, (1933), Instructor, Tulane University, 7426 Freret St., New Orleans.

PASCAL PARETI, JR., (1933), Engineer, 619 Bourbon St., New Orleans.

WILLIAM P. OSTER, (1928), Engineer, 4651 Baccich St., New Orleans.

PHILLIP FRANK PHILLIPS, (1933), Engineer, 4424 So. Claiborne Ave., New Orleans.

CARROLL J. PEIRCE, JR., (1933), with Sewerage & Water Board, 526 Carondelet St., New Orleans.

RAYMOND C. PROUET, (1933), Drafting Engineer, 4902 Franklin Ave., New Orleans.

CHARLES L. RITTENBERG, (1923), Chief Draftsman, Dock Board, 4437 S. Rocheblave St., New Orleans.

JAMES M. ROBERT, JR., (1933), Member of firm, McCloskey, Moore, Morrow and Robert, Attorneys and Counsellors at Law, 404 Marine Bldg., New Orleans.

H. S. SALZER, (1927), Assistant Lighthouse Engineer, U. S. Lighthouse Service, 6028 Catina St., New Orleans.

HERBERT M. SHILSTONE, JR., (1933), Shilstone Testing Laboratory, 301 M. and M. Bldg., Houston, Texas.

WALTER S. SIMPSON, (1933), Engineer, 19 Audubon Place, New Orleans.

HENRY F. SIRGO, (1932), with Todd Dry Dock, Engineering and Repair Co., Inc., Engineering Division, 1215 St. Anthony St., New Orleans.

DAVID STAYER, (1933), with R. C. A. Victor Co., 219 White Horse Pike, Audubon, N. J.

J. FRASER THOMSON, (1933), Assistant Professor of Mathematics, Tulane University, 139 S. Genois St., New Orleans.

SID E. TROUARD, JR., (1928), Assistant Electrolysis Engineer, New Orleans Public Service Inc., 317 Baronne St., New Orleans.

LOUIS M. TOGNONI, (1933), Graduate Student, Tulane University, 4609 Arts St., New Orleans.

BERNARD J. TORTOMASI, (1933), Attorney and Notary, 1606 Masonic Temple Bldg., New Orleans.

NELSON W. TREMBLAY, (1933), M. & E. Engineer, 750 Orion Ave., Metairie, New Orleans.

WILDAY TUDURY, (1933), 2522 Palmer Ave., New Orleans.

ALVIN A. VOSS, (1929), Engineer with U. S. Coast and Geodetic Survey, 324 W. Strong St., Pensacola, Fla.

RICHARD E. WAGNER, (1933), Engineer, U. S. C. & G. S., 324 W. Strong St., Pensacola, Fla.

HORACE C. WELMAN, (1934), Engineering Department, Jones & Laughlin Steel Co., 200 Stella St., Metairie Ridge, New Orleans.

JOHN W. WILSON, (1933), Engineer, 7916 Oak St., New Orleans.

CARROLL L. WOOD, JR., Engineer, 819 Calhoun St., New Orleans.

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## NON-RESIDENT JUNIOR MEMBERS

A. L. BLACK, JR., (1931), Engineer, LaPorte, Texas.

ALFRED JOSEPH COOPER, JR., (1934), with T. V. A., 406 Cameron St., Chattanooga, Tenn.

CHARLES D. DAVID, (1933), Engineer, Mandeville, La.

GEORGE T. DeLa MATYR, (1933), Engineer, 235 W. Carter St., Route 1, Box 34, Hynes, Calif.

C. E. DOLHONDE, (1933), 7008 Zimple St., New Orleans.

FRED H. FENN, (1930), Instructor, College of Engineering, L. S. U., 204 Church St., Baton Rouge, La.

JOHN HARRY GILLUM, (1934), Engineer, Process Design, Standard Oil Co., Jackson, La.

JOSEPH E. LEININGER, (1931), Air Conditioning Engineer, 920 Music St., New Orleans.

FRANK M. MACDONALD, (1933), Engineer, 2820 Gen. Pershing St., New Orleans.

CHARLES R. MONTEIRO, (1933), Junior Engineer in charge sub office, U. S. Lighthouse Service, 311 Federal Bldg., Duluth, Minn.

HENRI J. MOLAISON, (1933), Chemical Engineer, Jefferson Lake Oil Co., care LeBlanc's Hotel, Erath, La.

JACOB F. MULLER, JR., (1932), Vice-President, Muller Furniture Mfg. Co., 7824 Hickory St., New Orleans.

WALTER H. PRICE, (1933), U. S. Reclamation Bureau, Denver, Colo.

BRISTER BLAKE PIERCE, (1929), Engineer, 841 St. Hypolite St., Baton Rouge, La.

EDWARD A. RODRIGUE, (1933), Engineer, La. Light and Power Co., Sterlington, La.

PHILIP A. WEBER, (1933), U. S. Coast and Geodetic Survey, Washington, D. C.

## SUMMARY

| | |
|---|---|
| Resident Honorary Members | 4 |
| Life Members | 17 |
| Resident Members | 143 |
| Non-Resident Members | 50 |
| Associate Members | 1 |
| Non-Resident Associate Members | 1 |
| Affiliate Members | 17 |
| Non-Resident Affiliate Members | 3 |
| Junior Members | 63 |
| Non-Resident Junior Members | 16 |
| Student Members | 0 |
| Total | 320 |

## PAST PRESIDENTS

| | | | |
|---|---|---|---|
| Sidney F. Lewis | 1898 | A. T. Dusenbury | 1917 |
| Thos. L. Raymond | 1899 | John Klorer | 1918 |
| Henry J. Malochee | 1900 | Ole K. Olsen | 1919 |
| Frank M. Kerr | 1901 | John Riess | 1920 |
| Alf. F. Theard | 1902 | R. S. Manley | 1921 |
| Alf. Raymond | 1903 | Donald Derickson | 1922 |
| J. F. Coleman | 1904 | J. S. Barelli | 1923 |
| W. B. Wright | 1905 | James M. Robert | 1924 |
| W. H. Hoffman | 1906 | Marcel Garsaud | 1925 |
| G. W. Lawes | 1907 | Farrar P. Hamilton | 1926 |
| C. W. Wood | 1908 | Edward S. Lanphier | 1927 |
| J. T. Eastwood | 1909 | John L. Porter | 1 28 |
| W. B. Gregory | 1910 | Frederick H. Fox | 1929 |
| J. C. Haugh | 1911 | James M. Todd | 1930 |
| D. S. Anderson | 1912 | Frank G. Frost | 1931 |
| A. M. Shaw | 1913 | Frederick N. Billingsley | 1932 |
| W. H. Williams | 1914 | John H. O'Neill | 1933 |
| L. C. Datz | 1915 | A. Lee Dunlap | 1934 |
| Samuel M. Young | 1916 | | |

## MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

### Minutes of Board of Direction, December 12, 1934.

The meeting was called to order by President Dunlap and the following members were present: Messrs. Bres, Ricker, Moses and Muth.

The minutes of previous meeting were read and approved and bills on hand ordered paid.

The matter of annual meeting was discussed with the Chairman of the Entertainment Committee and tentative plans of the committee were approved, subject to a special meeting of the Board to be called if necessary.

Applications for membership passed on at previous meeting were ordered to ballot.

There being no further business the meeting adjourned.

F. A. MUTH, Secretary.

### Regular Meeting of the Society, December 12, 1934.

The meeting was called to order about 8:15 P. M., Prof. A. Lee Dunlap, President, in the chair, F. A. Muth, Secretary, and 63 members and guests were present.

The minutes of previous meeting were read and approved. Several announcements were made by chairmen of committees.

The Nominating Committee submitted its report as follows:

For President.....Col. E. S. Bres
For Vice-President.....Mr. Allen H. Hackett
For Secretary.....Mr. Frank A. Muth
For Treasurer.....Mr. Walter B. Moses
For Director (to serve three years).....Mr. B. H. Grehan

There being no further nominations, nominations were closed and it was voted to send the foregoing names to ballot.

An interesting address on "Need of Counsel in Lumber Specifications," was given by Mr. O. N. Cloud. A rising vote of thanks was tendered the speaker and the meeting adjourned to a stag smoker which was enjoyed by all.

F. A. MUTH, Secretary.

### Minutes of the Board of Direction, January 19, 1935.

The meeting was called to order by President Dunlap, and the following members were present: Messrs. Ricker, Bres, Hoots, O'Neill and Muth.

Minutes of the previous meeting were read and approved and bills on hand were ordered paid.

On motion, duly seconded, it was voted that the President be authorized to appoint a committee to make a study of the Constitution and if found desirable to recommend amendments relative to grades of membership, etc.

Resignation of Mr. Oscar Riess was accepted with regret and the name of Mr. A. J. Cooper was changed to Non-resident Junior Member.

The annual reports of the Secretary and Treasurer were read and received with thanks. The Secretary was authorized to have a consolidated report printed in the Proceedings.

The annual report of the Library Committee was read and was accepted with thanks. It was ordered referred to the new Library Committee for consideration in connection with the use of additional shelving. The annual report of the Membership Committee was received with thanks and was ordered referred to the committee authorized to submit recommendations in regard to amendments to the Constitution.

The annual report of the Committee on Employment was received with thanks.

Ballots for new members were opened, there being 48 straight ballots and the following members were declared elected:

Mr. Marcel Ducros, Resident Member.

Mr. Harry Shutts, Non-resident Member.

There being no further business the meeting adjourned.

F. A. MUTH, Secretary.

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**Annual Meeting of the Society.**

The meeting was called to order about 8:30 P. M., in Room A, St. Charles Hotel, there being 122 members and guests present. This was the Annual Meeting and Dinner Dance. President Dunlap presided.

On motion, duly seconded, the minutes of the previous meeting and the annual report of the Board of Direction was dispensed with and were ordered printed in the Proceedings.

The President announced that the tellers had reported 48 ballots cast for officers, there being 47 straight ballots and 1 informal ballot. The following officers were therefore declared elected:

E. S. Bres.....President
Allen S. Hackett.....Vice-President
Walter B. Moses.....Treasurer
F. A. Muth.....Secretary
B. H. Grehan.....Member of the Board (to serve 3 years)

The meeting was then turned over to Colonel Bres, the new President, who made some appropriate remarks and solicited the cooperation of all officers and members during the year. He then introduced Mr. A. M. Fromherz, Toastmaster, and the evening was given over to entertainment and dancing following the dinner.

F. A. MUTH, Secretary.

# ANNUAL REPORTS

## ANNUAL REPORT OF THE BOARD OF DIRECTION

Year 1934.

To the Members of the Louisiana Engineering Society:

Gentlemen—Your Board of Direction begs to report that during the year 1934 there were held 10 regular and 2 special meetings, or a total of 12 meetings for the transaction of the business of the Society.

The Technical Papers Committee has given us a most excellent program of high grade papers covering a variety of interesting topics. These papers have all been printed in the Proceedings for permanent record.

The Library Committee has done good work in rearranging the books in the new quarters of the St. Charles Hotel. Subscriptions for technical magazines have been continued. Expenditures have been kept well within the amount allotted to the committee for its activities.

The Committee on Employment has kept up its fine performance record in securing positions for unemployed engineers. The committee has rendered a report at each monthly meeting of the Society which was of interest to the members. Engineers and draftsmen in need of employment should use the facilities of this committee.

The Membership Committee has found it most difficult to secure new members during this past year, although several additions have been made to the Society. Effort has been put forth to secure eligible members by circularizing engineers of local sections of the national engineering societies in this state and in inviting their attention to the facilities of our club rooms and library. It is hoped that a number of members will be enrolled during the next year as a result of the efforts put forth in this direction, especially in view of the splendid club room facilities now available.

The Publication Committee has carried on its good work in issuing the Proceedings and the Editor deserves the highest praise for the tone and quality of this publication. The committee has worked diligently in keeping down the cost of the Proceedings without impairing its appearance or scope of coverage. The cost of the Proceedings has been kept within the amount budgeted and has been greately improved by the inclusion of a directory of Federal and State officials. Other innovations have been included to provide a medium of furnishing information to our members.

The Committee on Entertainments and Outings has handled this phase of the activity of the Society in an admirable manner. The fourth annual golf tournament was held in May and was very well attended. Numerous trophies, generously donated for the occasion, were distributed at the dinner which followed the tournament. The Stag Smoker was held in March and another in December. Plans have been effected for a Ladies' Night, to be held January, 1935, and notices of this dinner and dance are to be sent to all engineers of other technical societies in New Orleans. The entertainments have been conducted largely on a self supporting basis. A special committee was appointed to take charge of the moving of the Library from the State Museum to a suite of rooms in the St. Charles Hotel. The committee carried on this work most efficiently under the chairmanship of Mr. John Riess, and the Society is now domiciled in dignified and comfortable quarters on the fourth floor

of the hotel. Club rooms and library are centrally located for use of the members day or night, and the meetings are held on the mezzanine floor of the hotel.

In response to the need for a careful use of operating funds, the Finance Committee, acting as a Budget Committee, rendered a most comprehensible and analytical report under the chairmanship of Col. E. S. Bres. This report was approved, not only by the Board but by the Advisory Budget Committee, which was composed of the four past Presidents of the Society representing different periods in the life of the Society. The report set forth recommendations for a budgetary control of the Society's expenditures. Numerous items were considered, both in connection with proposed or anticipated revenue, and all items of expenditures were carefully examined. As a result, the expenses of the Society were kept within the budget and numerous innovations were effected. Provision was also made in the Proceedings for use of a page by each section of a national engineering society. A page has already been subscribed for by the Louisiana Section of A. S. C. E., and it is hoped that other societies will subscribe to a page in the Proceedings. It is most gratifying that the Society was able to pay all outstanding bills in December without carrying over unpaid bills.

Another innovation of the year was the appointment of an historian, Mr. C. W. Lawes, who has consented to prepare a history of the Society. This will be not only of interest but of considerable value to the members when it is completed.

The matter of registration of engineers was one of the important activities of the Society. The Legislative Committee took care of the bill for registration of professional engineers and it successfully passed both houses of the Legislature but was vetoed.

The Society took a very active part in contacting the Federal activities engaged in the employing of engineers on various Federal projects and every effort was put forth to communicate promptly with all Federal activities so engaged in the effort to provide employment for engineers.

The Society continued its practice of awarding junior memberships to two outstanding students. This year the awards were made to Mr. John Gillum of Louisiana State University and Mr. Alfred J. Cooper of Tulane University.

The award of two scholarships were continued. The recipients this year were Mr. J. S. Connor of Louisiana State University and Mr. Arthur C. Porter of Tulane University.

At this time, some effort should be put forth to secure the re-enrollment of some of those members who were forced to terminate their membership on account of business conditions. Some increase in advertising in the Proceedings may reasonably be expected before long.

In conclusion, the Board wishes to express its appreciation to the various committees and members of the Society for their support and cooperation in assisting to carry on the activities of the Society so successfully during this trying period.

Respectfully submitted,

A. LEE DUNLAP, President,
EDW. S. BRES, Vice-President,
F. A. MUTH, Secretary,
WALTER B. MOSES, Treasurer,
C. W. RICKER,
P. F. HOOTS,
JNO. H. O'NEILL,
Board of Direction.

## CONSOLIDATED FINANCIAL STATEMENT

January 1, 1935.

**Assets:**

| | | |
|---|---|---|
| Cash in Bank— | | |
| Checking Account Balance | $ | 477.35 |
| Savings Account Balance | | 668.07 |
| Accounts Receivable— | | |
| Membership Dues for 1934 | | 519.00 |
| Advertisers | | 97.80 |
| Investments | | 4,208.76 |
| Frozen Funds | | 4,239.28 |
| | | $10,210.26 |

**Liabilities:**

| | | |
|---|---|---|
| 1935 Dues Paid in Advance | $ | 11.00 |
| Reserves— | | |
| General Reserve Fund | | 10,079.07 |
| Proceedings Reserve Fund | | 120.19 |
| | | $10,210.26 |

### Cash Account—Year 1934

**Receipts:**

| | | |
|---|---|---|
| 1933 and Prior Years Dues | $ | 137.00 |
| 1934 Dues | | 1,680.75 |
| 1935 Dues | | 4.00 |
| Advertisers | | 445.83 |
| Proceedings Sales | | 2.25 |
| Entrance Fees | | 111.50 |
| Interest | | 74.88 |
| A. S. M. E. and A. S. C. E. Contributions | | |
| N. O. Security Gold Note, Liquidation | | 210.00 |
| Savings Withdrawn to Move Library | | 500.00 |
| Union Title Guaranty Gold Note, Liquidation | | 520.02 |
| N. O. Bank Savings, Withdrawn | | 85.82 |
| | $ | 3,772.05 |
| Less N. F. S. Check | | 14.50 |
| | $ | 3,757.55 |
| Add 1934 Balance | | 65.30 |
| | $ | 3,822.85 |

**Disbursements:**

| | | |
|---|---|---|
| Cost of Proceedings | $ | 942.06 |
| Smoker (Entertainments and Outings) | | 98.35 |
| Scholarships (2) | | 115.00 |
| Printing and Postage | | 197.44 |
| Librarian | | 40.00 |
| Secretary | | 600.00 |
| Assistant Treasurer | | 16.67 |
| Gavel and Present to President | | 23.00 |
| Watchman | | 131.50 |
| Library Expenses | | 41.80 |
| Bond for Treasurer | | 12.47 |
| Lights and Porterage | | 41.00 |
| Sundry Expenses (Flowers, Wires, etc.) | | 26.86 |

| | | |
|---|---|---|
| Not in Budget (Extraordinary Expenses)— | | |
| Fire Insurance | 6.12 | |
| Moving Library | 525.70 | |
| Accounts Payable 1933 | 290.95 | |
| Auditor for Year 1933 | 50.00 | |
| Exchange and Tax | 4.08 | |
| Registration Expenses | 174.50 | |
| | | 3,545.50 |
| Cash Balance | | $ 477.35 |

**Proceedings Fund**

| | | |
|---|---|---|
| **Revenues:** | | |
| Sales | $ 2.25 | |
| Allotted | 1,060.00 | |
| | | 1,062.25 |
| **Expenses:** | | |
| Salary of Editor | $ 300.00 | |
| Salary of Assistant to Editor | 180.00 | |
| Printing and Mailing | 462.06 | |
| | | 942.06 |
| Cash Balance | | $ 120.19 |

**Library Fund**

| | |
|---|---|
| Allotted | $ 100.00 |
| Expenditures of | 41.80 |
| | $ 58.20 |

**Investments**

(From Treasurer's Report)

| | |
|---|---|
| 2—$100—1st Liberty Loan | $ 200.00 |
| 1—$ 50—1st Liberty Loan | 50.00 |
| 5—$ 50 (1917 Liberty Loan | 250.00 |
| Greater New Orleans Homestead | 1,208.76 |
| Union Homestead | 500.00 |
| Standard Homestead | 500.00 |
| Italian Homestead | 500.00 |
| Security Homestead | 500.00 |
| Columbia Homestead | 500.00 |
| Deferred Account—Canal Bank (Savings) | 403.69 |
| National Bank of Commerce (Savings) | 668.07 |
| Deferred Account—Interstate (Savings) | 1,630.59 |
| Deferred Account—Interstate (Checking) | 2,205.00 |
| | $ 9,116.11 |

# ACTIVITIES OF LOCAL SECTIONS

President,
JOHN H. O'NEILL

1st Vice-President,
F. P. HAMILTON

2nd Vice-President,
CLIFFORD H. STEM


Secretary,
H. A. SAWYER,
care Lone Star Cement Co., of La., 1120 Hibernia Bank Building, New Orleans, La.

Treasurer,
R. L. MORONEY,
8134 Sycamore Street, New Orleans, La.

Annual meeting at New Orleans in May.
Special meetings at call of President.

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**STUDENT CHAPTERS**

Louisiana State University
President, Edward Hulme
Vice-President, Wilson Broussard
Secretary, Charles Schweizer
Treasurer, Chester Siess

Tulane University
President, Waldo S. Powell, Jr.
Vice-President, Wilbert L. Argus
Secretary, William B. Settoon
Treasurer, Louis C. Bisso

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The Tulane University Student Section of the American Society of Civil Engineers has been very active in this, the second year of its existence. The men who were kind enough to visit and deliver talks this year were Mr. Ray McNamara of the Government Engineering office who spoke on "Revertment of the Mississippi River"; Mr. David W. Godat, Assistant City Engineer, who spoke on "Maintenance in Engineering"; and Mr. J. F. Thompkins of the Carnegie Steel Company, who delivered the results of investigations on piling made by his company.

The section has, in addition, made an inspection trip to the Public Belt Bridge, where, through the courtesy of Major Bedell and Mr. C. G. Melville, the members spent an enjoyable and beneficial afternoon. Further inspection trips are planned to the spillway bridges and the Southern Pacific Railway Yards.

Suggestions from members of the Louisiana Engineering Society, as to improvements in our meetings will be gratefully received.

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Mr. John Klorer, Mem. Am. Soc. C. E., formerly Chief Engineer, Orleans Levee Board, has been appointed Chief Engineer, State Board of Engineers.

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Members are urged to cooperate in the survey being made by the Am. Soc. C. E. by furnishing full information and making prompt reply to questionnaires.

# DIRECTORY

## FEDERAL ENGINEERING OFFICES AND OFFICIALS

**Division Engineer**

Col. Warren Hannum, U. S. Army
Masonic Temple Bldg., New Orleans.

**District Engineer, 1st New Orleans District**

Major Henry Hutchins, U. S. Army
Union Bldg., New Orleans.

**District Engineer, 2nd New Orleans District**

Lieut-Col. J. N. Hodges, U. S. Army
Prytania St. at River, New Orleans.

**Superintendent of Lighthouses**

E. S. Lanphier
224 Customhouse Bldg., New Orleans.

**U. S. Coast and Geodetic Survey**

Field Inspector
314 Customhouse Bldg., New Orleans.

**Emergency Relief Administration (N. E. R. A.)**

A. R. Brousseau, State Engineer,
805 Canal Bank Bldg., New Orleans.

**Public Works Administration (P. W. A.)**

Orloff Henry, State Engineer,
Masonic Temple Bldg., New Orleans.

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## LOUISIANA STATE ENGINEERING OFFICES AND OFFICIALS

**State Board of Engineers**

John Klorer, Chief Engineer,
207 New Orleans Court Bldg., New Orleans.

**Orleans Levee Board**

Beauregard Davey, Chief Engineer,
606 Common St., New Orleans.

**Louisiana Highway Commission**

Harry B. Henderlite, Chief Engineer,
Baton Rouge.

**Louisiana State Board of Engineering Examiners**

J. T. Bullen, President, Shreveport, La.
F. A. Muth, Secretary, 817 Audubon Bldg.,
New Orleans.

PROCEEDINGS
OF THE
# LOUISIANA ENGINEERING SOCIETY

VOL. XXI. APRIL, 1935 NO. 2

## CONTENTS



## EDITORIAL NOTES AND COMMENT

**Engineers As Expert Witnesses.** It seems to us that the attitude of the profession needs to undergo a change in the matter of giving technical evidence before courts of law. We see, all too frequently, the spectacle of an expert employed on one side of a legal case giving expert testimony with regard to that case. We then see an expert on the other side of the case giving expert testimony which is directly in conflict with that of the first expert. This cannot but have a bad effect on courts of law and the general public. As a matter of fact, you have seen many statements to the effect that the testimony of experts in courts of law is something to smile at rather than to consider seriously.

There is another phase of this subject which also needs correction. We refer to the ability to discredit a high grade expert's competent testimony on one side of a case by the counterfeit testimony of a mock expert on the other side of the case. This ability to discredit competent testimony usually

comes from the lack of technical education of the judges. A judge with his lack of technical knowledge is unable to distinguish the difference in sound value between the bogus testimony of the bogus expert and the competent testimony of the competent expert. A "shyster" engineer, (and there are some of them in the profession) or a willful distortion of technical facts and laws before the court, can be and frequently is very troublesome to a competent engineer in his honest attempt to interpret natural laws as he sees them. The judge or the jury, not being able to detect these insidious distortions, quite naturally experiences a doubt concerning the testimony of the competent man. These two situations, the honest expert as opposed to the honest expert and the honest expert as opposed to the incompetent so-called expert, have served to bring ridicule on the whole question of expert testimony before the courts. Incidentally, the same situation occurs as regards medico-legal testimony.

It occurs to us that there is a remedy for the condition, and steps should be taken by the profession to apply this remedy. Our suggestion is that the profession as a whole should insist that engineers should *not* appear as expert witnesses for either side of a case. If experts are to be employed in any case in order to interpret technical data or laws to the court, these engineers should sit as unbiased advisors *to* the court and *with* the court and not as witnesses for either side. This should not preclude but should give point to the presentation of technical evidence by engineers permanently or temporarily in the employ of the parties at suit. If these suggestions should be followed, they would result in some temporary embarrassment to a few engineers who have frequently appeared before courts as technical experts. Eventually, however, carrying out these suggestions would redound not only to the benefit of individual engineers, but would enhance the dignity of the profession considerably. We believe that public policy, as far as our profession is concerned, would be better served if the profession as a whole could say to the court, to the contestant and to the public: "We will not appear in court as technical experts for either side, but will gladly sit with the court and advise the court to the best of our ability on the technical questions raised." In short, we believe that the present system wherein technical experts appear on

opposite sides of a case, argue and present evidence to judge and jury, neither of whom have enough technical knowledge to interpret the evidence or detect a difference between the spurious and the genuine—we say we believe that this system is not only ridiculous, but highly undignified as far as the engineering profession is concerned.

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**Mississippi River Bridge Superstructure.** Again we are privileged to present to you an article on the Mississippi River Bridge above New Orleans. In the February, 1934, issue of the *Proceedings,* an article appeared describing the sinking of the foundation. The present article is a description of the method of erecting the superstructure and makes interesting reading indeed.

With the exception of the bridge over San Francisco Bay, going from San Francisco to Oakland, the bridge at New Orleans is quite the largest bridge either in North or South America in point of length, weight and size. Of course the amount of labor that went into the engineering design is stupendous. But even more striking is the fact that every detail of erection was contemplated long in advance. Interesting indeed is the method of building the cantilever each way from a given pier, care being taken to keep them balanced over the pier. This meant, of course, not only careful calculation in advance, but careful checking of the weights as they were added so that one cantilever will not over-balance the other and topple the whole structure into the river. You will find Mr. Doerr's paper well worth reading.

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**Society Sponsors Foundation Survey.** At the suggestion of the Louisiana Engineering Society the Federal Emergency Relief Administration has agreed to sponsor and furnish funds for a study of the behavior of the existing foundations in the city of New Orleans and immediate vicinity and making available such data as exists from borings and other investigations. Tulane University has donated office space and necessary utilities for the conduct of the work.

Such survey is of much economic importance. It will:

(a) Provide, for the use of engineers and architects, information of greatest value and hitherto not developed.

(b) Create positions for approximately twenty-five engineers, architects and draftsmen.

The Federal Emergency Relief Administration has requested the following engineers, under the auspices of this Society, to supervise the project:

A. R. Brousseau—State Engineer Works Division Federal Emergency Relief Administration.

Donald Derickson—Professor, Civil Engineering, Tulane University.

John H. O'Neill—President, Louisiana Section Am. Soc. C. E.

Edward S. Bres—President, Louisiana Engineering Society.

For the data required the sources of information will be the files of our local engineers, architects and public agencies.

F. E. R. A. engineers engaged in this work will call on these persons and at the offices of the public agencies in search of records and other information.

If your experience or your records contain matter which would be helpful in the above undertaking, will you assist by communicating with the office at Tulane University?

