

TRAINING AND GAS ENGINEERING AT THE ALGERIAN PETROLEUM INSTITUTE

E. I. SHAHEEN and D. V. Kniebes
Institute of Gas Technology
Chicago, Illinois 60616

ALGERIA IS A LAND of beautiful nature located on the Northern tip of Africa, it stretches along the Mediterranean sea for 640 miles, where the sun-bathed beaches are among the most beautiful in the world. It has large fertile plains, beautiful mountains, and a desert rich with oil, gas, and minerals. Many civilizations crossed this magnificent land, and left a spectrum of impacts; from the Romans, to the Arabs, Turks and French. The Arabs left an everlasting effect of Arabization. The Algerians fought courageously for their independence, which they gained from the French on July 5, 1962. In the defense of their motherland, they lost nearly one and a half million martyrs. Algeria is known nowadays as the "land of the million shahid and millions of moujahidine".

Throughout Algeria massive industrialization and development is taking place. Algerians have called on technologists and top scientists and engineers from across all political boundaries. This breathtaking pace for development was luckily blessed with oil and gas reserves which helped in bringing about the necessary cash for taking such gigantic steps. Thus, the creation of an Algerian Petroleum Institute to fulfill the needs of the oil and gas industry was a must.

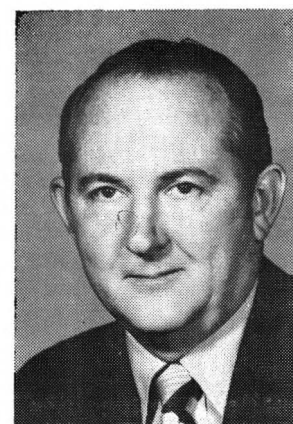
Created November 29, 1965, the Algerian Petroleum Institute expanded its mission of February 28, 1973 and thus became the Algerian Petroleum Institute of Gas, Chemistry, Petro-Chemistry, Plastic Materials, and Motors. Or, as is called in French, "Institut Algérien du Pétrole", abbreviation as IAP. It functions under the ministry of industry and energy, and works very closely with the major and only oil company in Algeria, namely SONATRACH (Societe Nationale de Transport et de Commercialisation des Hydrocarbures). In essence it is this oil company that makes the cash available for IAP's operations.

The three major objectives of the Algerian Institute of Petroleum are to provide: technician's training, engineering education, scientific and technical research.

The administration offices are mainly located at Dar El-Beida near the airport, about twelve miles from the city of Algiers. In this location, the technical training of engineers in the short cycle program takes place. This is a specialization for graduate students who have degrees in physics,

Dr. Esber I. Shaheen is Director of Education Services with the Institute of Gas Technology (IGT) in Chicago. He is also Director of International Education Programs with Gas Developments Corporation (GDC), a wholly-owned subsidiary of IGT. Dr. Shaheen has experience in both industry and the academic field, having taught at six different universities. Dr. Shaheen received his BS from Oklahoma State University, his MS from the University of Arizona, and his PhD from the University of Tennessee, all in chemical engineering. He is the author of many articles and four books: "Environmental Pollution Awareness and Control"; "Basic Practice of Chemical Engineering with Solutions Manual"; "Energy/Pollution Illustrated Glossary"; and "Arabic-English with a Petroleum Accent." He is listed in American Men of Science and in Outstanding Educators of America. (L)

Mr. Duane V. Kniebes, Assistant Vice President of Education and Research Services; BS in chemistry, MS in physics. Joining IGT's staff in 1949, Mr. Kniebes has served as head of the Analytical Division and as Director of Operations. His current administrative responsibilities include chemical analysis, technical information, and educational services, including management of specially-designed engineering and technician education programs. (R)





Industrial and Educational boom in Algeria.

chemistry, and engineering and who wish to specialize in the gas or oil disciplines. These students normally spend a preparatory year and another year for specialization.

The Ecole d'Ingenieurs at Boumerdes was opened in 1971. Here, most of the students take a normal engineering program, called the long cycle, where they will study for nearly five years before receiving their engineering degree. A special short cycle lasting about a year and a half is given to students in the specialty of gas transmission and distribution.

Technical schools are located near industrial centers. Thus, the specialized technicians while gaining their industrial education become accustomed to the industrial atmosphere. These centers are at Hassi Messaoud, Oran-Es-Senia, Arzew, Skikda, Annaba and Setif.

The students admitted to the technicians' program have already finished the first or second baccalaureate which is approximately equivalent to the high school diploma. These students study for a year or two depending on the speciality involved. At the end of their program, they become "technicians supérieurs". The various specialities for technicians are: geology, geophysics, production, refining, petro-chemistry, chemistry, gas and plastics, regulation, mechanical drawing, and safety. The general academic program includes the revision of basic principles of mathematics, physics and chemistry, and then some specific theoretical courses in the technology of materials, along with laboratory work, and a certain period of work in a plant to gain industrial experience.