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**Society Scholarships for Engineering Students.** Again we call your attention to the fact that each year the Louisiana Engineering Society awards one scholarship at Tulane University and one scholarship at Louisiana State University to worthy students who wish to pursue the study of engineering. It is always desirable that these scholarships go to the children of members of the Society, if possible. The Board of Directors has drawn up definite rules for awarding these scholarships and those rules are printed on a colored leaflet which will be found in the pages of this issue. If for some reason you do not get a copy of the rules, or should lose or mislay your copy, the Secretary will be glad to mail you a duplicate.

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**History of the Society.** May we anew bespeak the co-operation of the members of the Society with our Historian,

Mr. George W. Lawes. If you will remember, Mr. Lawes was appointed to write the history of our Society and has been assiduously at work on that task. Having joined the Society in the first year of its life, and having been a member of the Society for the whole period of its existence, the Society is fortunate in having him as Historian. However, your co-operation is earnestly solicited in calling to his attention or to his recollection all incidents in the history and life of the Society which very properly should go into its history. May our Historian count on your hearty co-operation?

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**May Meeting in Baton Rouge.** We wish to call the attention of the members that the regular May meeting of the Society will be held in Baton Rouge on Monday, May 13. This is an innovation which we hope will continue in the years to come. It is expected that a large proportion of the New Orleans contingent will go to Baton Rouge and will be able to meet there members from other parts of the state who can conveniently get to Baton Rouge, but who cannot so conveniently get to New Orleans.

The program is being developed in Baton Rouge by Dean Lassalle and Professor Pegues of Louisiana State University and the Baton Rouge Association of Commerce. The program so far will consist of a dinner by the University at 7:00 P. M., with the regular meeting on the campus at 8:30. There will be technical papers on some of the industries of Baton Rouge.

For the contingent which will motor from New Orleans and vicinity, this meeting will also include the opening of the bridge across the spillway above New Orleans. The motor cavalcade will meet at the New Orleans end of the bridge at 4:00 P. M., at which time the ceremonies attendant upon the opening will take place. At the conclusion of these ceremonies, the procession will continue to Baton Rouge for the program which is outlined above.

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**The Golf Tournament.** We are advised by Dave Stewart, Chairman, that the annual Golf Tournament will take place May 23rd, at the Colonial Country Club. A large attendance is expected. You will receive fuller details at a later date.

# PAPERS AND DISCUSSIONS

## ERECTION OF SUPERSTRUCTURES—RIVER SPANS, MISSISSIPPI RIVER BRIDGE, NEW ORLEANS, LA.

By C. W. Doerr *

Read before the Society, February 11, 1935.

The river portion of this new structure, extending from levee to levee, consists of eight truss spans; four large spans of the through type and the four shorter ones of the deck type, the total length being 3527 feet.

With two anchor arms of 530 feet each and the two cantilever arms with a 503-foot suspension span totaling 790 feet for the main channel span, we have the cantilever type structure at the west end—a bridge in itself. There is then a 531-foot simple span, and over the shallow water and lowland on the east bank, the 4-deck spans, one of 333 feet and three of 271 feet each.

With a minimum clearance for the channel span of 153 feet above mean Gulf level and a maximum center to center of chords of 110 feet, this structure has a maximum height of approximately 275 feet. The center to center of trusses for the through spans is 33 feet and the deck span 29 feet—allowing for a double track railroad. An 18-foot roadway is supported on brackets off the outside of each of the two trusses. This allows two lanes of traffic in each direction.

The railroad grade is 1¼% up, toward the channel span, with a vertical curve through it. The highway grade is 4% on the approach trestle and deck spans, 1¼% on the through spans with a vertical curve over the channel span.

The sequence of completion of the river piers "A" through "D," inclusive, determined the program of erection of the steel superstructure.

Piers V, B, C and D were completed first and in that order, permitting the erection of the three 267-foot deck spans starting at pier V and through to pier D, connecting with the east trestle approach. About the time the erection of these spans was completed pier 2 was ready and erection was started there with two rigs, proceeding one each towards piers I and III.

* Assistant Engineer, American Bridge Company.

completing a half of the channel span, with the rig going in the direction of pier III, continuing on through the 531-foot simple span and the 330-foot deck span to connect with the deck spans already erected beyond pier V.

Pier I was completed about the time that the east half of the cantilever arm from pier II had been completed, so erection was then started at this pier with two rigs—one proceeding toward pier A to connect with the west trestle approach at that point and the second working toward pier II to connect at the center of the channel span with the portion of the structure erected from pier II. The operations about pier I are a duplicate of those completed about pier II.

The erection of the through spans brought into play four of the most recent developments in the erection of steel bridges:

1. Transportation of fabricated steel by water in barges and erection directly from barges.
2. The use of guy derricks for bridge erection.
3. Balanced cantilever erection.
4. Steel falsework.

All the fabricated steel in this structure, approximately 20,000 tons, is being moved from the fabricating plant at Ambridge, Pa., via water, in steel barges, direct to the site, and the majority of the pieces handled by the erecting rig out of the barges anchored below into their final permanent position. This requires the proper divisioning of the structure into sections to make barge lots and the loading of each piece in the barge at the fabricating plant in such a manner that the piece is on top when its turn comes to be placed in its final position in the structure.

The use of guy derricks for bridge erection is a development of the past seven years. On this structure as on many similar structures on the upper rivers, the river foundations are scheduled for completion first and the time requirements in the contract make it imperative to start the superstructure erection at one or more river piers before the land piers are completed. In such cases the small amount of space that it requires on top of a pier and the ease in assembling it there has brought the guy derrick into this new use.

Balanced cantilever erection goes hand in hand with the development of this new use of the guy derrick. It is balancing

the erection each way about the starting pier with a small but safe preponderance to one side taken by a falsework bent usually at the second panel point from the pier. At times it is found advantageous to place a second falsework bent some distance beyond the first to take the prepondering load and releasing the first bent before reaching a pier. The through spans of this bridge have been erected 100% cantilever. The falsework bents required for the safe balancing of the cantilever portion of the bridge have been placed under the anchor or the 530-foot spans, leaving the entire 790-foot channel span clear at all times for navigation.

The use of standard steel falsework is as important and interesting as the above development. Steel piles with cages of steel bracing them laterally in deep water and steel grillages and the steel bent reaching up to the bottom chord of the structure, gives the contractor an assurance of permanency equal to that which he knows he can expect from the permanent concrete pier. No need to fear high water with attendant ice, lodging drift and swift current. On this job we had to provide against possible scour on falsework bents placed in the river. Fortunately our falsework bents adjacent to pier I and II are well within the permanent willow mattresses placed to protect these concrete piers themselves against scour. At two falsework bent locations—one midway between piers II and III and the other midway between piers III and IV—willow mattresses were specially placed to prevent any scour while the temporary falsework bents were in place at those locations.

The assembling of the first derrick on the pier is an interesting procedure. The tops of the high piers of the Mississippi River bridge are approximately 145 feet above Mean Gulf Level. The first step is to place temporary cantilever pier beams crosswise of the piers and firmly anchored into the pier. This operation was made simple as there was available a floating tower derrick of sufficient capacity and belonging to Siems-Helmers, the river pier contractors.

The boom of the derrick to be assembled on the pier is then hung vertically by falls from these beams and used temporarily as a floating gin pole.

The weight of the gin pole is held by the falls at the bottom with the top held against movement by four wire rope guys, one to each side, anchored in the pier and one each way lengthwise to anchors in the nearest completed adjacent piers.

The permanent side guy beam of the derrick is then raised to position by the gin pole and fastened by tension bolts to the permanent cantilever pier beams.

After the permanent side guy beam has been erected, the gin pole side guys are moved out to the ends of it. The pole is then raised higher to place the pier floor beam and two center railroad stringers of the first panel. Upon these stringers the derrick skid, seat, and mast are placed and the mast guys run out to the adjacent completed piers and to the ends of the side guy beam.

The gin pole is then dismantled as such and becomes the boom of the derrick and the rigging of the derrick is then completed.

The derrick is then ready for actual erection work. One of the first sections of bottom chord, weighing 52 tons, is lifted from the barge (as it came from Ambridge) direct to its final position in the structure.

As soon as sufficient steel has been erected by the first derrick, it assembles the second derrick. They then proceed away from each other with the erection.

The power units, consisting of gasoline hoisting engines, fuel oil driven air compressors and accessories, are housed in a barge tied to the starting pier.

The steel falsework used has a steel A-frame with hydraulic jack heads to maintain elevation, steel distributing grillages and 12-inch Carnegie Beam steel piles, which in this particular bent are 175 feet long, probably the longest pile of any kind ever driven. The lateral bracing cage is 20 feet wide, 84 feet long and 78 feet high and reaches to the bottom of the river. It is fully braced in each of the three planes. It is top hung from the 40 piles in the bent. The steel piles pass through openings in the horizontal and diagonal members of the cage with a reasonable clearance provided for the pile while being placed and driven.

This whole assembly weighs approximately 800 tons.

As this material is all standard, it can be used many times and with proper care, for years to come.

The assembly of one of these steel pile bents is a fair sized job in itself. The size of the cage required, and which weighs approximately 300 tons, made it necessary to design and build a truss arrangement supported on two large barges, within which the cage was assembled two tiers at a time and gradually lowered into the water by double sets of falls at each of the four corners.

Between successive lowerings and while additional tiers were being added, steel rods with turnbuckles supplanted the falls.

With the cage completely assembled, twelve of the forty steel piles are placed in the assembly and held above the river bottom a distance sufficient to allow the movement of the cage hung between the barge truss assembly to be moved to its proper position and exactly located. The twelve steel piles are then lowered to the bottom of the river and driven, the cage bolted off to them and the barge truss assembly removed. The remaining steel piles are then placed and driven, grillages placed and the A-frame bent completed to the elevation of the bottom chord of truss.

Two complete and duplicate falsework bents are required for this work, being used singly at each of two locations under each of the anchor arms and finally combined as a tower under the 531-foot simple truss span.

The 531-foot simple truss span is being erected cantilever off the end of the adjacent span, using temporary eye-bar tie backs, until the temporary falsework tower is reached just beyond the center of the span. Landing on this tower the eye-bar tie back is cut loose and the span completed by cantilevering over the temporary falsework tower.

The three 267-foot deck truss spans over the shallow water and lowland at the east end were erected first, starting from the river end. Three falsework bents were required per span or every second panel joint. A guy derrick was first erected on the pier to erect the first two panels and assemble the erecting derrick, which worked through to the connection with the east viaduct approach.

## DISCUSSION

MR. DOERR: The chairman has asked when the bridge will be completed. Mr. Frank Masters announced that the bridge will be turned over to the public on or about Thanksgiving Day, this year.

MR. ROESSLE: What is the weight of a section of temporary piling?

MR. DOERR: The steel piles are 12-inch Carnegie Beam Sections, the older ones 110 lbs. per lineal foot, latter ones 88 lbs. per lineal foot. Recently, however, the sections were revised, and new ones ordered are 85 lbs. per lineal foot. We have so altered these three sections by details that they are interchangeable and piles of any of the three weights spliced together.

MR. NAQUIN: At what points in the cantilever structure will expansion be taken care of?

MR. DOERR: Expansion is taken care of at the extreme ends of the two anchor arms and at each end of the suspended span.

PROF. DERICKSON: Speaking very roughly, what provision has been made for the expansion of the spans?

MR. DOERR: The casting in the slide that I showed you is one of two each under the two towers of the cantilever structure and there is no provision for expansion at these two points. There are, therefore, fixed points. Provision for expansion at the ends of the anchor arms away from the tower piers is taken care of by steel rollers. Expansion of the suspended span is taken care of at each end with slotted holes in the ends of the cantilever arms at the points of contact of the bottom chords.

PROF. DERICKSON: How much deflection takes place when built out at the farthest reach?

MR. DOERR: About 5 inches.

PROF. DERICKSON: It is very interesting and seems to me that the man who started the balanced cantilever construction is like the man who ate the first oyster. You can't help but wonder at his temerity. Is the method of balanced construction patented and is it exclusively the right of the American Bridge Company?

MR. DOERR: Some features of balanced cantilever erection have been patented by American Bridge Company.

PROF. DERICKSON: What precautions are used to maintain a proper balance?

MR. DOERR: Knowing the scale weight of each piece of steel as it is erected and also the weight of equipment on top, it is possible by moments about the balancing pier, to determine at any time the load on the temporary falsework bent. This load can vary between certain definite limits, and be held within these limits by controlling the speed of erection of the derricks operating each way from the balancing pier. These moments are tabulated progressively daily and it is only a matter of minutes at any time to determine the falsework bent load. The balancing reactions were worked out originally in the Pittsburgh office on the basis of estimated weights of all members and equipment and we can check that balancing very closely, in fact our field figures are not varying more than about 1% from what the engineering department in Pittsburgh told us it would be.

PROF. DERICKSON: What working values are used during erection?

MR. DOERR: The allowable unit working values for erection are approximately the same as for the finished construction. There are stresses occurring during erection in some members, higher than may occur in the finished structure, and additional section is required to carry the load during erection.

MR. LECOURT: Can you give us any idea of the size of some truss section?

MR. DOERR: I cannot tell you how the sections are made up, off hand, but the top and bottom chords are approximately 32 inches by 42 inches and two panel lengths (about 75 feet) will weigh 30 to 45 tons, depending upon their location in the structure.

I might add for the people of New Orleans, that I have no knowledge myself of any bridge in either North or South America that approaches this bridge in length and weight and size for the purpose that it is intended, with the exception of the bridge over San Francisco Bay (San Francisco-Oakland), which is considerably longer and considerably higher, has longer spans and is also heavier. Though you are not first, in a matter of this kind, you should feel well satisfied to be second. One thing I want to ask the people of this city. As soon as the bridge is completed, I am going back to Pittsburgh, but I hope that, should I revisit

New Orleans and come down to St. Charles and Canal streets I will see this bridge listed for visitors among the points of interest, which now includes the races, Royal Street, French Quarter, City Park, Club Forest, etc.

MR. GODAT: There is one very interesting phase that was told to me and that is the method of reeving tackle in order that the heavier members may be picked up more slowly, and the lighter loads may be picked up more rapidly. I think that it would be a good idea for Mr. Doerr to explain this feature to us.

MR. DOERR: We have on the bridge here lifts varying from a few hundred pounds to approximately forty-five tons. The lighter lifts are made with a single line and the slightly heavier lift with an auxiliary falls of three parts and they will take care of from seven to ten tons. The heavier lifts of 45 tons are taken care of with 12 part falls. There are a lot of intermediate lifts of approximately twenty-five tons. The only thing available is the main falls. To make such lifts with twelve part falls would take a lot of time. The lower falls block is actually two three-sheave blocks which, when bound together, make a six sheave block and 12 parts for heavier lifts. For the intermediate lifts the lower falls block can be quickly divided into two parts, one block lashed to the foot of the boom and the other three-sheave block used to make the many intermediate lifts. This saves considerable time in lifting and also considerable wear on wire rope blocks and engines.

MR. SCALES: In connection with the cages, are they bolted or riveted?

MR. DOERR: The cages are all bolted.

MR. SCALES: Are they turned bolts or ordinary rough bolts?

MR. DOERR: They are ordinary rough bolts.

MR. PEGUES: It is a pleasure to be here. Even though I don't live very far off, I don't get down to the meetings very often. There has been some talk of holding a meeting in Baton Rouge this spring, and I hope that will be done. I certainly hope to see you and greet you there. I have enjoyed the lecture tonight very much.

MR. COLEMAN: This is a little out of my regular line. I was, however, very much interested in the Mississippi River Bridge

project from the outset. This was about the second project which came before the Reconstruction Finance Corporation. Since I came back from Washington, it has been my privilege to look after the interest of the R. F. C. in connection with the bridge. I have perhaps a little more familiarity with the work as it has progressed than many of the members probably have. I have very much enjoyed Mr. Doerr's talk.

MR. DABNEY: Do you employ high tensile steels and also alloy steels to resist corrosion, etc.?

MR. DOERR: All the main truss members and the floor systems are of silicon steel. The bracing including portal bracing and minor members are of ordinary medium carbon steel. The I-bars are medium carbon steel and heat treated.

## MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

### Regular Meeting of Board of Direction, February 7, 1935.

The meeting was called to order about 4:00 P. M. in the Library of the Society and the following members were present: Messrs. Bres, Moses, Grehan, Hoots, Hackett, Ricker, Dunlap and Muth.

The minutes of the previous meeting were read and bills on hand were ordered paid.

A communication relative to the Public Library was read and on motion, duly seconded, it was voted to refer the matter to the Chairman of the Library Committee with full power to act for the Society as he deems best.

Announcement was made by the President relative to appointment of District Contact Representatives and Committees. On motion, duly seconded, it was voted to approve appointment of the Contact Representatives and such Committees as the President deems necessary to carry on the work of the Society.

The books of the Society were audited by the Board and the report of Finances Committee was approved, subject to verification of securities.

The use of prizes donated for the stimulation of attendance was approved and the Chairman of the Committee on Entertainments and Outings was authorized to make such arrangements as are necessary.

There being no further business, the meeting adjourned.

F. A. MUTH, Secretary.

### Regular Meeting of Society, February 11, 1935.

The meeting was called to order about 8:10 P. M. in the Hunt Room of St. Charles Hotel, there being 116 members and guests present.

The minutes of previous meeting were read and approved. Reports of various committees were made and several announcements were made.

The matter of joining the American Engineering Council under the new arrangements was discussed by Mr. J. F. Coleman. On motion, duly seconded, it was voted that the matter of joining the Council be referred to the Board of Direction with full power to act.

Professor Williamson announced the forthcoming meeting of the Electro Chemical Society in the city. On motion, duly seconded, the President was authorized to appoint a committee to assist in arrangements for our members to be co-hosts.

A most interesting address was given by Mr. C. W. Doerr on "Erection Methods of Main River Bridge, N. O. Public Belt R. R. Bridge." A lively discussion followed the address and the speaker was tendered a rising vote of thanks.

The meeting adjourned to the collation in the club rooms.

F. A. MUTH, Secretary.

### Minutes of Board of Direction, March 11, 1935.

Meeting was called to order by President Bres, and the following members were present: Messrs. Hoots, Dunlap, Ricker, Hackett and Muth.

Minutes of the previous meeting were read and approved and bills on hand were ordered paid, subject to the approval by the Chairman of the Finance Committee.

Report of the Chairman of the Library Committee relative to the New Orleans Public Library was read and approved.

Details of the May meeting to be held in Baton Rouge were discussed, and the plans for same were approved.

Communication from the American Engineering Standard Association was ordered referred to the Editor. The Secretary was instructed to secure a Guest Register to be placed in the library.

The Secretary was instructed to communicate with the Chairman of the House Committee to the end that the Library Committee and the House Committee can secure necessary book ends, waste paper baskets, and the House Committee can arrange for a house phone for use for inside calls but no outside calls. The repair of the electric fan in the outer room is to be taken care of.

On motion, duly seconded, it was voted to approve arrangements which the President can make with E. R. A. to sponsor white collar projects without expense to the Society.

The Secretary was instructed to confer with the absent members of the Board to ascertain from them what other hour than 7:15 P. M. would be convenient for holding Board Meetings.

F. A. MUTH, Secretary.

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**Minutes of the Regular Meeting of the Society on March 11, 1935**

The meeting was called to order about 8:10 P. M., Colonel E. S. Bres, President, in the chair, F. A. Muth, Secretary, and 98 members and guests present.

The minutes of the previous meeting were read and approved, and several announcements were made by Committee Chairmen.

As this was a joint meeting of the New Orleans Section of the A. S. M. E. and the Louisiana Engineering Society the meeting was then turned over to Mr. Richard Muller, Chairman. A most interesting address was made on "Design and Operating Features of the 1450-Pound Steam Plant, Deepwater Station", by Mr. H. G. Hiebeler. A very profitable discussion followed. A rising vote of thanks was tendered the speaker.

The meeting then adjourned to the collation which was served in the club rooms of the Society, where a number of attendance prizes were awarded.

F. A. MUTH, Secretary.

# ACTIVITIES OF LOCAL SECTIONS

President,
JOHN H. O'NEILL

1st Vice-President,
F. P. HAMILTON

2nd Vice-President,
CLIFFORD H. STEM


Secretary,
H. A. SAWYER,
care Lone Star Cement Co., of La., 1120 Hibernia Bank Building, New Orleans, La.

Treasurer,
R. L. MORONEY,
8134 Sycamore Street, New Orleans, La.

Annual meeting at New Orleans in May.
Special meetings at call of President.

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## STUDENT CHAPTERS

Louisiana State University
President, Edward Hulme
Vice-President, Wilson Broussard
Secretary, Charles Schweizer
Treasurer, Chester Siess

Tulane University
President, Waldo S. Powell, Jr.
Vice-President, Wilbert L. Argus
Secretary, William B. Settoon
Treasurer, Louis C. Bisso

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## EUGENE HUNTER COLEMAN

Member, American Society of Civil Engineers, Died February 12th, 1935.

Death has taken from our midst, Eugene Hunter Coleman. Mr. Coleman was a prominent member of the civil engineering profession and a past president of the Louisiana section of the American Society of Civil Engineers.

His unceasing efforts to further his knowledge and usefullness in his field of endeavor, and his pleasing personality made him known and liked where ever he went.

BE IT RESOLVED that the Louisiana Section of the American Society of Civil Engineers tender to the family its sympathy.

BE IT FURTHUR RESOLVED that the secretary forward a copy of these resolutions and a copy of the memoirs of Eugene Hunter Coleman to his family.

# THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

## LOUISIANA-MISSISSIPPI SECTION

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### Officers and Members

C. S. Williamson, Jr., Chairman, Tulane University, New Orleans, La.
W. R. Stryker, Vice-Chairman, Southport Mills, New Orleans, La.
E. A. Gastrock, Secretary-Treasurer, Celotex Co., Marrero, La.
H. A. Levey, Director, American Products Co., New Orleans, La.
J. J. Ganucheau, Director, Southern Co'ton Oil Co., Gretna, La.

E. Bache, Bogalusa Paper Co., Bogalusa, La.
R. M. Boehm, Masonite Corp., Laurel, Miss.
M. W. Boyer, Standard Oil Co., Baton Rouge, La.
C. E. Coates, Louisiana State University, Baton Rouge, La.
C. B. Dicks, Jr., Tulane University, New Orleans, La.
H. S. Foote, Bay Chemical Co., Weeks, La.
H. H. Hewetson, Standard Oil Co., Baton Rouge, La.
P. M. Horton, Louisiana State University, Baton Rouge, La.
A. G. Keller, Bunkie, La.
W. B. Logan, Newport Co., Lake Charles, La.
G. P. Meade, Colonial Sugars, Gramercy, La.
E. S. Rothrock, Louisiana Chemical Co., Baton Rouge, La.
J. H. Thickens, Masonite Corp., Laurel, Miss.
E. Wander, Bay Chemical Co., Weeks, La.

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Regular meetings are held on the first Friday in February, May, October and December in the Richardson Chemistry Building, Tulane University, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXI. JUNE, 1935 NO. 3

## CONTENTS



## EDITORIAL NOTES AND COMMENT

**The Baton Rouge Meeting.** Congratulations, Gentlemen! It was a real get-together. Not only was it that—it was one of the few outstanding mile posts in the history of the Society.

All credit is due those who conceived and prosecuted the idea. And not only credit but grateful thanks are due those hard-working members in Baton Rouge who labored long and earnestly to make the meeting a success. The outcome of their effort was happy indeed.

Those members of the Society who did not get to Baton Rouge on the night of May 13 missed a rare treat.

The New Orleans contingent assembled at the Spillway bridge for inspection of the same at 4:00 P. M. Unfortunately, previous rains had made the bridge approaches impassable so that the assembled cars could not pass completely over the bridge. It had been planned that the motor parade would be led from the Spillway to Baton Rouge by an escort of motorcycle patrolmen.

It was at this point that the New Orleans members either had directions mixed or were afraid of missing dinner in Baton Rouge. Anyway they left immediately for Baton Rouge at a speed of about five hundred miles per hour without the slight formality of waiting for the motorcycle escort. One member expressed the thought that since the motorcycles could run only one hundred miles per hour the officers would be in constant danger of being run down if they lead the caravan.

At Baton Rouge the visiting and local members were guests of Louisiana State University at dinner in the Venetian Hall. The meeting was combined with the dinner.

The members were graciously welcomed by Dr. James M. Smith, President of the University, and Dr. Leo J. Lassalle, Dean of Engineering, cordially expressed the hope that another such meeting would be held soon.

Four technical papers comprised the technical exercises as follows: Mr. M. J. Rathbone, Superintendent of the Standard Oil Refinery, spoke on the relationship of engineering to the oil industry; Mr. T. E. Crosseau described the problems of the Steam Generating corporation; Mr. W. J. Daspit described the manufacture of sulphuric acid, and Mr. J. A. Moore traced the history of the Mengel Company, which now operates in Baton Rouge the largest plywood plant of its kind in the United States.

An added and enjoyable feature of the occasion was the informal and impromptu talk by Congressman Frank Reid of Illinois. His witty remarks kept his audience in a gale of laughter.

Again, the thanks of the Society are due the Baton Rouge members, and its hard working committee, Dr. Smith, Dean

Lassalle and Professor Pegues, for an enjoyable and unique meeting of the Society.

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**It's Doctor Coleman Now!** Mr. J. F. Coleman, Charter member of the Society, was given the honorary degree of Doctor of Engineering by Tulane University during the celebration of the Centennial of that institution.

In extending our congratulations to Doctor Coleman we feel that through him the Society too has been honored. The choice was indeed a happy one. The man will grace the title as well as the title will grace the man.

Doctor Coleman, we salute you!

Tulane University also bestowed the same degree on another outstanding local engineer, C. Glennon Melville, engineer of construction, Mississippi River Bridge.

Our felicitations Doctor Melville.

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**High Pressure Generating Stations.** We publish in this issue a most interesting and timely article on the Deepwater Generating Station at Houston, Texas.

It has been some time since we have had the good fortune to publish a paper of so much interest to power engineers.

If we go back to our thermodynamics we will remember that our ability to secure useful work from a given amount of thermal energy depends *not* on the initial and final pressures, but on the initial and final temperatures.

We are faced with the dilema, however, that high initial temperature necessarily means high initial pressure as long as we use water (or steam) to transfer the energy from the furnace to the turbine. It has been the combination of high pressure *and* high temperature that increasing efficiency has had to flight. This fact has been the reason for the development of the mercury boiler, which develops high initial temperatures with moderate initial pressures.

It has been not only a thermodynamic problem, but also a metallurgical one. And the improvement has taken place only

as fast as the metallurgists have developed alloys which do not change their characteristics at high temperatures. The temperature fringe is getting higher and higher all the time.

To anyone interested in the latest developments of power generation, Mr. Hiebeler's article will prove both interesting and instructive.

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**Mapping Louisiana from the Air.** The paper on aerial mapping read by Captain Dean on April 8th, and published in this issue is interesting indeed.

There is probably no recent development that has minimized the labor, expense and comfort of precise mapping of difficult areas as has the airplane and aerial camera.

The application of aerial mapping to some of the inaccessible portions of the local terrain is a particularly happy solution to a troublesome and costly undertaking.

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**District Contact Representatives.** Attention is called to the fact that a list of the District Contact Representatives will be found on the page devoted to Standing Committees of the Society. These representatives are appointed at strategic points to establish contact with the members of the profession no matter where they are located in the State. It is hoped that members will avail themselves of the opportunity to contact these representatives upon any matters that may be of interest to them.

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**Attendance Prizes at Meetings.** An innovation during the activities of the past season has been the awarding of attendance prizes at the regular meetings. There is no doubt that they have stimulated attendance.

These prizes have all been donated by friends of the Society. They have been secured through the efforts of Mr. H. L. McLean, Chairman of the Entertainment Committee, and have added no little to the interest and fun of the after-meeting gathering in the Club Room. It is confidently hoped

by all that our genial chairman will be able to secure a continuance of the prize donations during the next season. The following firms have generously made donations during the past season of activity and the Society here wishes to acknowledge thanks:

E. A. Zatarain & Sons
Roosevelt Laundry
Wm. B. Reilly Coffee Co.
Legendre's Drugs
Dr. Pepper Bottling Co., Inc.
Flower Blossom Shoppe
Rubenstein Bros.
Beekman's Clothing Store
Oliver H. Van Horn Co.
Valley Manufacturing Co.
Pokorney Shoe Store
Haspel Brothers
Overing Battery Supply Co.

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**Fifth Annual Golf Tournament.** Braving a rainstorm Thursday, May 23, thirty-three members and guests of the Louisiana Engineering Society participated in the Fifth Annual Golf Tournament at Colonial Country Club.

K. P. Kammer won the championship of the Society for 1935, replacing J. J. Bulliung, winner in 1934. S. V. Massimini was runner-up.

J. M. Todd won the President's flight from F. N. Billingsley, who won the trophy in 1933 and 1934.

J. T. Dupre was the winner in the guest flight with Dr. E. A. Baumbach as runner-up.

The following first ten scores in the members flight:

| | |
|---|---|
| K. P. Kammer | 85—19—66 |
| S. V. Massimini | 87—19—68 |
| C. F. Rantz | 100—30—70 |
| R. P. Lockett | 89—19—70 |
| J. M. Todd | 90—19—71 |
| D. W. Stewart | 85—14—71 |
| J. J. Bulliung | 88—17—71 |
| C. S. Williamson, Jr. | 79— 8—71 |
| W. O. Turner | 94—23—71 |
| Stone Leake | 96—24—72 |

PRESIDENT'S FLIGHT

| | |
|---|---|
| J. M. Todd | 90—19—71 |
| F. N. Billingsley | 94—20—74 |
| F. G. Frost | 101—25—76 |

GUEST FLIGHT

| | |
|---|---|
| J. T. Dupre | 93—22—71 |
| Dr. E. A. Baumbach | 101—24—77 |
| A. K. Moise | 103—25—78 |

The championships of the Society for the past years were won by L. L. Newman in 1931; D. W. Stewart, 1932; F. J. Schwab, 1933; J. J. Bulliung, 1934.

The committee was composed of D. W. Stewart, Chairman, S. E. Hottinger, H. L. McLean, and J. J. Bulliung.

Below is a list of donors of the prizes which contributed so largely to the success and interest of the tournament:

Gulf States Tire Co.
Louisiana Power & Light Company
Lawrence's Restaurant
Rubenstein Bros.
Katz & Besthoff
E. Dietzgen Co.
New Orleans Blue Print Co.
Reilly Tayler Co.
Dunlap Sporting Goods
D. H. Holmes
Sam Bonart
B. Beekman
Oliver H. Van Horn Co.
New Orleans Public Service Inc.
General Electric Co.
Graybar Electric Co.
Electric Appliance Co.
A. M. Lockett Company
Roosevelt Laundry Co.
E. A. Zatarain
A. Baldwin
Keller-Zander
Maritime Electric Co.

# PAPERS AND DISCUSSIONS

## DESIGN AND OPERATING FEATURES OF THE 1450-LB. STEAM PLANT DEEPWATER STATION HOUSTON, TEXAS

By H. G. Hiebeler *

The purpose of this paper is to review the salient design features of the high prsesure, high temperature installation at the Deepwater Station of the Houston Lighting and Power Company, and outline the experience with the equipment there.

Of interest to engineers of this section should be the fact that it is the largest steam-electric station in the South, the use of 1400 lb. steam pressure, the relatively high steam temperature (850°F) employed, and more particularly, the use of steam reheat.

The primary reason which led to the adoption of high pressure for the extension was better fuel economy obtainable. In addition, circulating water requirements were reduced, allowing greater ultimate capacity at a given site. This is particularly important in hot, dry climates. A third reason was that it was in line with the apparent future trend of the industry, thereby discounting obsolescence.

The selection of high pressure naturally required some method of reheating the exhaust steam from the high pressure turbine in order to avoid excessive amounts of moisture, reduced stage efficiencies and erosion effects in the last stages of the low pressure turbine. This reheating could be avoided if it were possible to start with an initially high superheat, of say 1000°F. In fact, the new unit being built for Henry Ford's River Rouge plant will be designed for an initial temperature of 900°F and no reheating.

At the time the Deepwater designs were first projected, several years ago, machines were not available for temperatures above 750°F, which had been the commercial limit for

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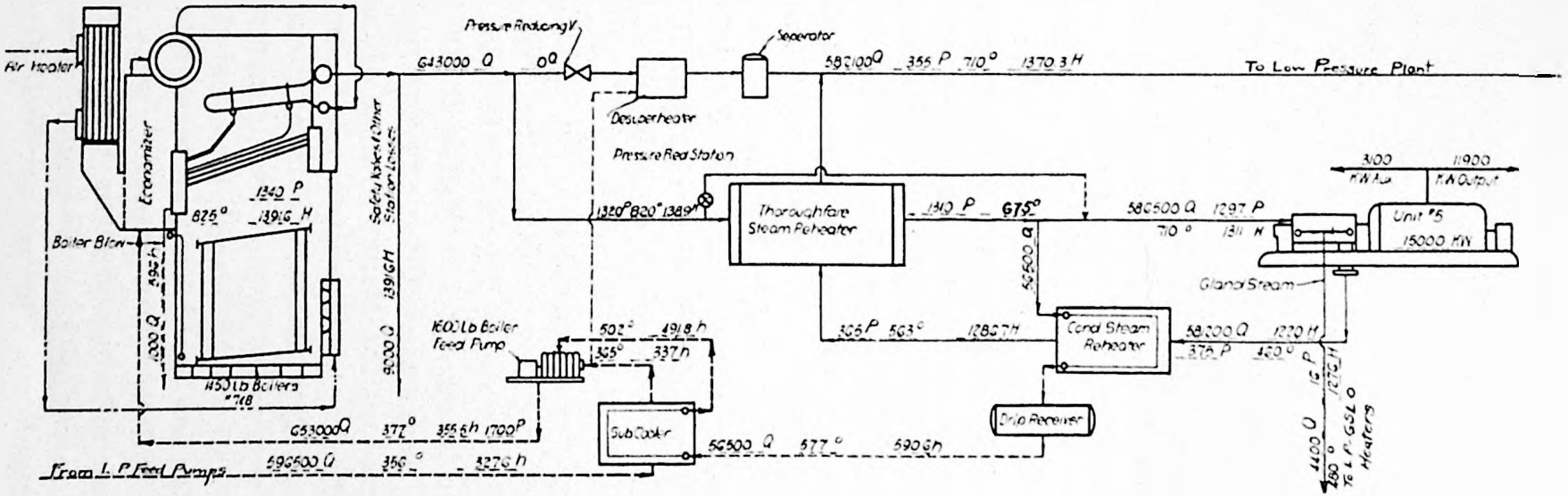
many years. At temperatures higher than this the ordinary steels change or lose their physical characteristics and have a useful life of only a few thousand hours. Creep or the gradual change in dimensions under the influence of heat occurs above this point. However, as improvement of economy can be obtained by the use of higher temperatures, it seemed desirable to proceed in this direction and to accumulate experience with these temperatures. It was, however, equally desirable to proceed slowly.

For reheating the steam a choice of methods was available: the boiler or gas reheat, a combination of condensing steam and boiler reheat or complete live steam reheat. After considerable study, the latter method was chosen as being more flexible especially in the future after several turbine and boiler units had been installed. This system also allowed or required the use of steam temperatures of 825°F to 850°F, which boiler manufacturers agreed could be obtained without undue risks. It seemed safe and logical to take this step to the higher temperatures as the temperature was not applied to any rotating equipment and allowed accumulation of data and experience. and placed the station in position to take advantage of the next probable development in the industry. It will be but a short step on future extensions to even higher temperatures applied directly to the machine with little or probably no reheating.

The cycle evolved for the high pressure plant is illustrated. The high pressure steam from the boiler at 850°F passes through the thorofare reheater and loses some of its heat reaching the turbine at about 710°F. The exhaust at 460°F corresponding to 30°F superheat passes first through a condensing type reheater where it is heated to approximately 575°F by condensation of some high pressure steam and then through the thorofare reheater, where it is heated to about 750°F by the surplus superheat extracted from the high pressure steam on its way from the boiler to the turbine. Other details of the cycle will be described later.

The high pressure plant in this case was superimposed on an existing 350-lb. plant similar to the Market Street plant of the New Orleans Public Service, and the reheated exhaust is




HEAT BALANCE—HIGH PRESSURE PLANT—DEEPWATER STATION
HOUSTON LIGHTING & POWER COMPANY,
HOUSTON, TEXAS

discharged into the low pressure header for use on any low pressure machine, although it would normally be used in the two 35,000 Kw machines adjacent to the high pressure unit.

The logical size of the installation had already been determined as 50,000 Kw by engineering studies. This was obtained by choosing a 12,000 Kw high pressure unit, with an overload capacity of 15,000 Kw, and a 35,000 Kw low pressure machine. The exhaust from the high pressure machine at 15,000 Kw is capable of supporting 50,000 Kw could not be justified, however, and the 35,000 Kw unit chosen matched an existing machine, for which all spares were available.

The principal equipment installed was as follows:

**Boilers:** Two Babcock and Wilcox cross-drum sectional header boilers with integral steaming economizers, tubular air preheaters and five-pass single loop type superheater. The furnaces have Bailey refractory faced rear and side walls and each is fired by 20 Peabody combination gas and oil burners.

The boiler proper is but 8 tubes high and arranged for single pass gas flow. Water cooled transverse headers for supporting the superheater bank are provided. The superheater headers are located in a "vestibule" in front of the tube bank proper. Uniform steam distribution essential at high temperatures is secured by fifteen connections between the drum and inlet header.

The maximum design conditions are 1450-lb. gage and 850°F. The normal working conditions are 1350 lb. and 850°F, at which each unit has a capacity of 350,000 lbs. per hour. The heat release in the furnace at this load is 28,000 Btu per cu. ft. Two Green Fuel Economizer Company two-speed forced and induced draft fans and the Bailey system of combustion control with Smoot feedwater regulators are installed.

**Steam Reheater Equipment:** This equipment of Foster-Wheeler design and manufacture comprises two pair of reheaters arranged in parallel, each pair consisting of a thorofare and a condensing or dead end reheater. No data was available for their design and extensive tests had to be run by the manufacturer before designs were laid out. All reheaters are of the same physical size and design. They are of single pass floating head type set vertically to facilitate ex-

pansion and drainage. Shells are 51″ inside diameter and the tube bundle approximately 26 ft. long overall. About 4300 sq. ft. of surface made up of 1000 ¾″ outside diaseter 14 gage chrome vanadium steel tubes are installed in each heater.

Single pass design was necessary as the difference in temperature 100°F—150°F between inlet and outlet would cause bowing of tube bundle on a multipass heater. To provide for differential expansion between the shell and tube bundle of in excess of 2″, the outlet from the floating head is made by a special pipe 60 ft. long encased in a larger pipe or envelope and fastened at this lower end. Of interest is the 7½″ thickness of tube sheets.

The total load on the head to be carried by the bolting is 5 million pounds and special design of nuts was necessary to provide sufficient bolting in a single row to allow low stresses (12,000 lbs. per sq. in.) to avoid difficulty with creep. Material of studs was heat-treated chrome nickel steel (SAE 3140) good for 125,000 lbs. per sq. in.

**Drainage Coolers:** The drains from the condensing reheaters flow by gravity and at 1300 lbs. and 577°F to a drip receiver from whence they are automatically drained by a Smoot drainage control through sub or drainage coolers into the third stage of the high pressure feed pump. The drains are cooled to avoid flashing when the pressure is reduced, the cooling medium being the feedwater.

**Turbine:** The turbine is General Electric 3600 rpm 14-stage 5-valve type designed for inlet conditions of 1280 lbs. and 710°F. The exhaust is at 360 lbs. 470°F or about 40°F superheat. Water rates vary from 38.5 lbs. at full load to 43.2 lbs. at half. Rated at 12,000 Kw, the unit has an overload capacity of 15,000 Kw. The piping is forged steel with modified Van Stone serrated face joints using 0.018″ thick gasket of dead soft Monel. Chrome tungsten steel bolting, chosen for creep resistance, with special threads was used. Bolts were tightened to definite stresses by measuring elongation with micrometers. After several weeks' operation, measurement showed creep of 9 to 12 thousandths (in 15 inches) and bolts were retightened. No leakage troubles were experienced with the piping joints.

**High Pressure Boiler Feed Pumps:** Four Worthington high pressure, vertically split 6-stage single suction, 3600 rpm. centrifugal boiler feed pumps were installed. They take suction from the discharge of the low pressure pumps at 400 lbs. and deliver against 1600 lbs. header pressure. Each is capable of handling 350,000 lbs. of 350°F water per hour with the reheater drains (60,000 lbs. per hour maximum) admitted at the third stage.

Three of the pumps are driven by Ridgeway (Elliott) 1200 horsepower, 2200 volt, squirrel-cage constant speed induction motors designed for across-the-line starting. The fourth pump is driven by a DeLaval 1200 horsepower turbine operating on 350 lbs. steam.

Another item of interest is the Smoot pressure reducing system automatically controlled for bypassing the high pressure steam directly into the low pressure header.

An Elliott deaerator of 2,500,000 lbs. per hour capacity, the largest ever built, is also installed.

## OPERATION

Three years of operation of this plant has proved the general soundness of design. The troubles encountered have been no greater than might be experienced with moderate pressures. Some of our difficulties arose at first from inexperience with the equipment and the necessary precautions in handling it.

The troubles have shown the necessity for the absolute highest standards of workmanship, particularly on joints under water pressure where any leakage which develops very quickly cuts the joint faces badly.

Some changes in boiler water treatment methods were found necessary and have been made.

The greatest difficulty, and the one which has not yet been solved, has been to find the most satisfactory material for valve seats and discs on the valves in high pressure water service. Nitrided nitralloy has not been successful and we have had insufficient experience with other materials to date to venture any opinion. Water-cutting is really a serious problem. No trouble with the same type valves has been noted in steam service.

The first year was naturally devoted to many changes and adjustments of equipment so that operation was not steady. However, in that year the high pressure turbine averaged 71% availability and the boilers over 80%. For the past two calendar years, the turbine availability has been over 90%. The boiler availability increased but slightly due to several thorough inspections to determine effects of water treatment changes. For the 12 months just ending (February 28, 1934, to February 28, 1935) the turbine operated all but 101 hours out of the 8760, or over 99% of rated full load. The boilers were on the line over 90% of the time and showed an average hourly output of 280,000 lbs. each.

The overall plant economy, including the low pressure station, has been improved approximately 12% while the high pressure plant alone for the year has shown approximately 16.5% improvement over the economy of the plant before the high pressure equipment was installed. It is hoped to still better these figures during the coming year.

From these results it is felt that the high pressure plant has more than paid its board, even during the reduced load period of the Depression.

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## DISCUSSION

MR. STEWART: If your two high pressure boilers are feeding to a common header, do you have any difficulty with leakage through the valves when one boiler is down?

MR. HIEBELER: It is customary to close the header valve after the boiler is off the line and the non-return closed. We have not had any leakage difficulties under these conditions.

MR. FROST: You spoke of the automatic reducing valve to bypass superheated steam from the high pressure boilers to the low pressure header in event of trouble with the high pressure turbine. Have you ever had the turbine trip out?

MR. HIEBELER: We have never had the turbine trip out but several times in lightning storms we lost an appreciable block of load suddenly. Last summer lightning struck the transmission lines near the plant and we lost about 40,000 Kw of an 80,000

Kw load. The machine behaved very nicely although the governor is more sensitive than that of the low pressure units and has a tendency to "hog" all the load. When this occurs we have more steam going into the low pressure header than we have going into the low pressure turbines. This causes the safety valves on the low pressure header to blow until the load is properly balanced between the high and low pressure machines.

MR. BENDER: How about the high pressure reducing valve? Have you had any load drop off the high pressure unit causing this to operate?

MR. HIEBELER: Only in small blocks. The load usually drops off the low pressure machines as explained previously. We have made trials shifting it off as fast as we could. There is no use inviting trouble and we hesitated at tripping the machine entirely off. As a regular matter of operating procedure, we occasionally drop the low pressure header pressure to test the ability of the reducing station to come in.

MR. MALOCHEE: I should like to ask if you have had any trouble with deposits of salts in the turbines.

MR. HIEBELER: Some trouble was experienced shortly after the plant was first started. The high pressure boilers have a relatively small storage capacity, only about 45,000 pounds each, compared to maybe 100,000 pounds in an equivalent low pressure boiler. Operating at such high rates of turnover the slightest leakage results in rapidly building up concentrations in the boilers. Some deposits did build up in the high pressure turbines. To remove this, the plant was operated with the steam to condensing reheater shut off. That meant the low pressure steam to the thorofare reheater was "cold" and reduced the high pressure steam temperature almost to practically saturated steam temperature. Running several hours on this "cold" steam washed out the deposits. We have had no trouble in this regard in the past two years since getting the boiler water conditions under better control. We have recently found a silica deposit in the low pressure turbines that won't wash off. It must be scraped or sandblasted off.

MR. MALOCHEE: What has been the rate of heat release used in your furnaces?

MR. HIEBELER: I believe that it is a little under thirty thousand Btu. per cu. ft. per hour.

MR. MULLER: I should like to ask about necessity for taking up on the bolts after operating for a period of two to three weeks. How often is that required?

MR. HIEBELER: I did not mean to create the impression that creep compensation had to be repeated every so often. We expected the creep to develop in three stages, primary, secondary and tertiary, each of decreasing magnitude. Actually all apparently developed at once. It was decided not to follow exactly the procedure outlined by the designers as to restoring all the initial tension in the bolts. Naturally, if the bolts have permanently elongated due to creep the tension is no longer thirty-five thousand pounds per square inch but something less. All that will be holding the joint tight is the tension due to the five or six thousandths elongation still remaining.

However, we see no particular need for increasing the tension if the joint remains tight. It seems good practice to keep stresses low if leaks do not develop. It was originally feared that leakage would cut the serrated faces of the flanges and make it difficult ever to achieve tightness. We have had no trouble from this and do not anticipate cutting with superheated steam. I am sorry that I can not explain more thoroughly about creep. At best there is still considerable discussion about it and I am not a qualified metallurgist. It might be regarded as a rearrangement of the molecules in the materials under effects of temperature and stress.

QUESTION: What is the temperature of the escaping gases from the boiler?

MR. HIEBELER: At a normal load about 325,000 pounds from each boiler, the gas at the top of the superheatre bank and passing into the economizer, runs between 1000 to 1100°F. This drops to about 550°F at the outlet of the economizer and is further reduced to about 350°F at the preheater outlet. The preheated air averages about 325°F.

QUESTION: Do you have plate type reheaters?

MR. HIEBELER: They are of the Babcock & Wilcox tubular type.

QUESTION: What about your fuel?

MR. HIEBELER: We are burning natural gas with oil as a standby.

QUESTION: In designing this plant was economy of fuel a prime factor?

MR. HIEBELER: The design of any plant is somewhat of a compromise between the ultimate possible thermal efficiency that might be obtained and the money required to obtain it. Deepwater is located in an oil and gas region and it is expected that fuel costs will not be unduly expensive although they will probably gradually rise over the next ten years. Also oil or gas firing does not require the investment or operating labor necessary with pulverized fuel and there is less compulsion to get the ultimate efficiency from this viewpoint. We aimed at good economy and dollar efficiency rather than the ultimate in thermal efficiency. Points of possible thermal improvement without regard to economies might include the feed heating at the crossover pressure or by steam bled from the exhaust of the high pressure turbine. Some loss in economy occurs when a unit is superimposed on an existing low pressure plant. Loss results from throttling by low pressure turbine controlling valves. If the units were operated compounding the crossover pressure would vary. When operated superimposed the steam might leave the high pressure unit at 350 or 360 pounds and be throttled down to 250 pounds going into the low pressure machine. Another place of slight theoretical thermal loss is the reheating of the steam at 350 pounds pressure. The theoretical best point of reheating would probably be at about 125 lbs.

QUESTION: How is the load distributed between high and low pressure stations on the machines?

MR. HIEBELER: As long as the load is below 65,000 Kw the low pressure station is just floated with as slight a flow as possible from one of the boilers. This minimum flow is just sufficient to keep the steam lines hot and avoid development of leaks from points alternately hot and cold.

Below 65,000 the low pressure fireman does not fire at all. Possibly only two burners are lighted under one boiler there. The low pressure header pressure is controlled by the switchboard operator through the load on (or the amount of steam that he lets through) the high pressure machine. By changing slight-

ly the relative amounts of load between the high and low pressure machines the crossover pressure is varied. The usual proportion of load is approximately 20% on the high pressure and 80% on the low pressure units.

QUESTION: Could not this pressure be controlled automatically?

MR. HIEBELER: No doubt it could be controlled. The frequency control could undoubtedly be adapted to also control load if it were thought desirable. However, there are some disadvantages of too close control. For instance, with the frequency control set for maximum sensitivity the automatic combustion control, the turbine governor and the frequency control tend to hunt across one another.

QUESTION: What is the pH of the feed?

MR. HIEBELER: The pH value of the feed runs about 8.2. We use a blowback from the boiler and this raises the pH slightly.

QUESTION: What is the economy of the plant?

MR. HIEBELER: The overall economy including that generated by the steam from the low pressure boilers is under 15,000 Btu. per Kwh net. For the high pressure plant alone about 14,000. This may not seem as low as quoted for plants in the North but for one thing our circulating water temperatures are higher than they are in most places. We do not have the Mississippi to bring cold water down almost from Canada. Further, using gas and boiler efficiency is naturally lower than with coal fired plants due to higher hydrogen losses. This may be five or six per cent. loss in comparison to what some of the northern stations may do. In fact it may be more than that. As high as 88 or 89 per cent. annual boiler plant efficiency has been claimed by some stations. We must be satisfied with eighty to eighty-one per cent. It would be safe to say that from all sources there would be a 10% difference between our station and a comparable station in the North operating on coal. Ten per cent. improvement on a heat rate of 14,000 Btu. will bring the results down to 12,600 Btu. which compares favorably with the results elsewhere, even where such plants operate wholly on base load with swings at other stations.

QUESTION: Do you have to operate the two thirty-five thousand Kw machines with the high pressure?

MR. HIEBELER: We could actually operate any low pressure machines on the high pressure exhaust but usually on low loads operate one thirty-five and a smaller machine.

QUESTION: Do you control load by your high pressure unit or your low pressure unit?

MR. HIEBELER: As explained previously, we have purposely desensitized slightly our frequency control which can be arranged to pick up load on any machine. The load is picked up on the low pressure machines and redistributed by the operator manually as necessary between machines.

QUESTION: What kind of governor do you have on your high pressure unit?

MR. HIEBELER: It governs on frequency and not back pressure. The high pressure is a five valve machine and is more sensitive than the two valve low pressure machines. It tends to "grab" any load coming on the system and build up the cross-over or low pressure header pressure causing the safety valves to blow.

QUESTION: How does the plant efficiency compare with mercury vapor unit?

MR. HIEBELER: I do not know the exact per cent. Of course the mercury vapor plant is much more efficient and more expensive.

QUESTION: What is the overall efficiency with this high pressure-low pressure plant?

MR. HIEBELER: I think the theoretical efficiency approaches 27 per cent. We actually run about 25 per cent.

QUESTION: I am surprised it is not higher.

MR. HIEBELER: I hope we are talking about the same thing. There are several kinds of efficiencies used in comparing plants and heat cycles.

MR. MUTH: How long does it take to put the high pressure unit in service?

MR. HIEBELER: That depends on how long it has been down. If it is stone cold, it may take four to six hours. This includes time necessary for warming the reheaters. The turbine of course is started against atmospheric exhaust but once this has been closed the heat losses are very low as all the heat in the

steam merely passes through the machine into the low pressure units.

MR. TODD: The New Orleans section is very much indebted to Mr. Hiebeler for his paper and I should like to move that we offer him a vote of thanks.

MR. O'BRIEN: I want to concur with my good friend in what he has just said about the good paper given here tonight by Mr. Hiebeler. The Louisiana Engineering Society and the New Orleans Section of the A. S. M. E. can be very well proud of that. We probably all have heard of De Wolf Hopper, the old time actor. He once told this of a friend who was being married to the same lady for the fourth time. In sending out the announcements, he penned a personal note which read: "This is no amateur performance." You will all agree with me that as a designer and constructor of a high pressure plant, Mr. Hiebeler is no amateur. I was told that I was not to talk over fifteen minutes. I just want to give you one idea. When I think of accomplishments such as have been described this evening, I wonder why we engineers are not just a little bit more proud of our profession. Yet we very seldom speak about it as do members of other professions. It is told about two American salesmen who had lost their jobs in a certain country in Europe. They were holding forth on the conditions of the country and said that the low faced emperor was nothing but a d—d old thief anyway. A plain clothes officer stepped up to them after hearing them malign the emperor. "I shall have to place you under arrest," he said. One of the Americans spoke up and said. "We did not say anything about your emperor. There are a number of emperors here in Europe." "Oh, yes," said the plain clothes officer, "but we have the only d—d old thief." We have numerous accomplishments at which to point, to make ourselves proud of our profession, and we should take credit and responsibility for the good that we do when others who are critical criticize.

## MAPPING LOUISIANA FROM THE AIR

By John Paul Dean *

Read before the Society April 18, 1935.

The project for flood control and navigation of the Mississippi River adopted May 15, 1928, included provision for making a general utility topographic map of the alluvial valley.

In the execution of this phase of the project the general procedure was as follows:

A thorough research was made of all prior surveying and mapping work within the valley, by any and all agencies, public and private. All data, ancient or modern, pertaining to a given area, were assembled and critically analyzed. A preliminary general topographic map, horizontal scale 1/250,000, or about 4 miles to the inch, with contours at 5-foot intervals to show vertical relief, was prepared for each of the major natural subdivisions or basins of the alluvial valley and printed in seven colors in 1929. A preliminary general topographic map, scale 1/500,000, with 5-foot contour interval, was published in seven colors in 1930, to cover the entire alluvial valley in two sheets of convenient size, or each flood control district in a single sheet. Using this preliminary work as a basis for detailed planning of future work the entire alluvial valley was next gradually photographed from the air with a high degree of precision and excellent detail. The photographs were tied in to the ground control, which had been materially strengthened geodetically and extended throughout even the more remote and inaccessible portions of the valley. The entire valley was subdivided into quadrangles, bounded by the 15 minute lines of latitude and longitude, was mapped on a field scale of 1/48,000, and published in colors to a horizontal scale of 1/62,500, or about 1 inch to the mile, with a contour interval of 5 feet vertically.

These 15 minute topographic quadrangles, each containing about 250 square miles, are designed to assist in the planning and execution of details of the flood control project and as an element of preparedness and general utility for the economic

* Captain, Corps of Engineers, U. S. Army.

development of the country, as well as to serve as standard tactical maps for general use in field operations by military forces of the United States. They are published in quantity for general use. About 50,000 square miles are included.

All standard military maps of the United States are constructed upon the polyconic system of projection. Each sheet has ticks at 5,000 yard intervals along the margin to facilitate the application of the standard rectangular grid to the sheet. The alluvial valley falls within Zone C of this grid.

The datum is mean gulf level at Biloxi, Miss. Elevations differ from mean sea level elevations as determined by the U. S. Coast and Geodetic Survey, by small fractions of a foot. Persons interested may secure elevations of bench marks as determined by the latest U. S. C. & G. S. adjustment by applying to the U. S. Coast and Geodetic Survey. North American datum is used for horizontal control. Political boundaries are shown according to best available information but are subject to change except where established by coure decision. Section lines are shown wherever the U. S. Land Plats can be reconciled with topography.

To summarize, our efforts were constantly directed toward producing promptly at reasonable cost general purpose maps to meet as nearly as practicable the present and anticipated needs of the entire public as well as our special needs in connection with the flood control project. With the large amount of data available in the files of the Mississippi River Commission and the United States Engineer Department, and with the cooperation of other agencies, national and local, public and private, it appeared that this mission could best be accomplished by the use of combined aerial and ground methods.

The basic framework of control was obtained from the latest adjustments made by the U. S. Coast and Geodetic Survey of geodetic position from networks of triangulation and traverses of a high order of accuracy; and of elevation from numerous interconnected precise level lines run by various agencies throughout the years before and since the project was started. The detailed control required to tie in the photographs, determine their scale, avoid distortion and develop topographic information, was based upon this framework.

In the details of execution of different phases of the work the various agencies charged with the accomplishment of the several tasks, each developed methods which seemed to be peculiarly adapted to the needs of the local situation. I shall attempt to comment only on methods which I had occasion to use myself.

I was directed by the Chief of Engineers in the spring of 1929 to prepare by the summer of 1929 the preliminary map of the Yazoo-Tensas Basins in two sheets, about 32″ x 48″ each, having a horizontal scale of 1/250,000, and a vertical contour interval of 5 feet within the alluvial valley. Personnel of the Office of the President, Mississippi River Commission, were simultaneously directed to prepare the other half of this preliminary series of basin maps. I used all available local maps and prior surveys, including those made for flood studies under my direction in 1928 in the Tensas Basin, and surveys made during 1928 and 1929 for flood studies in the Yazoo Basin by the Vicksburg Engineer District, reducing them to a common datum and scale, supplementing them by extensive personal reconnaissance and occasional minor surveys, and contouring the whole from the best information available plus all the engineering and geological judgment I could summon up to fill in the gaps. The high water marks from the widespread 1927 overflow, together with my previous studies of that overflow, served me well as an everpresent datum for elevation of great convenience and considerable precision when adequately controlled by good scattered bench marks of high precision. The air photos, mostly tri-lens, taken in 1927 to determine the limits of the overflow area, were invaluable. Brunton transit, automobile speedometer, tape, military sketching board, and hard, thin-lead colored pencils were my principal reconnaissance instruments. Final drafting and publication was by the Engineer Reproduction Plant in Washington. The 5-foot contour interval was admirably suited to showing the general slope, both lognitudinal and transverse, of the many alluvial ridges built up through the centuries of the overflow of the silt-bearing waters of the streams. The horizontal scale was, of course, too small to show, except by a blue line, the trench in the ridge through which the stream itself meandered. The

scale was too small to show individual houses, but an attempt was made to show all communities with local names, to show and classify all roads, airplane landing fields, transmission lines, railroads, streams, drainage ditches, levees, gages, etc. Comparison with the detailed precise standard quadrangles made later demonstrates the adequacy of a general large scale map made under such conditions with great speed and trifling cost. The "basin sheets" were designed to serve both as wall maps and general planning maps; they were drafted so that they could also be used for direct reproduction on the 1/500,000 scale without redrafting. They have been and are still widely used in both scales.

After completion of these preliminary small scale general or strategic maps by personnel from the Office of the Chief of Engineers and the Mississippi River Commission, then the Memphis, Vicksburg, and Second New Orleans Engineer Districts, and the United States Geological Survey were each assigned a group of the standard quadrangles. Each agency used air photographs as well as ground methods and each developed a slightly different normal technique. I shall confine most of my remarks to matters which pertain to the work of the Second New Orleans District where I have been stationed since leaving the Office of the Chief of Engineers, and to discussion of my personal experiences and views as to technique.

My previous experience with aerial mapping in various places since 1921 had led me to strongly favor the use of multilens photographs. I still believe that they are unsurpassed when the primary mission is to cover a large area where there is little existing ground control and no demand for large scale mosaics. Their outstanding merit lies in the possibility of using photographic control to dispense in considerable measure with local ground control.

All of the photographs used by the Second New Orleans District since 1928 have been single-lens photographs. In this district not only is the entire area well mapped but also a considerable portion of the area is covered by controlled mosaics on a scale of 1/10,000, which is the scale normally used for levee construction maps, bank line surveys, general hydrographic surveys, etc. These mosaics are in constant use for

supplementing visually in large scale detail the information which could be shown on the 1/62,500 quadrangles. The important area along the river banks and the levees is covered by photographs on 1/5,000 scale.

All the photographs have been taken by the commercial air photographers making the low bid on the several contracts specified and advertised. Our recent specifications require that:

> Aerial photographs shall be sharp and clear in detail, equal in these respects to samples of photographs previously taken with the same type of camera and submitted with the bid. They shall be sensibly free from distortion. They shall be taken with a standard aerial mapping camera and provide satisfactory stereoscopic pairs of the entire area. All photographs shall be taken with the optical axis of camera as nearly vertical as possible and in no case shall the tilt exceed 3°. They shall be taken from such an altitude and with lens of such focal length as to give a scale of delivered photographs of approximately 1/10,000 in the plane of average ground elevation, but a tolerance in scale of 5% will be allowed. The required scale may be obtained by enlargement or reduction provided the photographic qualities are satisfactory. Photographs shall have approximately 60% and not less than 55% overlap between successive exposure of each flight, and series of photographs of parallel flights shall overlap not less than 40%. All flight courses shall be made in approximately strainght lines. Side displacement between successive photographs shall not be greater than 10% of width of photographs. Flights made to fill in, because of skips or lack of sufficient overlap, shall be parallel to main flights and the photographs shall tie adequately to other photographs of main flights. No photograph will be accepted which is skewed (crabbed) more than 10° with respect to the line of flight as determined by relative positions of centers of photographs. No photograph will be accepted which has been taken when the terrain is obscured by clouds, fog, or smoke or is covered by snow or when streams are over their banks or when the sun is less than 20° high. Negatives shall be numbered in logical order and in a manner to print clearly to the photographs. Each installment of photographs delivered shall be accompanied by an index showing

positions of flights and individual photographs. All photographs shall be printed on double weight paper with matte finish. They shall be permanently fixed, thoroughly washed, and dried without pressing, rolling, or stretching. All photographs shall have their principal point (optical center) accurately indicated by registration marks at the borders or else the diagonals shall truly supply that point. There shall also be furnished the date of exposure, direction of flight, and serial number of photographs. All single-lens photographs shall be delivered untrimmed and unmounted.

One set of the finished photographs shall be contact prints to the approximate scale of 1/10,000. Upon receipt of scale checks, the contractor shall furnish two sets of ratioed prints at 1/10,000 scale.

Contact prints at intervals from each roll of film are taken into the field, position ties made and the scale of the photograph determined by the ratio of the distances between two points on the ground and between the corresponding points on the print. The scale is furnished the photographer who then makes "ratio prints" to the desired scale, i. e., 1/10,000 or 1/5,000.

With the ground control and picture ties as a basic frame work on a plotted 1/10,000 polyconic projection it is possible to carry the control forward for a considerable distance using the radial line method of intersection with the photographs. This corresponds to the method employed in mapping with a plane table where station positions are determined by resection and lines are then drawn to numerous points to locate them. This method practically eliminates the displacements caused by relief and minor tilt. It is based on the fact that lines drawn from the optical center of a vertical aerial photograph indicate the direction to those points through which the lines pass. In other words, the center of the horizontal camera film at the moment of exposure can be treated as though it were a plane table station. With at least 60 per cent. overlap between consecutive photographs, satisfactory results are obtained so long as the same principles are observed which govern good plane table work. Angles of intersection should never be too small. A good long base is desirable. Expansion

from the base should not be carried too far. The accuracy of resection locations depends on the position of the instrument with respect to the points sighted. The wider the chain of points used the longer it can be carried without serious error. With single lens photos it is undesirable to carry the control forward over four times the width of the photos.

In making controlled mosaics only the central portions of photographs are used to avoid tilt and relief distortions. Mosaics are mounted on Masonite board in 3 x 3 minute units with flush edges. Twenty-five units make a quadrangle. Photographic reproductions of one or more units or portions thereof are made at small cost whenever needed. Hydrographic surveys are sometimes plotted directly on mosaics with ink that can be wiped off after a photographic negative has been made.

In closing, I should like to emphasize a few points that are sometimes overlooked in the use of aerial photographs for map making.

(a) Insist on as good photographs as practicable. To secure good photographs requires specially designed equipment in the way of camera, film, and laboratory accessories, a suitable plane with proper instruments, good flying conditions and visibility, and experience on the part of both pilot and photographer. The plane should fly in a straight line at a uniform speed and altitude to avoid tilt, maintain proper overlap and uniform scale. To assist the photographer successive flights should be lade out in straight lines on a good general map in sufficient number to insure adequate side overlap and coverage. Good photographs are only the beginning of the map, but the ease and success of the remainder of the work depends on them.

(b) Get enough prints so that one or more sets may be used in the field and some possibly damaged in either field or office without serious handicap to the work. Prints are relatively cheap. Field work is expensive and photos can cut its cost and improve its quality.

(c) Be careful with picture ties. Be sure you identify the *exact* point on both photo and ground. Having identified it prick its location on the print with all the precision practicable. The error in identifying and marking a point may be many

times the error of measurement on the ground unless extreme care is taken. Mistakes in identification are costly; it is wise to double and triple check if necessary.

(d) With good contact prints and careful scale checking, it is possible to get excellent ratioed prints to a specified scale if you insist on it. This is much cheaper and faster than trying to get along with distorted and off-scale prints.

(e) Good ground control is always desirable; it is better when it is positively tied to the photographs at frequent intervals. It is generally easier and better to tie the photographs to the ground control in the field *after* the pictures are taken than to place markers on the ground *before* the photos are taken. The markers, if visible, are usually poorly disposed with respect to the individual prints.

(f) The greatest use of the photograph is in vastly increasing the amount and accuracy of detail which can be shown on a map without materially increasing costs. If the detail shown on the photograph is to be properly and accurately transferred to the map it must be correctly interpreted. Some field experience with the photographs is almost essential for training in interpretation. A good stereoscope is an invaluable office aid. Interpretation is here defined as the operation of detertmining just what the features shown on a vertical photograph really are, or of discovering obscure or hidden features through related visible features.

(g) There is usually a considerable amount of potential information shown on a photograph which cannot be transferred to a map. It is this information which frequently makes the photograph or mosaic an invaluable supplement to the map. The complete study of aerial photographs involves not only interpretation, but also restitution or the transfer of the interpreted features to a map; and exploitation, or the study, analysis, and evaluation of the information obtained from the photographs. In the planning of flood control work my experience has been that the greatest value of the photographs is in this latter phase of their use.

# A HISTORY OF THE MENGEL COMPANY

By J. A. Moore *

Read at the Baton Rouge Meeting May 13, 1935.

Being a representative of one of your industries of Baton Rouge, I have been asked to give a brief outline of our plant here in your city.

The Mengel Company was originated by Colonel C. C. Mengel, Louisville, Ky., in the year 1877, as a manufacturer of wood boxes, in which candles were shipped. This was soon followed by a general line of boxes, such as plug tobacco, fruit and vegetable boxes; as this business increased in volume others were taken in, and prior to the World War the wood box industry had grown to a tremendous volume. Having factories and timber holdings in several states, and being the largest manufacturer of wood boxes, we were the first to be called on by the allied nation to manufacture boxes for ammunition, and later on turned our activities into manufacturing amunition boxes for the United States. At the termination of the war, we were forced to seek new production to take care of the large investments which we had, and after trying out various products, we are now manufacturing fiber (paper) containers, cigar and whiskey boxes, toys of the larger type, plywood for the furniture trade, lumber, both foreign and domestic. We have logging operations in Central America, Africa and British Honduras.

In 1924 the company decided to build a large plywood plant, and after making a tour of the South, decided on our present location here in Baton Rouge. Eleven (11) years ago this month we began the construction of the plants—sawmill and veneer mill, which were in operation about seven months later. This plywood plant is the largest of its kind in the United States for the manufacture of furniture stock, cabinets, show case and building panels of all foreign and domestic wood.

It may be of some interest to you to know that we own and operate our own steamboats and barges to take care of our

* Manager, The Mengel Co., Baton Rouge, La.

various logging operations which are located in Louisiana, Mississippi and Arkansas. Of course, during all of these various developments we have been closely associated with engineers of all types, and we feel that in practically every industry today the engineer is the backbone of that industry.

I shall not go into details of the process of the manufacture of plywood, as it would possibly take up too much time, but I should be very glad to answer any questions.

# SOME NOTES ON THE MANUFACTURE OF SULPHURIC ACID

By W. J. Daspit *

Read at the Baton Rouge Meeting, May 13, 1935.

I shall ask that you bear with me for just a few minutes and I will, with much pleasure, try to give you some information concerning the manufacturing of sulphuric acid in our factory, a few of its uses, and some of its characteristics.

Our plant at Baton Rouge has a daily capacity of one hundred and eighty tons of 100% commercial sulphuric acid, and it represents an investment of well over a million dollars.

In the manufacturing of sulphuric acid, of course, the raw material used is sulphur. Sulphur as you know is being mined in large quantities right here in Louisiana by the Freeport Sulphur Company at Grand Ecaille, some sixty miles below New Orleans, and also by the Jefferson Lake Oil Company near New Iberia.

For every 100 pounds of 100% sulphuric acid produced there is required approximately 33 pounds of sulphur, 18 pounds of water and 49 pounds of oxygen, which is obtained from the air.

Sulphur is first introduced into our plant in a solid form as brimstone. It is then burned in rotary burners and changed to a gas, the gas being sulphur dioxide, which is formed by simply burning sulphur in air.

The sulphur dioxide gas is collected by a large motor driven fan under a partial vacuum. It leaves the burners or combustion chambers at about 2,000°F. It is then cooled considerably, before it is washed to free it of all injurious foreign matter. Next it is dried at first by condensation, then by adhesion and last by bringing it in contact with a good dehydrating agent. After being thoroughly dried, the sulphuric dioxide gas is then introduced into a catalyzer, where it is further oxydized or converted into sulphur trioxide gas. This gas has a great affinity for water, and of course, when it comes in con-

* Superintendent Louisiana Chemical Co., Inc., Baton Rouge, La.

tact with water it is readily absorbed by the water to form sulphuric acid.

Acids of strong concentrations are stored and shipped in steel containers. Of course weaker acids must be stored and shipped in glass containers. Different strengths of sulphuric acids attack different metals at different temperatures. Therefore it is necessary to use several different kinds of metals at the different stages in the process. Commonly speaking, sulphuric acid can exist in any strength ranging from a 1% solution to 122%. All sulphuric acid above 100% is known as fuming sulphuric or better known as oleum. It also possesses a very erratic freezing or melting point. Just a slight variation in concentration will sometimes raise or lower the melting point as much as fifty degrees.

At our plant all the sulphuric acid we manufacture ranges in strength from 98% to 106%. However, with the addition of water we are so equipped to furnish acid of any strength desired either commercial or chemically pure.

Sulphuric acid, as you know, is used in the refining of oils, in the manufacturing of aluminum sulphate, or alum, as electrolyte in storage batteries, for pickling vegetables, as well as steel, also used by the cotton oil mills in the refining of cotton seed oils. It is also used in making high explosives and has various other uses too numerous to mention.

## MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

### Minutes of the Board of Direction, April 8, 1935.

The meeting was called to order by President Bres and the following members were present: Messrs. Ricker, Grehan, Hoots, Hackett and Muth. Mr. Moses was excused.

Minutes of the previous meeting were read and bills on hand were ordered paid.

A communication from the Library Committee was read, in which was listed books which were recommended for the Library. On motion, duly seconded, it was voted to refer the list to the Library Committee to use its discretion in acquisition of books and periodicals when the budget is completed.

A report was received from the Special Committee appointed to investigate the joining of the American Engineering Council. On motion, duly seconded, the recommendation of the Committee was approved to join the Council for this year.

The Chairman of the Entertainment Committee presented some of the details which are being prepared for the May meeting to be held in Baton Rouge.

The Budget report was received and the Secretary was instructed to furnish copies to the members for action to be taken at a later meeting of the Board.

Report was received from the Committee on Amendments to the Constitution. The Secretary was instructed to furnish copies to the members for consideration at a meeting of the Board to be held prior to the May meeting.

There being no further business, the meeting adjourned.

F. A. MUTH, Secretary.

### Minutes of the Regular Meeting of the Society, April 8, 1935.

The meeting was called to order about 8:10 P. M., E. S. Bres, President, in the chair, F. A. Muth, Secretary, and 106 members and guests present.

The minutes of the previous meeting were read and approved.

Reports were received from various committees and the Chairmen of the Entertainment Committee referred to the details which are being prepared in connection with the May meeting to be held in Baton Rouge.

As this was a joint meeting with the Louisiana Section of the A. S. C. E., the meeting was then turned over to Mr. John H. O'Neill.

The technical exercises consisted of a most interesting address on "Mapping Louisiana from the Air," by John Paul Dean, Captain, Corps of Engineers. The address was illustrated with numerous slides and maps. A rising vote of thanks was then tendered the speaker and the meeting adjourned to the collation in the Club Room.

F. A. MUTH, Secretary.

# ACTIVITIES OF LOCAL SECTIONS

President,
F. P. HAMILTON

1st Vice-President,
CLIFFORD H. STEM

2nd Vice-President,
H. A. SAWYER


Secretary,
C. M. KERR,
Care American Creosote Works, Inc., New Orleans, La.

Treasurer,
A. M. FROMHERZ,
Queen and Crescent Building, New Orleans, La.

Annual meeting at New Orleans in May.
Special meetings at call of President.

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## STUDENT CHAPTERS

Louisiana State University
President, Edward Hulme
Vice-President, Wilson Broussard
Secretary, Charles Schweizer
Treasurer, Chester Siess

Tulane University
President, Waldo S. Powell, Jr.
Vice-President, Wilbert L. Argus
Secretary, William B. Settoon
Treasurer, Louis C. Bisso

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The Annual Meeting of the Louisiana Section, American Society of Civil Engineers, was held Wednesday, May 29th, at the residence of Mr. Ole K. Olsen, 508 Millaudon Street. There were 52 members and guests present.

President O'Neill read his annual report, giving a detailed resumé of the various activities of the Section for the year and discussed the participation of the Section in the program of the F. E. R. A. for increasing the salaries and employment of engineers.

After considerable discussion as to whether the finances of the Section would permit the continuance of the scholarships at Tulane and Louisiana State Universities, a motion was made and carried to the effect that the matter should be referred to the incoming board.

It was agreed that all members be impressed with the necessity of paying dues to the Louisiana Section so that these scholarships may be available during the coming 1935-36 session.. This may not be possible unless necessary funds are made available. The fact was also brought out that names of prospective applicants for these scholarships must be submitted before August 1st.

After the election of officers for the ensuing year, General Harley B. Ferguson, President, Mississippi River Commission, discussed the treatment of cut-offs and bank erosion of the Lower Mississippi River.

Following adjournment, supper was served in the Olsen Rathskeller.

# THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

## LOUISIANA-MISSISSIPPI SECTION

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### Officers and Members

C. S. Williamson, Jr., Chairman, Tulane University, New Orleans, La.
W. R. Stryker, Vice-Chairman, Southport Mills, New Orleans, La.
E. A. Gastrock, Secretary-Treasurer, Celotex Co., Marrero, La.
H. A. Levey, Director, American Products Co., New Orleans, La.
J. J. Ganucheau, Director, Southern Co'ton Oil Co., Gretna, La.

E. Bache, Bogalusa Paper Co., Bogalusa, La.
R. M. Boehm, Masonite Corp., Laurel, Miss.
M. W. Boyer, Standard Oil Co., Baton Rouge, La.
C. E. Coates, Louisiana State University, Baton Rouge, La.
C. B. Dicks, Jr., Tulane University, New Orleans, La.
H. S. Foote, Bay Chemical Co., Weeks, La.
H. H. Hewetson, Standard Oil Co., Baton Rouge, La.
P. M. Horton, Louisiana State University, Baton Rouge, La.
A. G. Keller, Bunkie, La.
W. B. Logan, Newport Co., Lake Charles, La.
G. P. Meade, Colonial Sugars, Gramercy, La.
E. S. Rothrock, Louisiana Chemical Co., Baton Rouge, La.
J. H. Thickens, Masonite Corp., Laurel, Miss.
E. Wander, Bay Chemical Co., Weeks, La.

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Regular meetings are held on the first Friday in February, May, October and December in the Richardson Chemistry Building, Tulane University, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXI. AUGUST, 1935 NO. 4

## CONTENTS



## EDITORIAL NOTES AND COMMENT

**Two Day Annual Meeting.** An innovation which promises both considerable activity and considerable interest will be inaugurated at the annual meeting of the Society to be held in January.

Presidnet Bres has appointed Mr. James M. Todd, Chairman of a general committee to arrange for a two day meeting to be held in New Orleans on January 23, 24, 1936. On this committee also are representatives of the local sections of the national societies. It is the aim of the committee to make the meeting not only of statewide interest, but also of interest to

the different technical groups. It is expected that the meeting will be attended by all members of the Society and local sections within the state. It is hoped that many from outside the state will also attend.

The meeting will consist not only of many excellent technical meetings, but social and recreational features will be included as well.

For the visiting ladies, special programs and activities will be planned. (Yes, by all means, bring the ladies).

This will be the first time that a meeting of this magnitude and scope has been attempted by the Society. It can and should be the occasion for directing local attention in a dignified but forceful way to the part that engineers and their work play in modern economic life. (We almost said "civilized" economic life.)

The *tentative* program proposed by the committee is printed below.

*This meeting is for the members.* The committee is anxious to make it of the greatest benefit to the largest number.

Will you please, therefore, write to the Secretary or the Chairman of the Committee, Mr. Todd, any suggestions you may have for this meeting. Do not hesitate to make any suggestions, however trivial they may seem to you. The committee is anxious to receive ideas. And one other suggestion: It takes time to shape the details of a program. The men who have to do it are busy men. If you have suggestions to make, *won't you assist by making them as soon as possible.* The program, which is not complete and only tentative at this time, follows:

**Annual Meeting Program**

**Thursday, January 23, 1936**

THURSDAY: 8:30 A. M.—Registration at Headquarters, St. Charles Hotel.

10:30 A. M.—Opening of Meeting
Address by President (five minutes)
Annual Business Meeting of Society

Annual Report of the Board of Directors by Secretary
Report of Committee of Tellers of Election
Introduction of Officers Elect

12:00 M.— Lunch

1:30 P. M.—Technical Sessions
(1) Chemical
(1) Mechanical
(1) Electrical
(1) Civil

These sessions run in succession, so that members will have an opportunity to hear everything in which they may be interested. The object is to have a good technical program. Sessions cover subjects of interest to Louisiana Engineers and will not be talks by "sales groups."

8:00 P. M.—President's Reception, Banquet and Dance
Presentation of Prizes

FRIDAY: 9:30 A. M.—Open Forum.
Discussion from District Delegates or Representatives.

12:00 M. to 1:00 P. M.—Lunch
At lunch groups could get together, such as Past-Presidents, Juniors, Students, etc.

2:00 P. M.—Plant Visitations and Recreational Features

8:00 P. M.—Smoker

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**Engineers Note This!!** Paragraph 6, ADVANCE GRANT, Rules and Regulations relating to applicants and projects under the Eemrgency Relief Appropriation Act of 1935, published July 22, 1935, by the Federal Emergency Administration of Public Works will be of interest to members of the Society. This paragraph is as follows:

> 6. ADVANCE GRANT.—At any time after the acceptance by the applicant of an offer from the Government to make a grant, the applicant may request an advance on account of the grant of not exceeding 15

per cent of the previously approved estimated cost of the Project. *This advance grant may be used for paying architectural, engineering, and planning fees, cost of surveys, borings, and other preliminary investigations, costs of preparation of plans, specifications, and other forms of proposed contract documents,* and costs of advertisements for bids for contracts, but not in payment for the acquisition of lands, easements, or rights-of-way. The request for this advance grant must be accompanied by a signed certificate of purposes in which must appear in reasonable detail the purposes for which such advance grant will be used.

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**Practical Salt Dome Oil Geology.** A comprehensive article, titled as above, is published in this issue.

Professor Steinmayer, whose geological work in this section of the country has been widely recognized, is the author. To those even remotely interested in oil geology, Professor Steinmayer's article will prove both interesting and informative.

Professor Steinmayer was probably one of the first geologists to propound the theory that oil could be found east of the Mississippi River. At that time there seemed to be a well founded tradition among oil people and others that while quantities of oil lay beneath the surface west of the Mississippi, none lay beneath the surface to the east of that stream.

Recent subsequent events have proved that Professor Steinmayer's heresy wasn't really any heresy at all.

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**Technical Development of the Oil Industry.** We burn gasoline in our automobiles and lubricate them with oil without giving much thought to the processes by which these petroleum products are manufactured.

The article in this issue outlines in a very clear and interesting manner the complicated processes involved in the fractionating of crude oil into many different products which find their way into commerce.

Mr. Rathbone's well written article gives a general but clear picture. Those not already familiar with petroleum refining will find it interesting and informative reading.

**Louisiana Steam Generating Corporation.** This is the age of specialization—companies developed for the sole manufacture and sale of some specialized product. Witness ready-mixed paint, ready-mixed concrete, and even "ready-mixed" steam.

Central steam plants manufacturing and selling live steam to other companies for heating and process work have been in existence for some time in the North and East.

We believe, however, that the Louisiana Steam Generating Corporation is one of the first activities of its kind to invade this section of the "deep south".

Companies manufacturing some commercial product have long since found it both convenient and advantageous to buy their power outright rather than have their management troubled with the extra burden of generating their own power. They can thus confine their attention to their primary object, viz: commercial manufacturing.

In recent years, the idea has been extended to the purchase of steam from central steam generating companies for heating and process work of various kinds.

The paper by Mr. Thomas E. Crossan in this issue describes the equipment and operation of the Louisiana Steam Generating Corporation at Baton Rouge.

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**The F. E. R. A. Foundation Survey.** Since our last note in April Issue of the Proceedings, the F. E. R. A. Soil and Foundation Survey has progressed.

An office has been opened in LaSalle Hall at Tulane University and the Supervising Engineer, who has been placed in direct charge, is one of our members, Mr. F. P. ("Pete" to us) Hamilton. Besides the office staff, he has in charge a force of some ten field engineers.

The idea of this survey was initiated and actively pursued by the President of this Society, Colonel Bres, Professor Derickson, H. M. Gallagher and John H. O'Neill. It is gratifying to us to note four members of the Society have been requested by the Federal Emergency Relief Administration to supervise the project, namely: Mr. A. R. Brousseau, Professor Donald Derickson, Mr. John H. O'Neill, and President Edward

S. Bres. The engineers and architects are responding with cheerful co-operation. In some few instances there has been lack of co-operation partly from misunderstanding of the objectives and partly from lack of interest. When the true nature of the work is understood, however, and its import to the engineers and architects recognized, there is no doubt that these few individuals will realize that the right thing to do is to co-operate. The finished report when published will have assembled in easily available form a wealth of data and information almost invaluable to the engineer and architect.

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**Attention, Members of the Society!** The Editor has received the following letter which is printed here for your information and guidance:

U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON

July 1, 1935.

Louisiana Engineering Society,
New Orleans, La.
Dear Sir:—

As you are aware, the Bureau of Labor Statistics has undertaken a comprehensive survey of the engineering profession. The mailing list was supplied to us through your co-operation. While the number of returns is most gratifying and the returns are in many cases accompanied by useful comments, it is evident that there is some misunderstanding as to the purpose of the survey in that the Bureau is specifically seeking the information to find positions for engineers.

Since this Bureau has no facilities for placing unemployed engineers, it is believed that much disappointment would be avoided if you can make arrangements to notify your members through your society journal that such is not the case.

It is the hope that the final report will contain information enough from which to formulate some program to deal with unemployment in the engineering profession. Meanwhile may we refer your members and other engineers to the placement

bureau of your society and the United States Employment Service for information regarding employment prospects.

Yours very truly,

ISADOR LUBIN,
*Commissioner of Labor Statistics.*

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**Additions to the Library.** Professor Arthur M. Hill, Chairman of the Library Committee, announces the following additions to the Library:

Journal of Heating and Ventilating Engineers.

Guide of the American Society of Heating and Ventilating Engineers.

American Petroleum Refining, *Bell.*

A Manual of the Slide Rule, *Thompson.*

Design and Use of Instruments and Accurate Mechanism, *Whitehead.*

Hydraulics, *Hughs & Safford.*

Economy of Abundance, *Stuart Chase.*

Foundations for Human Engineering, *Gow.*

Transmission Lines (The Westinghouse Company), *Nesbit.*

Acoustics of Buildings, *Watson.*

Principles of Radio Communication, *Morecroft.*

Photo Cells and Their Application, *Zworykin & Wilson.*

House Painting, *Sabin.*

Heat, *Cork.*

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**Technical Papers for Coming Meetings.** Mr. David W. Godat, Chairman of the Technical Papers Committee, announces the following program for the remainder of the year:

September 9th—Major Henry Hutchings, Jr., sponsored by the Louisiana Engineering Society.

October 14th— Speaker unselected, but meeting to be sponsored by the American Society of Municipal Engineers.

November 11th— Speaker unannounced, but meeting to be held under the auspices of the American Institute of Electrical Engineers.

December 9th— Open date.

**New Members.** We are glad to welcome into the Society the following new members who were elected on June 10, 1935:

**Members**

A. R. Brousseau, New Orleans, La., with F. E. R. A.
Gray Doswell, New Orleans, La., with F. E. R. A.

**Associate Members**

C. M. Bowman, New Orleans, La., with F. E. R. A.

**Non-Resident Members**

D. A. Hunt, Alexandria, La., with F. E. R. A.
R. B. Fowler, Alexandria, La., with F. E. R. A.
J. G. Scheib, Shreveport, La., with F. E. R. A.

**Junior Members**

A. F. Blumer, New Orleans, La.
J. H. Trepagnier, New Orleans, La.
L. C. Dupont, New Orleans, La.

**Non-Resident Junior Members**

E. J. Hagstette, Erath, La.

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**Applications for Membership.** The following applications for membership have been received by the Secretary. Ballots to the membership will be sent out in due course:

**Non-Resident Members**

J. B. Howse, Jr., Shreveport, La., with F. E. R. A.
R. F. Seiler, Shreveport, La., with F. E. R. A.

**Non-Resident Associate Member**

H. M. Clanton, Shreveport, La., with F. E. R. A.

# PAPERS AND DISCUSSIONS

## PRACTICAL SALT DOME OIL GEOLOGY

By R. A. Steinmayer *

Read before the Society, June 10, 1935.

### History

There is a strong magnetic fascination that impels those who are interested in the development and progress of the science of oil geology to turn back the leaves of recorded historic time and to retrospectively search the ancient documents for the first mention of the "black-magic" in its relationship to the advancement of civilization.

The history of its beginning probably antedates by thousands of years the writings of the ancient philosophers, travelers, and historians, and must be interpreted from the artifacts of man.

Ancient historians, Herodotus, Ctesias, Plutarch, Aristotle, Pliny, Marco Polo, and many others, described the existence of gas, oil, and asphalt at Baku, Kir ab Susiana, Karamania, Mesopotamia, Albania, and the Apsheron Peninsula in the Eastern World.

From the foregoing it would appear as though all of the earlier romance of oil and its derivatives occurred only in the Eastern Hemesphere. There is, however, no contradictory proof that it did not play an important contemporaneous role in the advancement of civilization of the Western world. Unfortunately there are too few ancient American documents of this sort but petroleum must have aroused the interest of the aborigines, probably milleniums before the coming of Christopher Columbus. Some of the beautiful mosaics made by the Toltecs, in Mexico, are delicately set in bitumen, and archaeological investigation in the western part of the United States reveals the use of asphalt for adhesive, decorative, and ceremonial purposes.

* Member, Professor of Geology, Tulane University.

The earliest writings in modern literature described the presence of petroleum springs and asphalt seeps associated with the salt licks and salt springs in the Appalachian region of the United States. White† states that, "the salt industry (1800-50) prepared the way for oil production."

In 1821 natural gas was used for lighting houses in Freedonia, N. Y., and in 1828 petroleum was recommended for use in lamps to light the streets in Pittsburgh, Pa.

The outstanding feature of the second quarter of the last century was the development of the shale-oil industry. This was brought about by research and experiment for a suitable illuminant oil for lamps to replace sperm oil.

Impetus to the growth of the oil industry was brought about by the increasing price of the oil and the knowledge of its use in the production of coal oil, paraffin, and lubricants which culminated in the "drelling in" of the 25-barrel Drake Well on Saturday, August 28, 1859. This discovery inaugurated the era of oil booms with its attenuated evils—racing for leases, and wild speculation.

The development of the oil industry in the Gulf Coastal area was inaugurated with the gusher drilled by Capt. A. F. Lucas in 1902, which paved the way to the development of the entire salt dome belt.

‡"Two other causes besides the World War have contributed to the development of the recent surplus production of oil in the United States. One is the increase of knowledge of the geologic phenomena and conditions controlling the occurrence of petroleum; the other is the great advantage accruing to the producing companies through the utilization of this knowledge in the discovery and development of new oil fields. Most important to the progress in petroleum geology within the present century have been the development and application of geographical, micropaleontologic and micromineralogic

† David White; "Outstanding Features of Petroleum Development in America". Bulletin, American Association of Petroleum Geologists, Vol. 19, No. 4; April, 1935.

‡ David White; "Outstanding Features of Petroleum Development in America". Bulletin, American Association of Petroleum Geologists, Vol. 19, No. 4; April, 1935.

NOTE: Those who are interested in the historic development of the Petroleum Industry should read Dr. White's excellent paper.

methods of exploration in the search for and location of oil deposits, and the consequent rapidity with which new oil reserves have been found.

### Theories Regarding the Origin of Petroleum

No phase of the geology of the oil industry elicits such wide diversity of opinions among geologists, chemists, and engineers than the theories pertaining to the origin of oil. Each school of thought has its own theories which naturally reflect the viewpoint of the training of its members.

Geologists generally contend that oil is of organic origin, that is, they believe that it is the result of chemical action that took place with the assistance of an organism. They do not all agree however as to the kingdom of the organism. Some assert that oil is of animal origin; others, that it originated from vegetable matter. Still others combine both contentions and assert that the asphaltic type of oils are derived from animal matter and that the paraffin type of oils are derived from vegetable matter.

The animal theories may be subdivided upon the bases of phylum, class, or order to which the animal belonged that suffered distillation. For instance, there was recently published a large volume entitled "Fishes, the Source of Oil." Probably that accounts for the innumerable suckers that dabble in oil, until metamorphosed by a process of financial distillation. Then there is the mollusk theory which may be further subdivided into, for example, "The Scallop" or "The Oyster" theory. In regions where coral limestones abound others contend that oil originated from the coral polyps. In the Gulf Coastal area, much of the oil is found associated with the microscopic shells of unicellular animal organisms termed foraminifera, hence the Foraminiferal theory in regard to the origin of oil. It is an established superstition in the oil fraternity that the surest place to find oil is beneath a cemetery. However, I am merely stating this as a superstitious belief, not offering it as a new oily theory.

Similarly the vegetable theories may be classified upon the type of plants found associated with the oil bearing strata.

Many of the large oil fields of the United States occur in the Coal Basins and it is further known that distilled coals, principally carbonaceous residue of land plants, will yield hydrocarbons similar to those in petroleum. Microscopic one-celled plants with siliceous tests frequently are found in great abundance in marine waters or strata which were laid down in the seas. Sometimes shale beds rich in diatoms form strata thousands of feet in thickness. Oil is formed in such beds in California that it is but natural for the "native son" geologists to advocate "The Diatom Theory."

Both land and water plants may produce oil if they had accumulated in sufficient quantities and had been preserved under proper conditions for their subsequent distillation.

I will merely mention some of the inorganic theories pertaining to the origin of oil because geologists place little faith in these theories regardless of the fact that the inorganic chemists have been able to produce in their laboratories, without the aid of organisms, hydrocarbon products which smell, feel, and act oily but are not oil. These theories fall into three categories: The Carbide Theory, The Limestone Gypsum Hot Water Theory, and The Volcanic Theory. Whether gases emanating from deep-seated igneous masses as they pass through source sediments alter and distill the organic matter into hydrocarbons is a debatable question and presents the probability of a combination of the organic and inorganic theories.

### The Accumulation of Gulf Coastal Oil in Commercial Deposits

The close relationship between geologic structure and the accumulation of oil into commercial deposits has been realized since the rediscovery of the "Anticlinal Theory" by Dr. I. C. White in 1883. This initiated a marked increase in the value of geology to the oil industry. Under this and modified theories it is assumed that the oil, gas and water in the aquifers were at first widely diffused in the essentially horizontal porous formations in which state they remained as long as the beds attained their normal attitude. If the beds were folded, however, as they are in most of the oil fields of the world, the oil, gas and water separated and arranged themselves according to their relative specific gravities. Rock-pressure, seepage,

hydraulic pressure, diastrophism, internal heat, molecular attraction, and capillarity may have assisted their separation but their ultimate zonal concentration was in the order of the density of the substance; the lighter hydrocarbons (gas) collecting on the crest of the uplift, the oil lower down, while salt water when present lies still lower on the flanks of the uplift. The salt dome structures of the Gulf Coastal Oil Fields are merely modified anticlinal structures of the domal type; the beds dip downward away from an apex and not from an axis as they do in true anticlines. The existence of buried deep-seated salt ridges has also been recognized in recent years in the Coastal Salt Dome area.

Where there is a notable distortion of the strata within a limited area faulting, caused by the earth movements, is likely to occur due to a dipping or sinking of the strata upon one another.

Where subsurface faults occur, the oil may migrate along the fault plane to beds higher up. The upthrow side of a fault acts like the higher part of an anticline and is, in consequence, the most favorable place on a faulted structure to drill for oil.

### Correlation of Ages of Formation

There are two important basic dictums in geology which should be understood and must be considered when correlating the ages of the sedimentary formation.

The first is known as the "Law of Superposition" which briefly stated is as follows: In undisturbed formations, the sequence of geologic events is clearly shown by the order of superposition, the lowest formation is the oldest and the succeeding strata successively younger.

The second, the "Law of Faunal Succession." Each formation has a group of assemblages of species that constitutes its fauna. Since the type of plants and animals have slowly changed from age to age, each formation has preserved only those species that were living when deposited. We may depend on fossils to indicate the true order of succession even in areas of folding and faulting.

Attempts have been made many times to correlate formations on their lithologic, or rock-like, characteristics such as

color, texture, or mineral composition. This is a very hazardous procedure to follow because: "The character, attitude and distribution of the recent deposits of the Gulf Coastal Prairie of Louisiana vary considerably in different localities, during the same period of time, due to differences in the origin, transportation, and region of deposition, although gradual transition, either from one type environment to another or within the type environment in the same locality during different intervals of time, commonly produces sediments so similar that it is almost impossible to separate them." **

The proper correlation of beds is best accomplished by the use of distinctive fossils indicative of certain horizons (Index fossils). Where they occur, they definitely fix the age of the stratum and its position above or below others can be determined. Unfortunately however, few diagnostic fossils occur in the formations above the Miocene and the geologist can only roughly estimate the age of the formation the drill has encountered from its lithologic characters until it reaches a definite faunal horizon. Then too, the large fossils are poor index fossils of the youngest formation and only expert micropaleontologists can properly identify and classify the microscopic forms.

### Value of Correlation

The question often arises among laymen and wildcat promoters as to the value of correlating the formations they encountered in their drilling operations. They contend that their primary, secondary and tertiary interest in drilling a well is to strike and recover pay oil, and if this is accomplished why should they worry as to whether it came from the Neocene or Paleocene formations or contains some 5 syllable "bugs."

Unfortunately, however, the great majority of these unfortunate initiates in the oil fraternity bring with them figuratively nothing but their shoe strings, a poor reputation, and a little of other peoples money. They generally acquire a mineral lease that has been in litigation for years, make a location on the basis of a superstitious belief or a "doodle bug" artist's findings, put up a presentable derrick, and drill with used ma-

** Steinmayer, R. A., "Phases of Sedimentation in the Gulf Coastal Prairies of Louisiana," A. A. P. G., Vol. 14, No. 7. July, 1930, p. 903.

chinery and "scrapped" drill stem without knowing what they are doing or where they are going until they either exhaust their limited funds or junk the hole. When they finally abandon the hole they are no wiser than they were when they started because they did not and could not correlate the beds and so determine whether suitable structural conditions existed in the area that warranted deeper drilling, another hole in a new location, or the abandonment of the project.

### Physiographic Features of the Gulf Coastal Prairie

The physiographic features of the Gulf Coastal Prairie in Louisiana and Texas have been controlled by its deltas and sculptured by the rivers that formed them. In general, the region is a coastal plain of little or no relief that slopes slightly gulfward. The gradient of its slope is increasing landward. It is divisible into a coastal depositional deltaic prairie that merges landward into an interior erosional plain completely dissected by small streams. The prairie is traversed by numerous streams bordered by natural levee ridges, and interlevee basins dotted by an organized system of innumerable shallow lakes or traversed by tortuous bayous.

§ "The shore line of the deltaic plain, on the deltas proper, consists of bird-foot shaped fronts. The interdelta areas are serrate, fringed with cone-shaped interdelta bays and subordinate elongated re-entrant inter-distributary bays, besides numerous salient islands, spits and bars. The larger portion of these lands, with the certain exceptions, are soft, unstable swampy lands. These exceptions are the most striking relief features of the coastal prairie. They comprise (1) the long, narrow strip of high, solid ground immediately adjacent and on both sides of rivers; (2) the lines of growing and abandoned barrier beaches that fringe the southwestern coast of Louisiana, and (3) the land islands a mile or more in diameter that rise to heights up to 200 feet (61 m.) above the general level of the surrounding marshes. The sediments of these topographic ridges and land islands are characteristically sandy, grading laterally into sandy clays and finally into clays. The upper

§ See paper read by R. A. Steinmayer at the Spring Meeting of the Electrochemical Society, Inc., New Orleans, Louisiana, March 21-23, 1935.

portion of the marsh lands is composed of soft, saturated and partially saturated peat, mud, and silt."

### Stratigraphy

Stratigraphy is the detailed study of the order of deposition, composition, and relative ages of the rock formation.

The stratigraphy of the Gulf Coastal formation resolves itself in so far as its present oil bearing formations are concerned, with one exception, the volcanic ash beds, into a study of sediments. These may vary considerably as to origin and composition. Some are of mechanical origin transported and deposited under water as conglomerates, breccias, gravels, sandstones, sands, shales, gumbos, and clays, or they may have been transported and laid down as loess or dune sand by the wind.

The sediments of chemical origin formed from solution consist principally of the sulphates, gypsum and anhydrite, the chlorides, salts, the carbonates, limestone, and the ferruginous rocks and iron ores, principally the hydrous oxide, limonite. Those formed through the agency of animals and plants consist of the carbonates, limestones, and marl, the carbons, peats and lignites, and the hydrocarbon bearing sediments.

### Order of Deposition

#### Surface Beds

In the accompanying Table 1 are listed the various formations that rest unconformably upon one another and which outcrop in the Gulf Coastal Salt Dome Area of Texas and Louisiana. Geologists generally describe them chronologically according to their relative ages, beginning with the oldest and ending with the most recent. This system, while perfectly clear to the geologists, may appear ambiguous to the engineer, so the writer has inverted the order and described the material in the sequence as the formations would be encountered as the drill proceeded downward from the surface in any geographic area in Gulf Coastal Prairie covered by Recent deposits.

#### Recent

At the earth's surface, commencing in approximately the latitude of New Orleans and extending southward as an irregular fringe to the present Gulf Coast shore line occur the Re-

# TEXAS-LOUISIANA GULF COAST GEOLOGIC SECTION

| SERIES | GROUP | | FORMATION | CHARACTER OF FORMATION |
|---|---|---|---|---|
| RECENT | Coastal Prairie | | Recent | Sands, Muds, Clays and Peat |
| PLEISTOCENE | Surface Beds | | Beaumont | Clays, Sandy Clays, Sands, and Loess |
| | | | Lissie | Light Colored Sands, Clayey Sands and Sandy Clays |
| | | | Willis (E. Texas and La.) / Reynosa (S. Texas) | Chert Gravels, Coarse Sands, Clays, Red Sands and Light Colored Sands |
| | | | | Caliche, with Earthy, Gravelly and Sandy Inclusions |
| PLIOCENE-MIOCENE | | | Fleming | Predominately Colored Clays with Thin Beds of Gray Sands |
| OLIGOCENE | Upper | | Catahoula | Alternating Sandstones, Sands, Clays, and Volcanic Ash<br>Gray, Green, Blue, and Brown Color |
| | Middle | | Discorbis<br>Heterostegina<br>Marginulina | Fossiliferous Gray Hard Calcareous Friable Shales |
| | | | | Fossiliferous Gray Sandy Limestones |
| | | | | Greenish-Gray Calcareous Sandy Shales and Non-Calcareous Packed Sands |
| | Lower | | Frio | Light Colored Calcareous Clays, Marls, and Volcanic Glass |
| | | | Vicksburg | Fossiliferous Clays and Limestones |
| EOCENE | Jackson | Fayette | Whittsett<br>McElroy<br>(T. Hockleyensis)<br>Caddell<br>(T. Dibollensis) | Fossiliferous Calcareous Clays and Shales<br>Thin Basal Beds of Sand |
| | Claiborne — Upper | Yegua | Cockfield | Non-Fossiliferous Clays or Laminated Sands and Clays |
| | | | Upper Saline Bayou | Alternating Beds of Calcareous Clays and Glauconitic Sands |
| | | | Lower Saline Bayou | Glauconitic and Lignitic Sands |
| | Claiborne — Lower | Cook Mountain | Milams<br>Crockett<br>Sparta | Alternating Beds of Sands and Clays |
| | | | | Massive Sands and Interbedded Clays |
| | | Mount Selman | Weches | Massive Green Sands |
| | | | Queen City | Alternating Beds of Micaceous Sands and Carbonaceous Sandy Shales |
| | | | Reklaw | Glauconitic Shales, Sandy Shales and Glauconitic Sands |
| | | | Cane River<br>(Not Everywhere Present) | Glauconitic Clays with Subordinate Sands |
| | | | Carrizo | Light Colored Fine Textured Micaceous Sands |
| | Wilcox | | Wilcox | |

cent beds consisting principally of alluvial deposits in the stream channels, delta deposits outside and between the stream channels, and beach and marsh deposits along the present coast line.

#### Beaumont

The Beaumont is the most extensive of the Post Fleming formations, extending in Louisiana from the gulf margin of the Lissie area to the land margin of the Recent marshes and, in Texas from the Lissie area to upper edges of the Recent beaches. The continuity of the Beaumont zonal area is interrupted where streams have eroded older formations extending it up through the stream gaps as terraces on the sides of the river valleys.

The Beaumont is generally suffixed by the word clay, implying that the formation consists principally of clays, but fine sand and lime is also disseminated and associated with the clays and fine sand beds are often intercalated between the clay beds.

Loess deposits of probably Beaumont age occur in southeast Louisiana, north of St. Francisville. This material is of aeolian origin formed during glacial times and deposited unconformably by wind currents on considerably eroded older deposits.

#### Lissie

The landward margin of the Beaumont overlaps an older formation that outcrops as a flat partly prairie and wooded plain extending landward a distance of approximately 25 miles to the Willis Cuesta except where it extends as tongues in the stream gaps cut through the Willis Cuesta. The formation is made up principally of light-colored sands, clayey sands, and sandy clays.

Limonite concretions frequently occur in the upper sandy member of this formation.

#### Willis

The gravel and coarse sandy material forming the dissected hilly belt near the landward margin of the Lissie was considered until this year as a part of the Lissie formation. Doering,‖

‖ John Doering, "Post-Fleming Surface Formation of Coastal Southeast Texas and Louisiana", A. A. P. G. Vol. 19, No. 5, pp. 651-688.

however, recently proposed the name "Willis" for this cuesta forming formation consisting of three members: the basal, "Willis gravelly sand," made up of a small per cent. of gravel and clay, and the remainder of coarse slightly indurated sands; the "Willis Ferruginous Sand," the intermediate beds, consisting of red sands containing no siliceous gravels; and the uppermost, or "Hockley Mound Sand," resting usually as a thin light colored, soft, fine grained sand cap upon the "Willis Ferruginous Sand" member.

### Order of Deposition

#### Sub-Surface Beds

In the accompanying Table I are listed the various formations, which occur below the base of the Post Fleming, the lowest stratigraphic formation which extensively outcrops in the Gulf Coastal Salt Dome Area, down to horizons beyond the present depth of drilling operations. The table also includes a brief description of the character of the formations.

### Attitude of the Exposed Bed

A study of the general surface structure of the Gulf Coastal Salt Dome Area shows a low variable dip toward the present coast line varying from 20 feet per mile for the Willis, 5 feet for the Lissie, 2 feet for the Beaumont, and little or no dip for the Recent. There is a discordance of dip between the top and the base of each of these formations showing a coastward thickening of the formation.

The regularity of the structural contours is interrupted at intervals by small noses and bulges, wth no closures and 10-50 foot uplift. Doering states these noses and bulges in "this salt dome province seem to be good indicators of subsurface structures which may have hundreds of thousands of feet of uplift and closure."

### Louisiana-Texas Salt Dome Area

§ "Geographically, salt and salt bearing deposits of both the bedded and structural types have been found to encircle the earth and occur in all latitudes except the polar circles.

§ R. A. Steinmayer, "Salt Domes of the United States", Trans-American Institute of Chemical Engineers, Vol. XXV, pp. 239-249.

To date, however, those peculiar structural forms termed 'salt domes' are known to occur only on the North American continent. These unique salt masses are now found restricted to that region which formed a part of the paleogeographical Eocene gulf border of the continent termed the 'Mississippi Embayment Area' now lying within the coastal plain of the Gulf of Mexico. One group of domes situated in the Louisiana-Texas province and the other in the Isthmus of Tehauntepec, Mexico."

"The more extensive Louisiana-Texas province may be subdivided into two sub-provinces. The one including the coastal group of domes that skirt the Gulf of Mexico, extending inland a distance of approximately 70 miles, from just east of the Mississippi River to a short distance below the Rio Grande River. The other, the interior group, on or near the flanks of the Sabine Uplift in Louisiana and Texas, and separated from the former by a narrow strip apparently containing no salt domes. The first named group occurring on the flat coastal prairies of the Gulf, and the latter on the subdued hill lands approximately 100 miles further inland. We have every reason to believe that the present limits of the Louisiana-Texas province have been only apparently defined and it is more than possible that the area may be extended landward as well as out into the Gulf of Mexico. Up until a few years ago geologists were inclined to agree that the eastern boundary of the province was bounded by the Mississpipi River. That this was not the case, however, was proven by drilling into a salt dome (Sorrento) recently east of the river. Furthermore, geophysical explorations during the last two years have indicated the presence of salt domes in the Gulf of Mexico."

**Structure, Plan, Size, Parts and Composition of Salt Domes**

"Salt domes consist essentially of deep-seated sub-circular core-like masses of salt which have been intruded into the overlying beds and mantle rock, normally, bowing them upward into dome or mound-shaped, usually sub-surface, structures of the somewhat symmetrical specialized types known as quaquaversal folds. They are usually circular or elliptical in plan, although at times irregular in outline, and their diameter may vary from a fractional part of a mile to more than two miles."

"The thickness of the salt cores themselves has never been determined but it is definitely known that they may be measured in terms of thousand if not tens of thousands of feet."

"Coastal salt domes may be placed into three classes—shallow, intermediate, and deep-seated—according to the depths from the ground surface to the tops of the domes."

"The component parts of the North American salt dome structure consists of a solid core, with or without cap rock, and the overlying or adjacent disturbed country rock."

"The core is composed essentially of Halite, NaCl, which may be 99.4 per cent pure, although streaks of anhydrite occur often as impurities."

"The salt may or may not be topped with a cap, from a few feet to several hundred feet in thickness, consisting of various minerals or combinations of minerals such as limestone, gypsum, anhydrite, calcite, sulphur, galena, sphalerite, pyrite, petroleum, etc. The first four names constituting the essential, the others the accessory cap minerals. Some authorities consider the cap as a part of the core because they are both salt structure material, while others contend that they are separate and not connected with the salt core, basing their assumption on the occurrence of salt domes without cap rock."

**Surface Relief of a Salt Dome**

"Geologists are often asked this question, 'Do these intruded masses of great areal extent and indetermined thickness affect the topography of the overlying and adjacent area?' This question, simple as it first appears, can neither be answered definitely in the affirmative nor in the negative. The geologist, at best either way, considering all depth classes as a whole, could give but an evasive answer jumbled with elusive 'ifs.'

"Many of the shallow coastal domes it is true, as one would logically surmise, affect the overlying relief and drainage. This may also be possible under favorable conditions although highly improbable for the intermediate class and impossible in the deep-seated coastal class covered, as they are, with a thick mantle of loose incoherent sediments. Then too, where sur-

*Ibid. op cit.*

face expression does occur the relief of the area may vary with each group or individual dome from the flat featureless to the depressed basin-like, or to the pronounced mound-like topography."

"In southwestern Louisiana extending along a line bearing S. 49° E. from a place 10 miles west of New Iberia to the mouth of the Atchafalaya River are five distinct surface mounds known as the 'Five Islands of Louisiana,' comprising Jefferson's Island, Avery's Island, Weeks' Island, Cote Blanche, and Belle Isle, protruding above the neighboring marshes to a maximum of over 50 feet. The mounds are literally high islands of sediments surrounded by swampy lowlands near Gulf level. Incidentally, they also mark the highest elevations in the Gulf coastal plains of Louisiana and Texas. Nearby, however, at Vinton and Sulphur, Louisiana, the converse occurs instead of having high mounds overlying the salt masses, the surficial topography is characterized by depressed areas filled with water. Consequently lakes or ponds overlay the salt. In a few instances the outlines of the domes are perimetered by ridges of higher ground seldom, however, exceeding more than 20 feet."

"Normally in adjacent undisturbed areas the surface streams have dentritic, or tree-like, drainage patterns while adjacent to the surface dome relief the drainage is generally of the radial type."

### Surface Indicators of Oil

At the regular meeting of this Society on November 10, 1924, the writer presented a paper on "Surface Indicators of Oil in Louisiana." He listed in his paper, at that time, the following as surface criteria of oil: Natural Gas Seeps, Oil Seeps or Oil Springs, Salt Domes or Salt Islands, Mud Lumps or Mud Volcanoes, Sulphur, Mineral Springs, Structural Streams and Surface Indicators of Minor Importance. The accuracy of his convictions of the probable association of mud lumps to salt domes has since then been proved by the discovery of the Spanish Pass and Garden Island Bay domes and the geophysical indications of the Quarantine dome. In the discussion that followed the paper, references were made to ma-

*Ibid. op cit.*

rine oil coastal scums and ponds by Mr. John Klorer and Professor J. M. Robert, which the writer classified as Marine Oil Seepages. Today, a million or more acres of the shallow waters and partially submerged marsh lands are under mineral lease in Louisiana.

The author also predicted, at that time, that oil would also be found east of the Mississippi River. The Gulf Refining Co. "brought in" their United Lands Co., No. 4, on the Sorrento (McIlroy) dome in Ascension Parish, La., on February 1, 1928.

### Geophysical Methods of Prospecting

The absence of surface expressions of the underlying salt domes, in the majority of instances, has been the motivating reason for the rapid development of a new science which may not only detect but measure and determine the shape, size, and location of these masses even though they may be buried under thousands of feet of sediment and water. The problem resolved itself into the discovery and mapping of these deep-seated structures by an indirect method. Fortunately it was experimentally determined that, in general, measurable differences existed in the physical properties of the underlying structures and those of its surrounding medium.

"The knowledge that subsurface discontinuities would be reflected at the surface in detectable physical anomalies opened a new door of discovery to the scientist and engineer whereby he could pry into the hidden wealth that nature has secreted deep down in her bosom below an enormously thick mantle of sediments. As a result, the public mind and eye has been fascinated and captivated by the phenomenal use and result of geophysical prospecting methods. And nowhere in the world has nature provided a better laboratory for man to apply these methods than in the Gulf Coastal Prairies of Louisiana and Texas." ††

"The varying differences in the physical properties of the salt dome structures and the surrounding formations in the Gulf Coastal Prairie were ideally suited for and gave impetus to the practical application of geophysical prospecting." ††

†† A paper read by R. A. Steinmayer at the Spring Meeting of the Electrochemical Society, Inc., New Orleans, La., March 21-23, 1925.

"In geophysical prospecting the method consists of a sending device that produces the messengers which are dispatched into the earth and receiving device which receives and decodes the report of some of these messengers upon their return. We shout down questions and the ore whispers back its answer." ††

Of the messengers we may send, the principal ones are electrical currents, electro-magnetic fields of various sorts, or mechanical vibrations; of the messengers which are always present whether we will or not, the principal ones are gravitational attraction, the earth's own magnetic field and the field it automatically induces in magnetic material, natural emanations from radium active rocks, and local thermal variations brought about by diverse processes or chemicals within the earth.

Corresponding to these various messengers, we have corresponding methods used in the geophysical search for ore or oil, namely, (1) electrical, (2) electromagnetic, (3) seismic, (4) gravitational, (5) magnetic, (6) radio-active, (7) geothermal. Of these methods, the magnetic, gravitational, and seismic are the principal ones used in the oil industry.

**Mechanics of Formations of Local Folds and Salt Dome Structures**

The mechanics of uplifting of extensive areas in the Gulf Coastal States is somewhat problematic. It has been suggested that the origin of the disturbance is related to the subsidences of oceanic, or the Gulf of Mexico, area. This foundering resulted from a lateral migration of deep seated molten material and resulting in the collapse of magmatic reservoirs. This lateral movement of magmatic material produced a source for the vertical deviating forces which produced the local folds and salt dome structures.

The lateral movement of the magmatic material was probably accompanied by volume changes incident to crystallization during Wilcox (Eocene) times. The Sabine Uplift was outlined at that time. Renewed uplift occurred at the close of Miocene times.

**Mechanics of Growth of a Salt Dome**

The most acceptable theory concerning the growth of a Gulf Coastal Salt Dome is as follows:

Some time prior to Cretaceous time a large sea covered much of the area comprising the present Gulf Coastal area.

This sea remained on the continent for a sufficient length of time for the brine to evaporate and deposit its salt. There may have been several incursions and resulting evaporation of the water, resulting in sufficient salt to form extensive bedded deposits.

The period of saline deposition was followed by a long interval of erosion, during which time vast deposits of sediments were laid down and covered the bedded deposits of salt, preventing the subsequent solution of the salt when the waters again transgressed the Gulf Coastal area during Cenozoic times.

The upward movement of the salt stocks from the stratified beds was probably initiated by the crustal disturbances of Cretaceous and Miocene times. Subsequent movement resulted principally by the differential down warping of the Delta under load. The motive force being the static weight of the thousands of feet of overlying sediments. The salt being more plastic and more mobile than the associated sedimentary rocks consequently deformed as a plastic mass and flowed to points of weakness in the formation overlying the salt. These points of weakness may have been unconsolidated areas or at the intersection of faults. The upward movement of the salt was not necessarily contemporaneous with deposition, but it was probably interrupted by rest periods.

As the salt stock moved upwards it intruded itself into the overlying material, thereby disturbing the attitude and causing secondary faulting and folding of the overlying and adjacent beds.

The cap rock overlying many of the coastal domes is thought to represent the residue of the less soluble material in the upthrust salt, which remained after the salt stock was intruded into the zone of active ground water.

Some of the limestone of the cap rock may also have been derived in part from the overlying sediments.

The anhydrite of the cap is probably of sedimentary origin, being deposited from solutions from the same marine brine that formed the salt. The gypsum was derived from the anhydrite by its hydration. Gypsum generally occurs near the top of the cap where it contains much calcite and sulphur.

The sulphur that is found in the cap rock of an occasional dome may have resulted from the reduction of the outer part of the anhydrite or may have been precipitated from hydrogen sulfide (H2S) and metallic sulphides in solution. Where it occurs it is generally found as a secondary mineral in the transition zone between the lime rock and the anhydrite.

### Conclusion

Louisiana is now in the initial stage of an oil boom which is moving forward just as rapidly as the industries have been able to absorb the additional supply of oil fuel that is being placed on the market. This is due to the following facts: (1) Every week new leases are being acquired and exploitation started upon the recommendations of reputable geologists and geophysicists, and (2) engineering inventions and improvements are now making it possible both to extend the depth of drilling operations and to increase the amount of recoverable oil.

No other area of equal size in the world has an equal or greater supply of the basic minerals used so extensively in the chemical and allied industries than the State of Louisiana. It has not only inherited a large portion of the salt of the earth, but the Creator has added to it, as lagniappe, many other mineral and mineral fuels, principally oil and sulphur.

Add to Louisiana's almost inexhaustible supply of triumvirate minerals, Salt—Oil—Sulphur, a plentiful supply of natural fuel, gas, and cheap water transportation, and one finds within her domain all of the economic essentials for the progressive development of those industries that either directly use raw materials or fabricate from them innumerable by-products. Furthermore they offer an opportunity of decentralization from the great metropolitan centers to those industries whose management can visualize future markets for them in the area wherein they abound.

The growth and expansion of the oil and allied industries in the South, in fact, the world, is motivated by the scientific investigations and findings of the engineers and the geologists.

## TECHNICAL DEVELOPMENT OF OIL INDUSTRY

By M. J. Rathbone *

An address at the Baton Rouge Meeting, May 13, 1935.

I have been asked to say a few words this evening on the technical development of the oil industry. This subject is so broad that it properly could command, for an adequate discussion, a great deal more time than we can devote to it this evening, but I will endeavor to touch on some of the high lights of the subject.

It is a far cry from the old method of oil production and refining to the present day practices which exist in our industry. Originally oil wells drilled in this country were only a few hundred feet deep and both the drilling and lifting problems were relatively simple. To-day, oil wells are drilled to depths in excess of 10,000 feet and the completion of a well to this depth presents a real engineering problem, which commands highly specialized technical knowledge. Even after the well is drilled, in many cases, the lifting of the oil to the surface presents a real test of engineering ability and ingenuity. Within the last decade oil finding has become a specialized science. Prior to that time the location of oil deposits under ground was considered much of a hit and miss proposition, with a large element of luck attached to it, but to-day the application of technical training to this problem has resulted in the development of technique along this line, which was undreamed of in the earlier days of the industry.

Great as have been the advances in the art of finding and producing petroleum, I believe that the art of refining has developed to an even greater extent. As compared to the complex apparatus which is used to-day in the refining of petroleum, the old stills and treaters appear crude indeed. It may be of interest to you to very briefly go through the procedure which

* Vice-President and General Manager, Standard Oil Co. of Louisiana, Manufacturing Department, Baton Rouge, La.

is followed in the refining of crude petroleum and its manufacture into the many finished products which our industry provides to the consuming public to-day. The first step in the refining of crude oil is almost always the initial distillation of the crude. In this operation crude oil is distilled in its raw state in large, high capacity distillation units, the most efficient of which may be called combination units. In other words, the distillation is effected in two stages, the first stage being conducted at substantially atmospheric pressure, and the second stage under a relatively high vacuum. In these processes the oil is heated up in tubular heaters, or pipe stills, to temperatures of 500° to 600° F. and discharged into a cylindrical steel tower erected vertically and equipped with a number of fractionating plates. The lighter portions of the crude volatilize under the existing temperature and pressure conditions and ascend through the fractionating plates, partial condensing occurring all the way up the tower, and at various elevations in the tower streams of condensed oil of different characteristics are drawn off and cooled and are then ready for further processing and refining. The heavy unvolatilized oil which collects in the bottom of this tower is drawn off while still hot and passes through a second tubular heater and further heated up to temperatures in the range of 750° to 850° F. and discharged from this heater into another cylindrical steel tower which is also equipped with fractionating plates; this second tower, however, being maintained by means of barometric condensers and vacuum apparatus under relatively high vacuum, say 28″ at the top of the tower. Under these conditions, the heavier portions of the crude oil are also vaporized, passed upward through the various fractionating trays and condensed into a number of fractions, which are withdrawn from the tower and cooled in the same manner as was the case of the lighter components from the atmospheric tower. From the bottom of the vacuum tower an extremely heavy residue is obtained which does not volatilize even under the higher temperature and lower pressure conditions existing in this second tower, and this heavy residue, commonly known as pitch or asphalt, is

withdrawn from the system at this point. By means of this initial distillation operation we now have the crude, which originally consisted of a complex mixture of hydrocarbons of various molecular weights, specific gravities and boiling points, separated into six or eight fractions, or cuts. These, generally speaking, will be about as follows:

Light Naphtha, Heavy Naphtha, Kerosene, Gas Oil, Light Lubricating Distillate, Heavy Lubricating Distillate and Pitch. Each one of these fractions is then subjected to further processing, depending on the ultimate products desired.

Taking them in order, the next steps will be about as follows:

The Light Naphtha fraction is usually sweetened (by washing it with a sodium plumbite solution) which removes objectionable sulphur compounds and stabilizes color and odor. This stock is then ready for blending into finished motor fuel.

The heavy naphtha is frequently "cracked". The cracking operation which is carried out on a wide variety of petroleum fractions essentially consists of subjecting the petroleum fractions to quite elevated temperatures and pressures. Under these conditions the molecular structure of the petroleum fraction being cracked undergoes a drastic rearrangement. Literally, the molecule may be broken or cracked in two, so that a high boiling, high molecular weight product, when cracked, changes its characteristics in these respects and becomes a low boiling, low molecular weight product and as such can be worked into the gasoline boiling range. This operation of cracking actually results in an increased yield of motor fuel from any given crude, and while it has been estimated that the average "natural" gasoline yield from average crude petroleum may amount to 20/25%, by the use of the cracking process the ultimate gasoline yield from an average crude can be doubled and a total gasoline yield, combining both cracked and natural gasolines, in the neighborhood of 40/50% is readily obtainable. The development of this cracking process is the only thing which has permitted the oil industry to meet the increased demands of the public, during the last twenty years.

for gasoline motor fuel, since the total crude produced in the world to-day would not nearly supply the total gasoline demand if only natural gasoline in this crude were utilized.

There are dozens of different cracking processes which vary from each other in details of construction and operation only, but essentially all of them utilize the basic principles of heating crude oil fractions up to high temperatures at above atmospheric pressures and maintaining the oil under these conditions for varying lengths of time. Capacities and operating costs of the various cracking processes vary widely and each individual company has its own preferred type of operation.

The next fraction from the initial distillation, with which we are concerned, is the kerosene cut. This is the fraction which is used to produce kerosene, burning oil, lamp oils, etc., for illuminating, heating and power purposes. As produced, the kerosene fractions usually require certain additional refining to make them acceptable to the trade and this refining depends entirely on the crude source from which the kerosene came. It may vary from a very light Caustic Soda wash to as complicated and expensive an operation as treatment with liquid sulphur dioxide at low temperatures.

The next fraction from initial distillation is the gas oil cut. Gas Oil is used for many purposes and is an intermediate product in the crude, coming between the so-called white products (gasoline and kerosene) and the heavier products, such as lubricating oils and pitch. Gas oils are used for numerous purposes, such as Diesel engine fuel, enrichment of a product from a gas manufacturing plant, fuel for industrial heating plants, and many other purposes. Generally speaking, the majority of the gas oils produced by refiners from initial distillation of the crude is used as a cracking stock to increase gasoline yield, and the great majority of cracking operations use gas oil as a charging stock.

The next products from the initial distillation are the lubricating fractions which are, roughly, divided into light lubricating oils and heavy lubricating oils. Here again there are a multitude of refining and finishing operations, depending en-

tirely on the quality of the product which the refiner wishes to market and the crude source from which he must make his lubricating oils. Many crudes are wax bearing and in such cases the wax must be removed from the lubricating fractions, either by means of pressing through canvass blankets in a hydraulic press or by precipitation with a solvent which exercises a selective solubility between the wax and the lubricating oil or by other processes. After wax is removed there are a number of other undesirable components in the lubricating fractions which must be taken out before these oils are satisfactory for use. This refining is done by a variety of means, some of the most general of which are treatment with sulphuric acid, (treatment with) carbolic acid, (treatment with) cresylic acid, (treatment with) nitro-benzine, (treatment with) aluminum chloride, and many other re-agents. Following this refining step it is frequently the practice to filter the refined lubricating oil through clay, which tends to improve the color, remove certain undesirable components from the oil and stabilize the oil against a subsequent deterioration, as well as improve its demulsibility characteristics.

Time is entirely too short to go into the details of the numerous operations involved in the manufacture of finished lubricating oil from crude petroleum, but it is of interest to know that this is by far the most complicated and expensive operation with which refiners are faced, and an operation in which the greatest progress has been made in the past and undoubtedly will be made in the future.

The residual product from the initial crude distillation is a pitch or asphalt and, depending almost entirely on the crude source, this residue is variously used for road oil, roofing asphalt, paving asphalt, waterproofing compound, or fuel oil for power generating purposes.

The above very sketchy summary of the operations which are involved in the manufacturing and refining of various products from crude petroleum cannot fail to impress one with the prominent part that technical and engineering activities must play in this industry. Almost all types of engineers are required, such as chemists chemical engineers, mechanical en-

gineers, electrical engineers, civil engineers, refrigeration engineers, air conditioning engineers, metallurgists, physicists, geologists. Almost any other kind of technically trained man who is a product of our modern educational system is required and needed by the oil industry. In closing I would like to say that this industry offers unlimited possibilities to the technical graduate who can bring to its multitudinous problems, his technical training, combined with the necessary amount of ingenuity, resourcefulness and energy to practically apply his training.

## LOUISIANA STEAM GENERATING CORPORATION

By Thomas E. Crossan *

Read at the Baton Rouge Meeting, May 13, 1935

The Louisiana Steam Generating Corporation Plant was installed for two purposes, namely, to furnish steam and electricity to the local refinery, and to make available additional current for the local electric company. Starting April 1, 1935, we are also furnishing steam and electricity to a chemical company.

The steam generating equipment consists of five units, each consisting of one straight tube 40 wide, 12 high, cross drum boiler of 13,800 square feet of heating surface, a convection type superheater designed to heat the steam to 750° Fahrenheit at 625 pounds gage pressure at full rating, a steel tube counterflow economizer of 9800 square feet heating surface, one plate type air preheater of 32,800 square feet of heating surface, also water walls on all four sides of the boiler. Each boiler is equipped with one 109,000 cu. ft. per min. forced draft fan and two 84,000 cu. ft. per min. induced draft fans. Each fan is driven through a reduction gear by a steam turbine.

The stacks are of self supporting steel construction with acid resisting brick lining, 9 feet 10 inches inside diameter and 129 feet high from base of stack.

The boiler feed pumps are five stage centrifugal, direct connected to 2400 R.P.M. condensing steam turbines. Each pump is rated at 1500 gallons per minute.

The boiler feed water and combustion are controlled through mechanical regulating devices.

Main turbine generating equipment consists of three units, each of 15,000 K.W. rated capacity at 80% power factor. The turbines are a combined impulse and reaction type, operating non-condensing, at 3600 R.P.M., and are end tightening. Direct connected exciters are provided and one spare turbine driven exciter is also included.

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* Superintendent Louisiana Steam Generating Corporation, Baton Rouge, La.

Electric generation is at 13,800 volts, 60 cycles, three phase, and power is delivered at 13,800 and 66,000 volts. Provision has also been made for delivery at 33,000 volts if required, by use of a three winding transformer.

## WATER

The make-up at the plant is 80% of the total steam generated and as we often operate at rather high ratings and use river water for boiler feed, we have an unusual treating problem.

The raw water supply for the Louisiana Station is drawn from the Mississippi River and, because of the widely different character of soil in the different watersheds draining into the Mississippi, the composition of the water at Baton Rouge varies markedly with conditions of rainfall on these different watersheds. Roughly the total dissolved solids reach as high as 400 parts per million; the chlorides, expressed as chlorine, may vary from 10 p.p.m. to 100 p.p.m.; the hardness, expressed as calcium carbonate, from 100 p.p.m. to 200 p.p.m.; the suspended material carried by the water may vary from 200 or 300 p.p.m. to 5,000 p.p.m. or more.

*Water Treatment.* The water is first passed through presedimentation tanks where part of the suspended solids are precipitated. From these tanks the water passes to the reaction tanks where various coagulants are used for clarifying the water. The next step is sand filtration and then acid treatment, softening, and then to the generating station.

*Heating, Deaeration, and Steam Generation.* In the station the water passes through heat exchangers and is deaerated at a temperature of about 225 degrees Fahrenheit, pumped through a high pressure heater supplied by exhaust steam at 130 pounds pressure from the main turbines and to economizers in which the temperature is raised to about 400 degrees Fahrenheit. Upon reaching the boiler the water is finally treated with sodium phosphate to combine with such calcium salts as may have been retained by water after zeolite softening, to guard against possibilities of calcium scale formation at the rates of steam generation for which the boilers are designed, 850% of normal rating.

*Research on Feed Water Treatment.* Extensive research work has been carried on during the past three years on water treatment, in conjunction with Louisiana State University and the station chemical staff.

## FUELS AND COMBUSTION

The fuel used consists of from 50 to 80% natural gas and from 20 to 50½ refinery residuals. The residuals consist of various burnable but not-merchantable refinery waste fuels.

The fuels now being received from the refinery consist of two types of liquid fuels containing sulphuric acid, and petroleum coke. Various other residuals have been received in the past.

A typical analysis of the acid fuels as now received is as follows:

| | |
|---|---|
| Specific Gravity | 1.053 |
| Moisture (Weak Acid) | 33.42% |
| B.T.U. per Lb., as received | 12,158 |

## SPECIAL FEATURES

The normal operation of the turbines in this station is from back pressure control and the frequency is maintained by interconnected stations. The operation can be changed to the speed regulating governors whenever it becomes necessary to maintain frequency.

A complete pressure reducing and desuperheating unit has been installed for by-passing the steam around the turbines whenever the steam demand may exceed the electric demand.

In placing a turbine in service the exhaust pressure of the incoming unit must be equalized with the unit in service and then the generator is synchronized with the other generators.

*Continuous Blow Off System.* Two continuous blow off lines, one from each end of each boiler drum, are installed with regulating valves at a manifold header. The blow off varies from 6% to 15% of the feed water.

The blow off water and steam passes to the high pressure flash tank from which the steam passes to the 130 lb. per sq. in. steam system and the water passes to the low pressure flash tank. From this tank the steam goes to the auxiliary exhaust header and the water goes to the heat exchanger and then to waste.

## MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

### Minutes of the Meeting of the Society, June 10, 1935.

The meeting was called to order about 8:30 P. M. in the Hunt Room, St. Charles Hotel.

Col. E. S. Bres, President, in the chair, F. A. Muth, Secretary, and 61 members and guests present.

The minutes of the previous meeting were read and approved and several Committee announcements were made.

The Secretary presented to the Society, for first reading, the titles of the proposed amendments to the Constitution, which will be furnished to the membership for consideration.

Following the usual custom, the Society voted to recess during the summer.

Professor R. A. Steinmayer presented a most interesting paper on "Practical Gulf Coast Oil Geology." This paper was illustrated with numerous lantern slides.

The speaker was tendered a rising vote of thanks.

The meeting then adjourned to the collation served in the Club-room.

F. A. MUTH, Secretary.

### Minutes of the Board of Direction, June 10, 1935.

The meeting was called to order by President Bres, and the following members were present: Messrs. Grehan, Dunlap, Hackett, Moses, Ricker and Muth.

The minutes of the previous meeting were read and bills on hand were ordered paid.

An outline of the proposed 2-3 day annual meeting, as submitted by Mr. James M. Todd, Chairman of the Special Committee, was considered and was approved with the request that the Secretary advise Mr. Todd that the membership should be circularized and given an opportunity to express their desires as to the most suitable dates for the meeting.

The proposed amendments to the Constitution submitted by the Special Committee appointed for that purpose under the Chairmanship of Mr. James M. Todd and recommended by the Profession Advancement Committee were considered. On motion, duly seconded, the Secretary was furnished with data for preparing the amendments to be submitted to the Society with the recommendation of the Board that they be passed.

The ballots for new members were canvassed, there being 29 formal ballots and no scratched ballots; therefore, the following were declared elected:

**Members.**

A. R. Brousseau Gray Doswell

**Non-Resident Members.**

D. A. Hunt R. B. Fowler J. G. Scheib

**Associate Member.**

C. M. Bowman

**Junior Members.**

A. F. Blumer J. H. Trepagnier L. C. Dupont

**Non-Resident Junior Member**

E. J. Hagstette, Jr.

There being no further business, the meeting adjourned.

F. A. MUTH, Secretary.

# ACTIVITIES OF LOCAL SECTIONS

President,
F. P. HAMILTON
1st Vice-President,
CLIFFORD H. STEM
2nd Vice-President,
H. A. SAWYER
Secretary,
CHAS. M. KERR,
5831 S. Robertson Street
Treasurer,
A. M. FROMHERZ,
Queen and Crescent Bldg.


**STUDENT CHAPTERS**

Louisiana State Univ.
Baton Rouge

Tulane University
New Orleans

Annual Meeting at
New Orleans in May

Special Meetings at
call of President

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Our Section awards annually to worthy and meritorious students of Civil Engineering:

(a) LOUISIANA STATE UNIVERSITY.

(1) One Scholarship.

(2) One Junior Membership in the Society to the outstanding graduate.

(b) TULANE UNIVERSITY.

(1) One Scholarship.

(2) One Junior Membership in the Society to the outstanding graduate.

In addition the Section devotes much attention and financial support to efforts to increase the professional status and emoluments for engineers.

These objectives and the current expenses amount each year to approximately $300.00. This money is realized through the collection of Section dues of $2.00 per member and the allotment of $2.00 per member, for those paying, from the Parent Society.

Every member of the Society is eligible for this active Section membership. WE MUST HAVE 75 PAID MEMBERS TO BE ABLE TO CONTINUE THESE ACTIVITIES. If you have not paid will you please remit to the Treasurer without delay.

# THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

## LOUISIANA-MISSISSIPPI SECTION

### Officers and Members

C. S. Williamson, Jr., Chairman, Tulane University, New Orleans, La.
W. R. Stryker, Vice-Chairman, Southport Mills, New Orleans, La.
E. A. Gastrock, Secretary-Treasurer, Celotex Co., Marrero, La.
H. A. Levey, Director, American Products Co., New Orleans, La.
J. J. Ganucheau, Director, Southern Cotton Oil Co., Gretna, La.

E. Bache, Bogalusa Paper Co., Bogalusa, La.
R. M. Boehm, Masonite Corp., Laurel, Miss.
M. W. Boyer, Standard Oil Co., Baton Rouge, La.
C. E. Coates, Louisiana State University, Baton Rouge, La.
C. B. Dicks, Jr., Tulane University, New Orleans, La.
H. S. Foote, Bay Chemical Co., Weeks, La.
H. H. Hewetson, Standard Oil Co., Baton Rouge, La.
P. M. Horton, Louisiana State University, Baton Rouge, La.
A. G. Keller, Bunkie, La.
W. B. Logan, Newport Co., Lake Charles, La.
G. P. Meade, Colonial Sugars, Gramercy, La.
E. S. Rothrock, Louisiana Chemical Co., Baton Rouge, La.
J. H. Thickens, Masonite Corp., Laurel, Miss.
E. Wander, Bay Chemical Co., Weeks, La.

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Regular meetings are held on the first Friday in February, May, October and December in the Richardson Chemistry Building, Tulane University, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXI. OCTOBER, 1935 NO. 5

## CONTENTS



## EDITORIAL NOTES AND COMMENT

**In Defense of the Chemical Engineer.** It is undeniable that the great wealth of Louisiana lies in her natural resources. It is a fact that a large part of these resources have to be processed in some manner before they become available for civilized consumption. A tremendous amount of this processing involves techniques of both an engineering and a chemical nature. The combination of these techniques is embodied in the training and experience of the Chemical Engineer.

We are calling attention to it here because from complaints that filter in, it seems that some large corporations—and some small ones too—are not taking full advantage of the potentiali-

ties of the Chemical Engineer. These same corporations would not confine a civil engineer to the duties of an ordinary surveyor, nor would they take a mechanical engineer and confine him to the duties of an ordinary machinist in the machine shop. And yet we find time and time again that these same corporations relegate the chemical engineer to the status of a bench chemist or an analytical chemist. We find men well trained in both chemistry and engineering or chemical engineering in ordinary laboratory analytical work when much greater use could be made of their abilities. Our colleges are turning out men well trained in chemical engineering and it seems a pity that the potentialities of such high grade "raw material" should go to waste.

This is a plea to make better use of the training of the chemical engineer. We should also be warned that if such use is not made, these men will move to other localities. The state will thereby unfortunately lose abilities and training which should be devoted to the greater upbuilding of this Commonwealth.

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**Suggestions for Improvement of the Proceedings.** The President of the Society, Col. Edward S. Bres, has written a letter to all of the past Presidents of the Society, asking them for suggestions in the matter of improving the *Proceedings*. While the letter was written to the past Presidents of the Society, we are reproducing it here in the hope that all of the members will read it and give us the benefit of their advice. The *Proceedings* is your publication, what would you like to have in it? What can we do with the *Proceedings* that would make it more interesting and more valuable to you as a member of the Society? Is there anything that we can put in or anything that we can leave out for the betterment of the publication? We shall welcome all suggestions no matter how trivial they may seem to you. They may not be trivial in fact. The letter of President Bres follows:

"As a past President your suggestions are of increased value for further upbuilding Society activities.

"This year we have undertaken several changes. The improvement of the Library and of our monthly meetings. New plans

for our annual meeting; the beginning of our Baton Rouge meetings and the Soil and Foundation Survey.

"Right now, we want to improve the *Proceedings*. Make this publication more interesting and valuable to our members. Make it of real financial value to our advertisers. Make it self supporting, if possible.

"The Editor, Prof. James M. Robert, will welcome new thought for this development. A *Proceedings Committee* has therefore been appointed to receive suggestions and to confer and counsel with him.

"The *Proceedings* is our most direct medium of contacting and holding the interest of our membership. The cost of publication is approximately 40% of the gross income of the Society.

"In your opinion does this publication fulfill its function? Will you give us your ideas for improvement? Not necessarily a long letter. A few pointed remarks. The size of the book; the cover; the printing; the reading matter; civic news; personals about members; news of other societies; editorials; illustrations, etc.?

"Maybe you have never given any thought to this. Will you think now? Make comparisons with similar publications. Most important, however, let us have some expression from you. If you have no suggestions advise us that you are perfectly satisfied and see no room for improvement in the publication.

"Be assured that *your* suggestions will help. Let us have them, please, by August 15, 1935.

"Very truly yours,

"Edw. S. Bres, *President.*"

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**Honor for Dean Douglas Anderson.** The members of the Society and the host of friends of Dean Anderson will rejoice in the honor which has recently come to him. He was elected to the Presidency of the Society for the Promotion of Engineering Education at a meeting which was held in Atlanta, Georgia, on Wednesday, June 26, 1935. This marks the first time that this office has been held in the South and is indeed a tribute to the long period of service and the excellence of that

service that Dean Anderson has given to the cause of Engineering Education below the Mason and Dixon Line. Our congratulations, President Anderson!

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**Society Scholarships to Tulane and L. S. U.** In accordance with the custom of many years standing, The Society has again awarded two scholarships to worthy engineering students. One of these scholarships is to L. S. U., the other to Tulane University. This year the Society Scholarship to Tulane was awarded to Mr. Arthur Porter. The Society Scholarship to Louisiana State University was awarded to Mr. C. P. Siess, a Senior in Civil Engineering.

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**Navigation Problems in Louisiana.** It is regrettable that the excellent discourse of Major Henry N. Hutchings at the September meeting is not now available for publication. However, we are publishing a few notes, giving the high points of his talk together with an excellent discussion contributed by Professor W. B. Gregory of Tulane University. Those who were not present at the September meeting missed a very excellent evening.

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**Dean Anderson Now Acting President of Tulane.** Because of the unfortunate illness of President Dinwiddie, Dr. Douglas Anderson, Dean of the College of Engineering and former Editor of the *Proceedings*, has been elected Acting President of Tulane University for the Session 1935-36.

Professor James M. Robert has been elected Acting Dean of the College of Engineering for the same period.

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**President Bres Attends the A. S. C. E. Meeting.** Colonel E. S. Bres, President of the Society, attended the fall meeting of the American Society of Civil Engineers in Birmingham, October 16-19, 1935.

Vice-President Allen Hackett was also in attendance at the same meeting.

**Activities of the Members.** It is contemplated that in future issues of the *Proceedings,* a page or two will be devoted to personal activities of the membership.

The members of any organization are always interested in what the other members of the same organization are doing.

Will you not help, therefore, to make this page successful by sending to the Secretary, or the Editor, any personal items of interest concerning either yourself or some other member of the Society?

Please don't be too modest to let us know what you are doing.

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**Recent Accessions to the Library.**

Electrons at Work—Underhill.

Design of Concrete Structures—Urquhart and O'Rourke.

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**New Members.** We welcome to membership in the Society the following new members who were elected at the regular meeting, September 9, 1935: Members, J. B. Howze, Jr., Reginald F. Seiler; Non-Resident Associate Member, H. N. Clanton.

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Next to knowing when to seize an opportunity, the most important thing in life is to know when to forego an advantage.—*Disraeli.*

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Persistent people begin their success where others end in failure.
—*Eggleston*

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"Traveling on momentum alone is simply a process of coming gradually to a dead stop."

# PAPERS AND DISCUSSIONS

## NAVIGATION PROBLEMS IN LOUISIANA

By Henry Hutchings *

Synopsis of address before the Louisiana Engineering Society, September 9, 1935.

[Note by the Editor: Unfortunately, the splendid address of Major Hutchings is not available for publication at this time. We give below, however, a brief synopsis of the scope of his discussion. Following this synopsis is a discussion by Professor Gregory, which he has been kind enough to write out and submit.]

The topics covered were as follows:

a. Discussion of scope of work of the First New Orleans Engineer District during the past few years.

(1) Dredging of the Intracostal Canal.

(2) Construction of Harvey and Vermilion locks in that canal.

(3) Removal of hyacinths from streams of southern Louisiana.

(4) Explanation of requirements in dealing with navigable waters.

(5) Explanation of works for maintenance of the Passes of the Mississippi River as New Orleans' connection with the sea.

b. The last named led to a discussion of jetties in general, the behavior of jetties in tidal waters of the Gulf of Mexico, and specifically to the discussion of the jetties at Southwest Pass.

c. In discussing (b) above the following points were stressed:

(1) Properly spaced straight jetties of equal proper length are considered best.

(2) Reaction or other curved jetties, jetties of unequal length, etc., were not considered advisable.

* Major, Corps of Engineers, U. S. Army, District Engineer, U. S. Engineer Office, New Orleans.

(3) Geography and the "set" of ocean currents at jetties' mouth play a large part in the success to be expected.

(4) At South Pass and Southwest Pass a natural angle of 36 degrees to the east of the axis of the jetty channels has been shown to be the most successful line upon which to develop deep navigation channels across the bars at their mouths.

(5) The above fact is due basically to the fact that westward littoral Gulf currents force the formation of hook bar extension from the west jetty in each case instead of a crescent bar screening the outlet.

d. In studying effects of Southwest Pass jetties, the effect of reentering salt water at low stages was discussed, as well as the effect of the expulsion of the salt water at high stages by the unbalanced and greater fresh water head.

(1) Under this topic it was pointed out that no shoaling occurs in the jetty channel at Carrollton stages of less than 12 feet, but that at 12 feet the bed load begins to move and from that stage to 14 feet, rising, shoaling may occur.

(2) From 14 feet upward on this gage velocities appear large enough to cause the bed load to move across the bar to deep water and shoaling again ceases.

(3) The trace of the fresh water discharge of the pass was then developed and discussed in order to substantiate hydraulic theories which have been used in the development of the channel.

e. Necessity for proper location and use of meters and meter sections was then discussed with examples.

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## DISCUSSION

By W. B. Gregory

Major Hutchings has briefly referred to problems in the rice country of Southwest Louisiana with which he has had to deal. Some further remarks may be of interest.

Back in 1903 after two years of drought, the rice planters, the irrigation companies and other rice interests, organized and built the Mermentau Dam at Grand Chenier, at a cost of

about $130,000. The dam was to be closed in times of drought to prevent the irrigation pumps on the Mermentau and its tributaries from drawing salt water from the Gulf of Mexico. The salt not only damaged the rice crop but was not good for the land. The years of drought were followed by a year of excessive rainfall and the owners of the low lands of the lower Mermentau could not tolerate bad drainage; they asked that the gates of the dam be removed and the floods be allowed to flow out. These requests were not received in the spirit they had hoped for and were not complied with as quickly as they had wished, so the dam was blown out by dynamite by unknown parties.

Years later the Intracostal Canal was dug through the lower country connecting the Vermilion, the Mermentau and the Calcasieu Rivers and the passage of water between these rivers was facilitated, and there was a question as to whether one river was robbing the other as well as the menace of salt water. Some relief was had when the Schooner Bayou Lock and later the Vermilion Lock were installed between the Vermilion and Mermentau Rivers. However, they did not stop the discussion regarding the effects of the canal, and as the Corps of Engineers U. S. Army had been in charge of building, they were asked to make an investigation of the whole matter. It was done under Major Hutchings in a most thorough manner and after two years of study a comprehensive report was rendered. Among other things it was found that the damages due to salt water were, in the average, a minimum of $200,000 per year. Of course the damages occur when there is a drought but the average loss is that stated above.

The Louisiana Irrigation and Mill Co. of Crowley irrigates about 40,000 acres of rice annually from tributaries of the Mermentau River,—Bayou des Cannes, Bayou Plaquemine Brulé and Bayou Nezpique. The acreage watered from the entire river system is approximately 150,000 acres. There are many other irrigators in this territory but none so prosperous as the L. I. & M. Co., who have enjoyed the results of good management and good engineering. Out of the kindness of their hearts,—for the general good,—in which they would reap but a small portion,—this company instituted an engineering

survey and report which showed that all the loss due to salt water on the Mermentau could be avoided by the construction of proper works on the lower river and the large storage lakes, —White, Grand, Lake Arthur, etc. The cost was arrived at in cooperation with Major Hutchings' office and found to be $1,400,000.

The Chief Engineer of the L. I. & M. Co., L. P. Elberson, and the speaker, went to Washington to attempt to interest some Government agency in the construction of these works to eliminate the annual waste of $200,000. The trip was taken in May, 1935, after the announcement of a Government fund of $4,880,000,000,—a part of which was to be had on 100% grants—to put men to work on worthy projects and so overcome the depression.

On arrival in Washington the cooperation and advice of Dr. Elwood Mead was sought. He was in charge of the Rice Investigations for the U. S. Department of Agriculture back in the days when the Mermentau Dam was built; he had directed the work of the writer at that time and was familiar with all the details. Now he is building the Boulder Dam or rather is accountable for the conduct of the work as he is Commissioner of Reclamation and one of the outstanding figures in Washington,—an Irrigation Engineer who has accomplished much in this country and in Australia and a man of sterling character. Dr. Mead took our report home with him and next morning told us that it was one of the most worthy projects that had been brought to his attention and that he would back it before the allotment board, of which he was a member. We then went to the office of the Chief of Engineers, U. S. A., and explained our project to General Pillsbury as well as to General Markham. We were told that this office would recommend it for a 100% grant,—that the structures would be built by the U. S. Corps of Engineers on ground given by local interests and that the works would be operated by local interests without further cost to the Government in case the grant was allowed. Furthermore that it would be necessary to have the interests of the Mermentau Valley organized into a body capable of doing business with the Government.

Unfortunately there are interests that have clashed in the past in the rice country. The bad spirit that resulted from building the Mermentau Dam of 32 years ago has not entirely disappeared and although an earnest effort was made, it was impossible to get the various interests to unite on receiving an outright gift of $1,400,000 to be used to save an annual loss of $200,000 without causing injury or loss to any interests or any individual.

The promoters of this enterprise, who spent their funds trying to do something for a community where rice is the industry that is the principal source of income for all, either directly or indirectly,—these promoters were the people that would benefit least by the improvement as their lands are the farthest up the river and therefore the last to get salt water.

Such opportunities come but rarely to a section; it is to be regretted that this one was not recognized and promptly accepted.

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"Guilty or not guilty of this theft?" queried His Honor.

"Not guilty, sir," came the plea.

"Have you ever been in jail?"

"No indeed, sir," came the indignant response. "This is the first time I ever swiped anything."

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The visitor called at Mr. Jackson's house and asked the butler if he could see his master.

"I'm afraid he's not down yet," replied the butler airily.

The caller began to lose his patience.

"Vat, vat!" he exclaimed. "Yesterday you say I cannot see him because he is not up. Today you say I cannot see him because he is not down. Vhen, oh, vhen will he be in the middle?"

## MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

### Minutes of the Board of Direction, Louisiana Engineering Society, September 9, 1935.

Meeting was called to order by President Bres, and the following members were present: Messrs. Hoots, Dunlap and Muth.

The minutes of the previous meeting were read and the bills on hand were ordered paid, subject to approval by the Finance Committee.

Ballots for new members were canvassed, being 16 formal ballots, and the following members were declared elected:

Members: J. B. Howze, Jr., Reginald F. Seiler.

Non-Resident Associate Member: H. M. Clanton.

Messrs. H. N. Old and G. A. Frick were reinstated.

There being no further business, the meeting adjourned.

F. M. MUTH, Secretary.

### Regular Meeting of the Society, September 9, 1935.

Meeting was called to order in the Hunt Room of the St. Charles Hotel about 8:10 P. M., Colonel E. S. Bres in the Chair, F. A. Muth, Secretary, and 65 members and guests present.

The minutes of the previous meeting were read and approved.

Reports were submitted by various Committees and current announcements were made.

The proposed amendments submitted to the Society on August 1st, which had been read by title at the June Meeting, were given first reading. The following change was adopted by unanimous vote:

Section 2, in line 8, was amended to read:

"Recommendation of the Committee members voting, provided 80% of the whole committee vote."

On motion, duly seconded, the proposed amendments to the Constitution were recommended for second reading at next meeting.

The technical exercises consisted of an interesting talk on Navigation Problems in Louisiana by Major Henry Hutchings. The address was illustrated by numerous charts and maps. A rising vote of thanks was then tendered the speaker.

The meeting then adjourned to the collation.

F. M. MUTH, Secretary.

# ACTIVITIES OF LOCAL SECTIONS

President,
F. P. HAMILTON
1st Vice-President,
CLIFFORD H. STEM
2nd Vice-President,
H. A. SAWYER
Secretary,
CHAS. M. KERR,
5551 S. Robertson Street
Treasurer,
A. M. FROMHERZ,
Queen and Crescent Bldg.


**STUDENT CHAPTERS**

Louisiana State Univ.
Baton Rouge

Tulane University
New Orleans

Annual Meeting at
New Orleans in May

Special Meetings at
call of President

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As this goes to press the Fall Meeting of the National Society is being held in Birmingham, with Edw. S. Bres representing the Louisiana Section.

A. T. Dusenbury, chairman of the Local Sections committee, is also attending, along with several others from Louisiana, including the entire Senior Class in Civil Engineering of Tulane University.

The Texas Section will hold its Fall Meeting in Beaumont on November 8th and 9th. The Louisiana Section has been cordially invited to attend and take part in this meeting. W. B. Gregory and Merrill Bernard, consulting engineers, will present a paper entitled "The Irrigation System of the Orange County Water Company". There will be an informal "Bull Meeting" at Hotel Beaumont on Thursday night, November 7th, for merry-making and getting acquainted. Don't miss it.

Due to shortage of funds we have been compelled to forego our usual scholarships to students of Tulane and L. S. U. for the current session, but it is hoped that this worthy custom may be continued next year. Col. Bres has some suggestions for the Birmingham delegates to consider, which if adopted will help our financial situation and perhaps induce more interest by members in the Local Sections.

If you have not paid dues of $2.00 to the Local Section for 1935 please let us have your check promptly.

# THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

## LOUISIANA-MISSISSIPPI SECTION

### Officers and Members

C. S. Williamson, Jr., Chairman, Tulane University, New Orleans, La.
W. R. Stryker, Vice-Chairman, Southport Mills, New Orleans, La.
E. A. Gastrock, Secretary-Treasurer, Celotex Co., Marrero, La.
H. A. Levey, Director, American Products Co., New Orleans, La.
J. J. Ganucheau, Director, Southern Co'ton Oil Co., Gretna, La.

E. Bache, Bogalusa Paper Co., Bogalusa, La.
R. M. Boehm, Masonite Corp., Laurel, Miss.
M. W. Boyer, Standard Oil Co., Baton Rouge, La.
C. E. Coates, Louisiana State University, Baton Rouge, La.
C. B. Dicks, Jr., Tulane University, New Orleans, La.
H. S. Foote, Bay Chemical Co., Weeks, La.
H. H. Hewetson, Standard Oil Co., Baton Rouge, La.
P. M. Horton, Louisiana State University, Baton Rouge, La.
A. G. Keller, Bunkie, La.
W. B. Logan, Newport Co., Lake Charles, La.
G. P. Meade, Colonial Sugars, Gramercy, La.
E. S. Rothrock, Louisiana Chemical Co., Baton Rouge, La.
J. H. Thickens, Masonite Corp., Laurel, Miss.
E. Wander, Bay Chemical Co., Weeks, La.

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Regular meetings are held on the first Friday in February, May, October and December in the Richardson Chemistry Building, Tulane University, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXI. DECEMBER, 1935 NO. 6

## CONTENTS



## EDITORIAL NOTES AND COMMENT

**Attend the Big Two-day Annual Meeting.** Don't fail to do so! It will be well worth while! For the first time in the history of the Society a concerted effort is being made to bring together all the engineers in the state.

The committee has labored long and earnestly to make this meeting a "feast of reason and a flow of soul." No pains have

been spared in an attempt to make the meeting attractive to all.

There will be many technical discussions, visits and other recreations of both an instructive and entertaining nature.

And for the ladies, ample provision has been made. The Woman's Auxiliary has left no stone unturned to make the visiting ladies feel at home. We hope the ladies from outside of New Orleans will grace our meeting with their presence.

Come to the meeting with the men of your family—the meeting is for you too! Spring displays in the stores, interesting historical trips, etc., should be attractive and make your visit worth while.

This is our first organized effort to bring together all the members of the engineering profession (and their ladies) in the State. We are making a special appeal for all in the State to attend. Below we print a letter from the chairman of the Publicity Committee. We also print the program as far as completed to date.

We believe you will be sorry *if you don't attend.*

*We don't want you to be sorry.*

## A LETTER FROM THE PUBLICITY COMMITTEE

Professor James M. Robert, Editor,
Proceedings of the La. Eng. Society,
New Orleans, La.

Dear Professor Robert:

I am transmitting herewith the program to date for the 1936 Annual Meeting of the La. Eng. Society to be held on January 24th and 25th. Perhaps it would not be inappropriate to call to mind at this time the purpose and objectives of this annual meeting.

For some time there has been a feeling in the Society that there was a need for such a meeting. Located in the deep South, it is very difficult for many engineers to attend national meetings, which are usually held in the East and Middle West. For this and other reasons, it seemed desirable that once a year the engineers of the State of Louisiana might hold a two-day meeting for the purpose of plant visitations, reading and discussion of technical papers, informal conferences, and other technical and social activities which from time to time might be appropriate. It is hoped in this way to bring together all engineers of the state in one common gathering, so as to emphasize the solidarity of the profession, and to offset the natural tendency of the engineering fraternity to decentralize into groups of their respective branches.

Your attention is especially directed to the "Entertainment Features for Visiting Ladies" which have been enthusiastically planned by the Woman's Auxiliary to the Louisiana Engineering Society. It is hoped that the wives of engineers outside of New Orleans will increasingly attend these annual meetings of the Society, and that this event will be looked forward to with happy anticipation from year to year.

Yours very truly,

D. S. Elliott,
Chairman of Committee on Publicity.

## THE PROGRAM

### Friday Morning, January 24, 1936

8:30 Registration opens on Mezzanine floor, St. Charles Hotel. Registration continues throughout the day. There is no registration fee, and visitors as well members are urged to register.
Tickets for the Society dinner will be on sale at the registration desk until Saturday noon.
A representative of the Recreation Committee on duty at the registration desk will gladly furnish information and assistance in forming individual plans for recreation.

9:30 Meetings by sections of the following groups: The District Representatives of the Louisiana Engineering Society; American Institute of Electrical Engineers; American Society of Municipal Engineers; American Institute of Chemical Engineers; American Society of Civil Engineers; American Society of Mechanical Engineers; Conference of Engineering Students; W. P. A. Conference.

10:30 General meeting, Hunt Room, St. Charles Hotel. Edward S. Bres, Retiring President, in the chair.
Address of welcome, Dr.Douglas S. Anderson, Acting President of Tulane University.
Annual Reports of the Society.
Announcement of the results of the annual election of officers.
Installation of new officers.
Introduction of the local officers of cooperating Founder Societies and other groups.
Report on the conference of District Representatives of the Louisiana Engineering Society.

**Friday Afternoon, January 24, 1936**

1:30 Inspection trip, to start promptly from the St. Charles Hotel, to cross to the west side of the river on the Canal Street ferry, up west side of river through industrial New Orleans, stopping at the Celotex Plant for a detailed inspection, thence to the mattress plant of the U. S. Engineers working at the bridge on the river bank; then back, crossing to the east side of the river by way of the Public Belt-Mississippi River Bridge, returning to the St. Charles Hotel.

Other inspection trips may be arranged by special request, where the request is made sufficiently in advance for the Committee on Plant Inspections to make the necessary arrangements.

**Friday Night, January 24, 1936**

Dixon Hall, Newcomb College

8:00 Public Lecture. The newly elected President of the Louisiana Engineering Society presiding.

John Klorer, Chief State Engineer for Louisiana, will give an address on "The Mississippi River Flood Control Project in Louisiana and Its Present Status."

**Saturday Morning, January 25, 1936**

Hunt Room, St. Charles Hotel

Saturday morning and afternoon will be devoted to technical papers and discussions, to be opened with Allen S. Hackett of the Louisiana Engineering Society in the chair.

Chairman on Technical Papers, David W. Godat; Vice-chairman, F. N. Billingsley, F. Petrie Hamilton, J. S. Netherwood, C. W. Ricker, C. S. Williamson, Jr.

9:30 Dr. William Monroe White, Chief Engineer of Allis Chalmers Manufacturing Company, Milwaukee, Wis., "Manufacture of Large Machinery."

Discussion led by Richard Muller.

10:30 Col. A. M. Shaw, Engineer with P. W. A., New Orleans. "Effect of Public and Corporate Employment Upon the Practice of Consulting Engineering."

Discussions by Arthur M. Bulger, Assistant Engineer of P. W. A., and P. E. Foster, Refinery Manager, Shell Petroleum Corporation at Norco, La.

**Saturday Afternoon, January 25, 1936**

Hunt Room, St. Charles Hotel

1:00 C. S. Williamson, Jr., Professor of Chemical Engineering, Tulane University. "Industrial Resources of the South."

Discussion led by E. A. Gastrock.

2:00 Frank G. Frost, General Superintendent of Electrical Department, New Orleans Public Service. "Present Trends in Generation and Transmission of Electrical Energy."

Discussion led by J. M. Todd.

**Saturday Night, January 25, 1936**

8:00 Annual Dinner for members of the Society, their guests, visiting engineers and their wives.

Banquet Hall, St. Charles Hotel

Dr. Leo J. Lassalle, Dean of Engineering, Louisiana State University, presiding.

Presentation of awards of the Society.

Introduction of guests and officers of the Society.

Brief remarks by invited speakers.

Dancing.

(Tickets for the dinner dance will be on sale at the registration desk, Mezzanine floor of the St. Charles Hotel, until noon Saturday).

## ENTERTAINMENT OF VISITING LADIES BY THE WOMAN'S AUXILIARY TO THE LOUISIANA ENGINEERING SOCIETY

Plans for the entertainment of visiting ladies by the Woman's Auxiliary include: A complimentary luncheon in the French Quarter of New Orleans, Tour of the French Quarter, Visit of Old Gardens, Automobile trip over the city.

Visiting ladies have also been invited to visit the Municipal Airport.

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## Committees on Arrangement for the 1936 Annual Meeting

GENERAL COMMITTEE
J. M. Todd
J. H. O'Neill
R. H. Muller
C. S. Williamson, Jr.
F. N. Billingsley
R. J. Kuhn
D. S. Elliott
F. P. Hamilton
B. W. Pegues

PUBLICITY COMMITTEE
D. S. Elliott, Chairman
F. N. Billingsley
John Klorer
W. S. Leake
R. H. Muller
C. J. Peirce
C. S. Williamson, Jr.

RERISTRATION COMMITTEE
B. H. Grehan, Chairman
G. R. Hammett
Chas. Wiggin, Jr.
C. S. Williamson, Jr.

PLANT VISITS AND LOCAL TRANSPORTATION
Walter Scales, Chairman
L. J. Cucullu
W. S. Rainville, Jr.
L. J. Newman
Ralph Earl
J. M. Todd

BANQUET COMMITTEE
H. L. McLean, Chairman
S. E. Hottinger
R. H. Muller

RECREATION COMMITTEE
C. S. Williamson, Chairman
H. L. McLean
H. W. Williams
W. S. Leake
John Riess
R. E. Gosa

COMMITTEE ON TECHNICAL PAPERS
D. W. Godat
W. Stone Leake
P. H. Humphries
E. A. Gastrock
C. M. Kerr

FINANCIAL COMMITTEE
D. S. Elliott
J. M. Todd
B. H. Grehan
D. W. Godat

COMMITTEE ON STUDENT CONFERENCE
G. R. Hammett
B. W. Pegues
W. B. Gregory

## Officers of the Woman's Auxiliary to the Louisiana Engineering Society

| | |
|---|---|
| President | Mrs. Douglas S. Anderson |
| 1st Vice President | Mrs. James M. Robert |
| 2nd Vice President | Mrs. Daniel S. Elliott |
| 3rd Vice President | Mrs. A. B. Peterson |
| 4th Vice President | Mrs. J. M. Klorer |
| Recording Secretary | Mrs. H. D. Moore |
| Corresponding Secretary | Mrs. J. H. O'Neill |
| Financial Secretary | Mrs. Frank Muth |
| Treasurer | Mrs. A. L. Dunlap |

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**Notes Concerning the Society.** The Louisiana Engineering Society, organized in 1898, has for its purpose the promotion of the professional interests of the engineer, and the increasing effectiveness of his social contribution to the community and state.

The Louisiana Engineering Society subscribes to technical journals and maintains a library and club rooms, Suite 422, St. Charles Hotel.

The Louisiana Engineering Society supports and publishes, bi-monthly, a technical journal known as the Proceedings of the Louisiana Engineering Society.

The Louisiana Engineering Society exchanges library and club privileges with twenty-five other engineering and technical societies distributed throughout the country.

The Louisiana Engineering Society holds monthly technical meetings throughout the year.

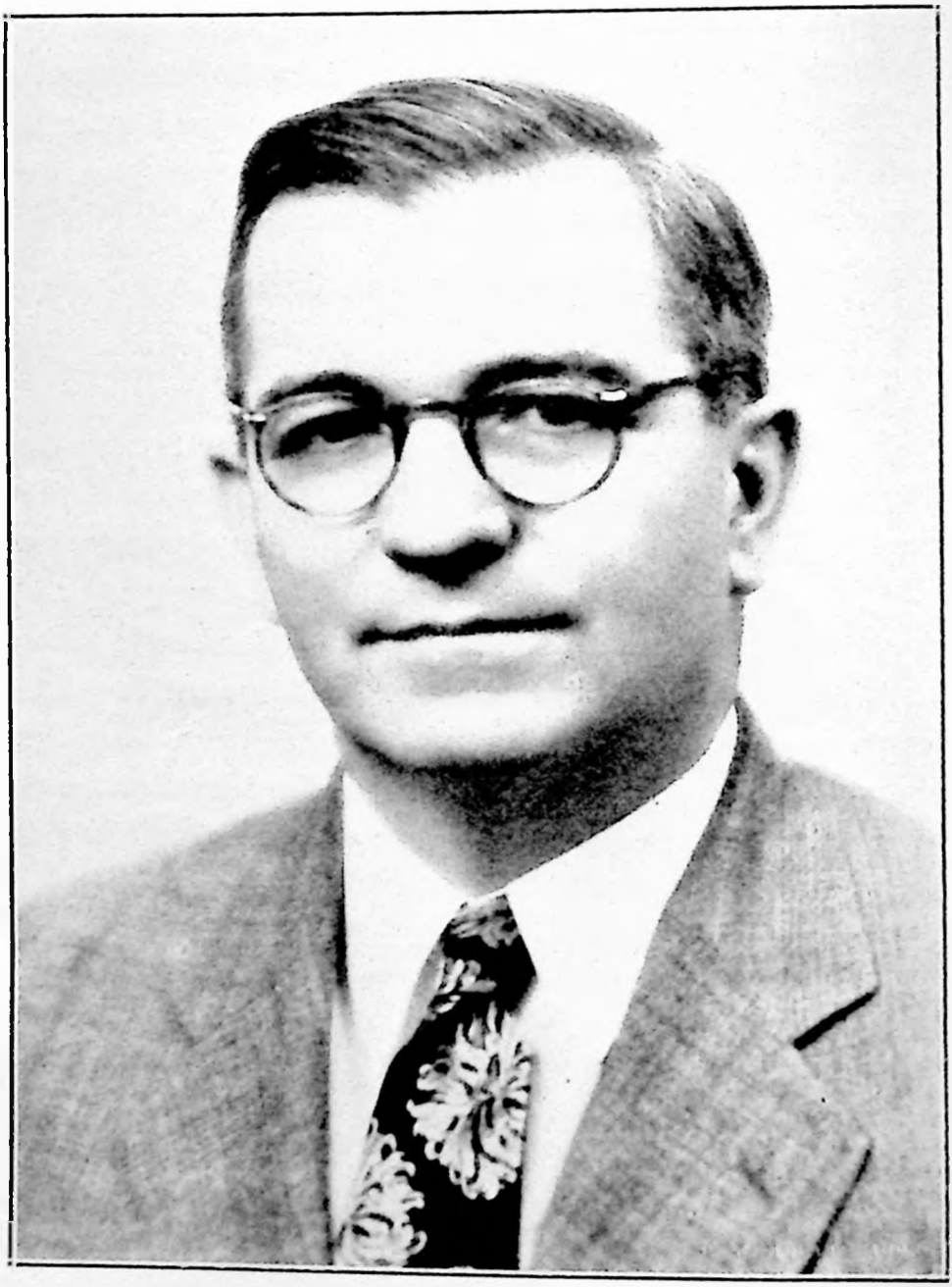
The Louisiana Engineering Society, in cooperation with the local sections of the Founder Societies, holds an annual meeting devoted to plant visitations, technical papers, and other technical and social features.

**Frank A. Muth Goes Forward.** It is with a mixture of considerable delight and distress that we announced the resignation of Frank Muth who has been Secretary of the Society since 1923. Delight because it means a well-earned promotion in his chosen life work; distress, because it means both official and physical (though not spiritual) separation of him from his valuable work for the Society.

He goes to Portland, Oregon, where he will take charge as Superintendent of the 17th Lighthouse District, covering the coast lines of Washington and Oregon.

Mr. Muth has been an indefatigable worker for the Louisiana Engineering Society. He has often said that the Louisiana Engineering Society means so much to its members for the good they can derive that if he were limited to membership in only one society, it would be the Louisiana Engineering Society. He has taken a great interest in the professional development of the young members, has endeavored to secure employment for the members in every possible way. He felt that the Secretary of the Society accepted considerable responsibility to its members.

We wish him godspeed in his new position.



FRANK A. MUTH

## RESOLUTION

ADOPTED NOVEMBER 11, 1935
at
NEW ORLEANS, LOUISIANA
by
THE BOARD OF DIRECTORS OF THE

**LOUISIANA ENGINEERING SOCIETY**
On the Departure of

**FRANK MUTH**
Secretary

BE IT RESOLVED, That the membership of the Louisiana Engineering Society expresses its appreciation of association with and for the services of

**FRANK A. MUTH**

as a constructive citizen and engineer. A member of this Society since 1915, and its Secretary since 1923, he has ever striven earnestly in the interest of the engineering profession at large and of the Louisiana Engineering Society in particular.

BE IT RESOLVED, That in leaving this State to accept promotion to fields of wider opportunity, Frank A. Muth carries with him the esteem and best wishes of the entire membership of the Louisiana Engineering Society. We shall miss him greatly, but shall find some compensatory satisfaction in the knowledge that we are releasing to some other community a most helpful citizen and engineer.

EDWARD S. BRES,
President;
ALLAN S. HACKETT,
Vice-President;
PAUL F. HOCTS,
Chairman Resolutions Committee.

**Death of Dr. Dinwiddie.** It is with poignant sadness that we record here the death of President A. B. Dinwiddie of Tulane University.

The University, the community and the engineering profession have lost an able educator, a great leader and a gracious friend.

Dr. Dinwiddie's belief in engineering education and his activities in behalf thereof are too well known to recount here. As a friend of the Louisiana Engineering Society he has been many times an honored guest at our annual banquets and smokers.

No young man who ever came within the wide range of his activities could fail to sense a feeling of fine human friendliness.

We shall miss him keenly.

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**Of Special Interest to Non-Resident Members.** We wonder if you are getting all out of your membership in the Society to which you are entitled. It is easily realized that you cannot often take advantage of the most valuable thing that the Society offers—the monthly technical and get-together meetings held in the St. Charles Hotel.

But do you take full advantage of the facilities offered when you have occasion to visit New Orleans? Do you realize that in addition to the library, you may have all the conveniences of a "day room" at a hotel? In the Society rooms you may do your telephoning, take a bath or a nap and write your letters. Unfortunately, the resources of the Society do not enable it to keep a paid attendant at the rooms. However, an out-of-town member simply has to go to the St. Charles Hotel desk, identify himhelf as a member of the Society, sign a slip of paper when he is given the key to the rooms, and he may then make himself at home.

Try this the next time you come to New Orleans.

**Dr. W. M. White to Lecture on Boulder Dam.** Almost coincident with the annual meeting is a lecture to be given before Research Society of Sigma Xi, of which he is a member, by Dr. William Monroe White.

This lecture will be given at Dixon Hall, Newcomb College, on the evening of January 23rd, at 8 o'clock.

The lecture will be illustrated with lantern slides. It will detail the interesting design and construction features of the large Boulder Dam turbines.

Dr. White, as the designer and builder of these turbines, will have a message of authority.

As a former member of this Society, Dr. White in 1901 first read before it his classical paper on "The Pitot Tube, Its Formula."

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**Taking the Boulder Dam to Market.** Those who attended the November meeting enjoyed a most interesting talk. The subject was "Taking the Boulder Dam to Market;" the speaker, Mr. E. T. Gunther, District Engineer of the General Cable Company, Dallas, Texas.

The talk consisted entirely of lantern slides and motion pictures, with running explanations by Mr. Gunther. It was an interesting exposition of the difficulties to be overcome—and their solution—in the carrying of such high voltage electricity from the generators at Boulder Dam to the place of consumption.

The design of the towers and special hollow cable were of especial interest.

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**Recent Advances in the Products and Refining of Petroleum.** Dr. W. J. Sweeney, of the Standard Oil Company in Baton Rouge, gave a most instructive discourse under the above title. This occurred at the regular meeting held on October 14, 1935.

A great deal of informative discussion ensued. Unfortunately, Dr. Sweeney's discourse and the resulting discussion are not available at this time. Therefore, we are reluctantly under the compulsion of going to press without it.

**President Bres Honored.** Col. Edward S. Bres, President of the Society, has been elected as the Representative from the fifth District to the Assembly of American Engineering Council to be held in Washington, January 10 and 11. The Fifth District comprises the states of Kentucky, Tennessee, Mississippi, Alabama, Oklahoma, Arkansas, Texas and Louisiana.

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**Soil and Foundation Survey To Be Completed.** The Soil and Foundation Survey has been approved as a W. P. A. Project, and will be carried to completion. The approval was granted as a result of the combined efforts of the American Engineering Council and the Louisiana Engineering Society.

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**Arthur M. Hill Now Acting Secretary.** Owing to the urgent necessity of having someone properly instructed in the duties of the Secretary before the departure of Mr. Muth, the President appointed Professor Arthur M. Hill as Acting Secretary for the remainder of the year. This action was ratified by the Board of Direction at its meeting on November 4, 1935.

Professor Hill's excellent services as Chairman of the Library Committee and his resulting close contacts with the Secretary's office, especially fitted him to take over Mr. Muth's duties.

Professor Hill has been nominated for Secretary in the coming election of officers.

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**Additions to the Directory.** It will be noted that several additions have been made to the engineering directory in the front of the *Proceedings*. There have been added the names of the officers of the local sections of national engineering societies.

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**Officers for 1936 Nominated.** In accordance with the Constitution, the Nominating Committee to nominate officers for 1936 was appointed as follows: John H. O'Neill, Chairman; John Riess and James M. Robert.

This year a unique procedure was followed in selecting the Nominating Committee. The members of the committee were sleected from the past-presidents who are not members of the present Board of Direction. The selection was made by a secret ballot of the Board.

The Nominating Committee made its report to the Society at the December meeting, nominating the following officers for the year 1936:

| | |
|---|---|
| President | Allen S. Hackett |
| Vice-President | Charles S. Williamson, Jr. |
| Secretary | Arthur M. Hill |
| Treasurer | Walter B. Moses |
| Director (to serve 3 years) | D. W. Godat |

Those holding over on the Board are Col. Edward S. Bres, Professor C. W. Ricker and Mr. B. H. Grehan.

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**Additions to the Library.** Mr. Henry J. Malochee has given the Library the following publications:

Rules for Construction of Power Boilers, Sections I, II, and IV.

American Society of Mechanical Engineers Boiler Construction Code, 1933.

American Society of Mechanical Engineers Power Test Code for Stationary Steam-generating Units With Supplementary Sections.

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## Personals

Mr. Charles W. Okey has joined the engineering staff of the Tennessee Valley Authority as Principal Engineer in the General Engineering Division.

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Mr. James D. Beck has written the leading article for the October 1935 number of the National Engineer. The article is entitled "The Cloverland Power Plant."

# AMENDMENTS TO THE CONSTITUTION

## ADOPTED AT THE MEETING OF THE SOCIETY OCT. 14, 1935

| (As of date prior to Oct. 14, 1935.) | (Changes adopted Oct. 14, 1935.) |
|---|---|
| **ARTICLE II.—Membership.**<br>(Amended December 12, 1932.) | **ARTICLE II.—Membership.** |
| Section 1. The members of this Society shall be designated as Honorary Members, Members, Associate Members, Junior Members, Student Members, Affiliate Members and Life Members. | Section 1. Eliminate the words "Associate Members." |
| Sec. 2. A member or Associate Member shall be a Civil, Military, Naval, Mechanical, Electrical or other professional engineer, or surveyor. | Sec. 2. "A Member or Junior Member shall be a Civil, Mechanical, Electrical, Chemical, Mining, Military, Naval or other professional Engineer, Architect or Surveyor."<br>(c) This clause should be made a continuation of Clause (a) without any letter designation.<br>[Clause (c). The performance of the duties of a teacher in a technical school of high grade shall be taken as equivalent to an equal number of years in active practice.] |
| Sec. 3. (a) A Member, at the time of his admission into the Society, shall not be less than twenty-six years of age, and shall have been in the active practice of his profession not less than five years. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years of active practice.<br>(b) An Associate Member, at the time of his admission into the Society, shall be not less than twenty-three years of age, and shall have been in the active practice of his profession not less than three years. Upon application he may be | Section 3. (b) Eliminate. |
| Sec. 4. A Junior Member shall be not less than twenty years of age. He shall have had active practice in some branch of engineering for at least two years, or shall have graduated from a school of engineering of recognized standing. A member may remain as a Junior Member for a | Sec. 4. A Junior Member shall be not less than twenty years of age. He shall have had active practice in some branch of his profession at least two years, or shall have graduated from a technical school of recognized standing. A member may remain as a Junior Member until, in the |

period not exceeding three years, after which, if eligible, he shall be transferred, without application, to another grade.

opinion of the Board, he is eligible for higher grade, at which time he shall be transferred, without application, to the appropriate grade.

Sec. 8. A Member, Associate or Affiliate Member who has paid dues for a period of thirty years in one or more of these grades shall, by virtue of that fact, become a Life Member, and shall be exempt from the payment of further dues.

Sec. 8. Substitute for present paragraph:

"A member who has paid dues in any grade, other than Student Membership grade, for a period of thirty years, shall, by virtue of that fact become a Life Member, and shall be exempt from the payment of further dues."

Sec. 9. The membership status of the members of the Society as it was immediately prior to (date of adoption of these proposed amendments) shall not be affected by the amendments to the Constitution taking effect on that date, except that; The Associate Members on that date shall thereafter be known as Affiliate Members; and Junior and Student Members, if qualified, shall be transferred to membership of higher grade.

Sec. 9. Persons who were in the Associate grade prior to Oct. 14, 1935 shall not have their status changed by the provisions of this section, except that; when eligible they shall be transferred to grade of Member.

Sec. 11. Honorary Members shall be proposed by at least ten members and shall be elected only by unanimous vote off the Society. A person elected as an Honorary Member shall be promptly notified thereof by letter. The election shall be cancelled if an acceptance is not received within three months after mailing off said notice.

Sec. 11. The Honorary Membership Committee shall consist of all living past presidents of the Society who are members. The President of the Society shall act as Chairman of the Committee. Proposals for Honorary Membership shall be submitted to this Committee. Upon unanimous recommendation of the committee members voting provided 80% of the whole committee vote, the name submitted will be referred to the Board of Direction for election. Action shall be taken by the Board within sixty days of receipt of such recommendation. Election to the grade of Honorary Member shall be only by the unanimous vote of the Board of Direction.

**ARTICLE V.—Meetings, Quorum.**

Meetings of the Society shall be held at such times as may be prescribed by the By-Laws. The regular meeting on the second Saturday in January shall be the annual meeting for the election of officers and for the hearing of the annual reports. Twenty-five members shall constitute a quorum for the transaction of business.

**ARTICLE V.—Meetings, Quorum.**

Meetings of the Society shall be held at such times as may be prescribed by the By-Laws. The regular meeting in January shall be the annual meeting for the election of officers and for the hearing of the annual reports. Twenty-five members shall constitute a quorum for the transaction of business. At the discretion of the Board, meetings may be arranged for and held outside the City of New Orleans.

**ARTICLE VI.—Dues.**

(Amended December 12, 1932.)

The Entrance Fees and Annual Dues shall be as follows:

| | Entrance Fee | Annual Dues |
|---|---|---|
| Resident Members | $10.00 | $10.00 |
| Non-Resident Members | 10.00 | 6.00 |
| Resident Associate Members | 8.00 | 10.00 |
| Non-Resident Associate Members | 8.00 | 6.00 |
| Resident Affiliate Members | 8.00 | 10.00 |
| Non-Resident Affiliate Members | 8.00 | 6.00 |
| Resident Junior Members | 3.00 | 5.00 |
| Non-Resident Junior Members | 3.00 | 3.00 |
| Student Members | none | 3.00 |

The Annual Dues for the current year shall become due on the first day of January and shall be paid in advance. Quarterly payments may be made.

It shall be the duty of the Secretary to notify each member of the amount due for the ensuing year at the time of giving notice of the annual meeting. Persons elected shall be charged with dues beginning with the quarter following their election. A person transferred from one grade to another shall pay the difference in Entrance Fee between the two grades, and his annual dues shall be those of the grade to which he is transferred.

Student members who apply for, or are transferred to, Junior or higher grade, membership within two years after graduation or after leaving college shall be credited to apply on Entrance Fee the amount paid for annual dues as Student Member to an amount not to exceed Ten Dollars.

**ARTICLE VI.—Dues.**

The Entrance Fees and Annual Dues shall be as follows:

| | Entrance Fee | Annual Dues |
|---|---|---|
| Resident Members | $10.00 | $10.00 |
| Non-Resident Members | 10.00 | 6.00 |
| Resident Affiliate Members | 8.00 | 10.00 |
| Non-Resident Affiliate Members | 8.00 | 6.00 |
| Resident Junior Members | 3.00 | 5.00 |
| Non-Resident Junior Members | 3.00 | 3.00 |
| Student Members | none | 3.00 |

Eliminate from the table the grade of Resident, and non-Resident Associate Members, along with the corresponding entrance fees and annual dues.

Revise fourth paragraph to read as follows:

"Student Members who are elegible shall be transferred to Junior grade membership at the annual meeting, following their graduation or after leaving college. They shall be credited to apply on entrance fee the amount paid for annual dues as Student Member to an amount not to exceed $10.00."

**ARTICLE VIII.—Privileges**

(Amended December 12, 1932.)

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

**ARTICLE VIII.—Privileges**

Eliminate the words "Associate Members."

(6) **Board of Direction.** The Board of Direction shall have power to order all ordinary or current expenditures of funds of the Treasury; shall provide for the exercises of the meetings; shall consider all applications for membership and submit such as it approves to the Secretary for balllot; shall examine all papers submitted with reference to their fitness for presentation to the Society and for publication, and shall make a general report at each annual meeting. To perform these duties it shall be authorized to appoint committees of its members, and to delegate to them such of its powers as it may deem it; provided, however, that any action of a committee unfavorable to any member, or applicant for membership, shall be reported to the whole Board for final action.

(6) **Board of Direction:** After the word "publication" on the 9th line, re-write as follows:

'publication; 'shall have the power to eliminate or reduce the entrance fees for any and all grades of membership for a period of time deemed advisable by said Board, and shall make a general report at each annual meeting. To perform these duties the Board shall be authorized, to appoint committees of its members, and to delegate to them such of its powers as it may deem fit; provided, however, that any action of a committee unfavorable to any member, or applicant for membership, shall be reported to the whole Board for final action."

(7) **Temporary Members.** The Board of Direction may at its discretion admit to the Society for a term not exceeding one year, members of other engineering societies, who are temporarily residing in or near New Orleans, on the payment of annual dues only. Temporary members shall have all rights of members, except the privilege of voting.

(7) **Temporary Members.**

Re-write the entire clause as follows:

"The Board of Direction may at its discretion admit to the Society for a term of one year members of other Engineering Societies, or Army, Navy and Federal Engineers, who are temporarily residing in or near New Orleans, on the payment of annual dues only. Temporary Members shall have all rights of members except the privilege of voting and holding office.'

(10) **Expulsion of Members.** The Board of Direction shall consider proceedings looking toward the expulsion of any member (a) upon information coming of its

(10) **Expulsion of Members:**

Added paragraph to be as follows:

"In any case where expulsion is based on malicious or false statements concern-

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

ing the officers of the Society, the Board of Direction shall appoint a committee of the last five available past-presidents to function for the Board on such case; and all requirements and powers set forth above as applying to the Board of Direction in such case shall apply to such Committee of Five Past Presidents."

**(13) Junior Member on Standing Committees.**

Proposed by-laws as written approved by this Committee as follows:

"The Board of Direction shall appoint on all standing committees, a Junior Member of the Society who shall sit in all meetings of such committees without vote."

## MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

### Minutes of the Meeting of the Louisiana Engineering Society, Held October 14, 1935

The meeting was held in a special room, St. Charles Hotel, about 8:10 P.M.

Professor C. W. Ricker, in the Chair, F. A. Muth, Secretary, and 68 members and guests present.

The minutes of the previous meeting were read and approved.

An interesting talk in regard to the work of the Community Chest was made by Sumpter D. Marks, Jr.

Several announcements were made by the Committee Chairman and the Secretary.

The amendments to the Constitution which had been previously proposed and unanimously voted upon at the September meeting, were given second reading. On action duly seconded, they were unanimously carried and were, therefore, declared adopted in accordance with the Constitution.

This meeting being a joint meeting of the Louisiana-Mississippi Section of the American Institute of Chemical Engineers, Professor C. S. Williamson, Jr., Chairman, took charge and introduced the speaker.

The address of the evening was made by Dr. W. J. Sweeney, on "Recent Advances in the Products and Refining of Petroleum." An interesting discussion followed, and a rising vote of thanks was tendered the speaker.

Respectfully submitted,

F. A. MUTH, Secretary.

### Minutes of the Special Meeting of the Board of Direction November 4, 1935

The special meeting of the Board, which was called by President Bres, was held at 8:00 P.M., Monday, November 4th, in Tulane Engineering Library, and the following members were present:

Colonel Bres, Messrs. Dunlap, Hoots, Ricker, Grehan, Muth, also Mr. Arthur M. Hill, upon invitation.

The minutes of the previous meeting were read and approved and bills on hand were ordered paid.

In accordance with the Constitution, the following Nominating Committee was appointed:

Mr. John H. O'Neill, Chairman, Messrs. John Riess and James M. Robert.

A unique system was followed in this matter in having secret ballot by the Board Members, selecting the names from the past presidents of the Society, who were not members of the Board.

On motion, duly seconded, it was voted to have a special committee of three members appointed to investigate and report on any constructive improvements which appear possible in the administration and set-up of the Society. The Committee is to submit its report direct to the Nomination Committee prior to the final report of the Committee.

On motion, duly seconded, it was voted that the Society be represented at the annual meeting of the American Engineering Council in January in Washington, by the Retiring President, subject to availability of funds for the expense account by the Finance Committee.

Ballots for Honorary Membership were canvassed, there being twenty-five ballots received from the Committee of Past Presidents, all of which were unanimous. These ballots were received in double envelopes in the same manner as the usual method of balloting, and the Committee declared Doctor Douglas S. Anderson unanimously elected by all past presidents as Honorary Member. The Board adopted the following resolution:

"Resolved, That the Committee of Past Presidents in its unanimous vote in electing Dr. Douglas S. Anderson as Honorary Member of the Society is hereby approved."

The President read a letter from Mr. F. A. Muth, Secretary, resigning because of his transfer to Portland, Oregon, by the Government. The resignation of the Secretary was accepted with regret and on motion duly seconded, the President was authorized to appoint a Committee under the Chairmanship of Mr. Paul F. Hoots, to draft suitable resolutions upon the retirement of the Secretary.

In view of the urgent necessity of having a Secretary instructed properly in the affairs of the Society, the President has appointed Mr. Arthur M. Hill, as Acting Secretary, pending annual election. On motion, duly seconded, this appointment was approved by the Board.

Communication from the National Rivers and Harbors Congress, advising of the meeting to be held in New Orleans in December was read and the President was authorized, as requested by the Chairman of that Congress, to appoint a Committee of seven members, three to be officers of the society and four other members to be selected from the membership of the Society.

There being no further business, the meeting adjourned.

Respectfully submitted,

F. A. MUTH, Secretary.

## THE MINUTES OF THE BOARD OF DIRECTION
### November 11, 1935

The meeting was called to order by President Bres. The following members were present:

Dunlap, Grehan, Hackett, Hoots, Moses, Ricker, Hill.

The minutes of the previous meeting were read and approved.

Mr. Walter Moses suggested that Prof. James M. Robert could be an aid to the historian in writing up the early history of the Society. Mr. Henry Malochee was asked by letter of November 5 to take over the work originally delegated to Mr. Lawes in writing the early history of the Society. Mr. Lawes requested to be relieved of this work because of ill health.

Colonel Bres brought up the question of voting for President, Vice-President and Treasurer of the American Engineering Council. The President will consult with Mr. Frank Coleman on this matter.

Prof. C. W. Ricker presented two suggested forms of certificate for Honorary Members. One of these was adopted as the final form.

Colonel A. M. Shaw was asked to read his report on suggested improvements in the Proceedings. No discussion followed the reading, but the motion was made that these findings and recommendations be passed on to the editor of the Proceedings. A vote of thanks was given Colonel Shaw for his effort and interest in the matter.

Mr. J. M. Todd submitted his report on plans for the annual meeting to be held January 24 and 25. Mr. Todd estimated that about $500 would be necessary to cover cost of publicity, banquet deficit, and speaker.

There being no further business, the meeting was ordered adjourned by President Bres.

Respectfully submitted,

A. M. HILL, Acting Secretary.

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## MINUTES OF THE REGULAR MEETING OF THE SOCIETY*
### November 11, 1935

The meeting was called to order about 8:20 in the Hunt Room of the St. Charles Hotel.

Colonel Bres in the chair, Arthur M. Hill, Acting Secretary, 156 members and guests present.

The minutes of the previous meeting were read and approved. The report of the Chairman of Employment Committee was read.

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* Held in conjunction with A.I.E.E.

President Bres asked for expression by the members as to the advisability or inadvisability of continuing the attendance prizes. Attention was called to the new method of selecting the members of the nominating committee.

Mr. J. M. Todd gave a short report on plans for the Annual Meeting, January 24 and 25.

President Bres expressed regret at the loss of Mr. Muth as the Secretary of the Society, because of his transfer to Portland, Oregon.

Mr. Paul F. Hoots read a resolution upon the resignation of Mr. Muth.

Prof. Donald Derickson moved that the resolution be accepted, and incorporated in the minutes of the Society.

Mr. Walter Moses moved that the resolution be made up into a permanent form, and presented to Mr. Muth.

Prof. Robert made a short address concerning Mr. Muth's valuable services to the Louisiana Engineering Society.

On behalf of the members of the Society Prof. A. Lee Dunlap presented Mr. Muth with a desk pen set.

Colonel Bres then turned the meeting over to Mr. J.M. Todd, President of the A.I.E.E. Mr. E. I. Gunther of Dallas, Texas, gave an interested illustrated address on "Taking Boulder Dam to Market." Discussion followed. A rising vote of thanks was tendered the speaker. The meeting was adjourned and collation served in the Hunt Room.

A. M. HILL, Acting Secretary.

# ACTIVITIES OF LOCAL SECTIONS

President,
F. P. HAMILTON
1st Vice-President,
CLIFFORD H. STEM
2nd Vice-President,
H. A. SAWYER
Secretary,
CHAS. M. KERR,
5831 S. Robertson Street
Treasurer,
A. J. NEGROTTO
501 S. Rendon Street


**STUDENT CHAPTERS**

Louisiana State Univ.
Baton Rouge

Tulane University
New Orleans

Annual Meeting at
New Orleans in May

Special Meetings at
call of President

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On account of being transferred from New Orleans to Birmingham, Mr. Alvin M. Fromherz has resigned as Treasurer of the Section and the Board of Directors appointed Mr. A. J. Negrotto, 501 South Rendon Street, to serve as Acting Treasurer until the next annual meeting.

The Section has lost a substantial and valuable member in Frank A. Muth who has been promoted to the position of Superintendent of Lighthouses at Portland, Oregon.

A total of 75 members have paid dues to the Section for 1935 compared with 70 for 1934.

It is hoped and expected that at least 15 more will pay before January.

# THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

## LOUISIANA-MISSISSIPPI SECTION

### Officers and Members

C. S. Williamson, Jr., Chairman, Tulane University, New Orleans, La.
W. R. Stryker, Vice-Chairman, Southport Mills, New Orleans, La.
E. A. Gastrock, Secretary-Treasurer, Celotex Co., Marrero, La.
H. A. Levey, Director, American Products Co., New Orleans, La.
J. J. Ganucheau, Director, Southern Co'ton Oil Co., Gretna, La.

E. Bache, Bogalusa Paper Co., Bogalusa, La.
R. M. Boehm, Masonite Corp., Laurel, Miss.
M. W. Boyer, Standard Oil Co., Baton Rouge, La.
C. E. Coates, Louisiana State University, Baton Rouge, La.
J. T. Cox, Jr., Himalaya Refinery, Tallieu, La.
C. B. Dicks, Jr., Tulane University, New Orleans, La.
H. S. Foote, Bay Chemical Co., Weeks, La.
H. H. Hewetson, Standard Oil Co., Baton Rouge, La.
G. K. Hickin, Freeport Sulphur Co., Port Sulphur, La.
P. M. Horton, Louisiana State University, Baton Rouge, La.
A. G. Keller, Bunkie, La.
W. B. Logan, Newport Co., Lake Charles, La.
G. P. Meade, Colonial Sugars, Gramercy, La.
H. J. Molaison, Jefferson Lake Oil Co., Barba, La.
E. S. Rothrock, Louisiana Chemical Co., Baton Rouge, La.
W. R. Schuler, Mathieson Alkali Works, Lake Charles, La.
J. H. Thickens, Masonite Corp., Laurel, Miss.
E. Wander, Bay Chemical Co., Weeks, La.

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Regular meetings are held on the first Friday in February, May, October and December in the Richardson Chemistry Building, Tulane University, New Orleans, La.