RESEARCH AND ENGINEERING

SCIENTIFIC RESEARCH and measurements are made at Dar El-Beida's laboratories. This type of work touches on the various branches of the petroleum industry, and covers geology, geophysics, production, refining and petrochemistry. Thus, in geology, IAP arranges missions to various terrains for establishing geological charts and geochemical works. In the production area, the research is directed toward harnessing of petroleum. It comprises the study of fluid flow in porous media, the mechanics of reservoirs, and the stimulus of reservoirs by chemical methods or through fracturing. The laboratories in the area of refining constitute distillation, chromatography, spectrophotometry by atomic absorption and flame emission, and solvents extraction.

As previously mentioned, the two major engineering programs offered at IAP are: short cycle (cycle court) and the long cycle (cycle long). A number of review courses are given in the short cycle program. After that the students specialize in any of these chosen disciplines:

- Petroleum Exploration, (Geology and Geophysics)
- Refinery and Petrochemistry
- Petroleum Production
- Motors and Applications
- Natural Gas.

Aside from the courses received at the institute, some practical experience is gained by working in the petroleum industry. For the short cycle the duration of the practical experience lasts about one month. Certain seminars are also given by specialists who visit the institute from time to time. This helps in rounding up the education given to the students prior to their full engagement in industrial work.

In the long cycle program, the first four years are spent in formal education, where students take the necessary courses along with various plant visitations that may last from a few days to five or six weeks. Each engineering student spends the fifth year at a plant, for gaining practical experience. Certain remedial courses are given from time to time. This is due to the temporary unavailability of professors in a given line of specialty.

Algeria leads the world in building two huge plants for the liquefaction of natural gas: the Skikda plant and the CAMAL plant at Arzew.



Vacation in the countryside away from oil and the pressures of the job.

The detailed program for gas engineering, which includes liquefied natural gas (LNG), and gas transmission and distribution, will be discussed to give the reader a good example of the long cycle type academic program at IAP.

GAS ENGINEERING

ALGERIA LEADS THE WORLD in building two huge plants for the liquefaction of natural gas: the Skikda plant, and the CAMEL plant of Arzew.

With basic plans for earning hard currency for industrialization, and a major goal for improving the standard of living, and bringing gas to all sectors of industry and all residential areas, the obvious need was for the development of LNG operations, transmission and distribution of gas. At IAP, the two major disciplines in the gas engineering program are: liquefied natural gas (LNG), and transmission and distribution. One major objective of this program is to train engineers for the natural gas industry of Algeria. Graduates of the program are badly needed, and jobs are waiting for them.

Currently, the long cycle discipline for liquefied natural gas is being taught. However, the short cycle was taught during the academic year 1973-1974. The discussion here will deal with the long cycle program because it will be used in the future.

Students choose their option after the second academic year.

This program is being modified so that students will receive instruction in the English language rather than French. Students will be receiving about a 6-month intensive course in English prior to receiving their classical engineering instruction.

TRANSMISSION AND DISTRIBUTION ENGINEERING

THE SHORT CYCLE program for Engineering and Distribution Engineering is described here. Its duration is nearly three semesters. It has been especially designed to train competent engineers for the SONEGAS company (Société Nationale d'Electricité et de Gaz).

Although very few engineers come from the Algerian Technical University (Ecole Nationale Polytechnique d'Alger), most of the students are chemists and physicists with B.S. degrees (license es-sciences). They have a strong theoretical background, but are extremely lacking in applications. Their laboratory experience is limited; and they are totally unfamiliar with engineering and operating practices.

These students have obtained the second baccalaureate (Baccalaureat Deuxième Partie). The second baccalaureate is essentially equivalent to our first semester of the sophomore year. After the second baccalaureate, and depending on performance, these students attend a University. The chemists and physicists take the first year in common. In the first year, they will have mathematics (integral, Taylor, matrices, differential equations), chemistry (general, organic), and physics (electronics, magnetism, optics). They do not take physical chemistry. In order to graduate with a B.S. from the university, the student must earn six certificates in the following 2 or 3 years.

- **Program for Chemists at the University:**

In the second, third, and fourth years, the chemists will take organic and general chemistry, thermodynamics, mineral chemistry, physics, experimental physics, and then may choose among the options of analytical chemistry, applied organic, applied mineral chemistry, or biochemistry.

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• **Physicists Program at the University:**

The subjects studied by the physicists are as follows: mathematical techniques of physics, triple integrations, differential equations, electricity, thermodynamics, optics, and the general theory of mechanics (trajectories). Finally they can choose among electronics, modern physics, fluid mechanics, and atmospheric physics.

A review of basic fundamentals is essential prior to dwelling into the basic topics of gas transmission and distribution. When a chemist or a physicist is enrolled in such a program, and the majority of the students have obtained degrees in physics and chemistry, basic fundamentals such as those encountered in material and energy balances, heat transfer, fluid flow, mass transfer and thermodynamics, must all be covered to bring such candidates into applied engineering. The difference between the thought process of the scientist, and that of an engineer is a basic and a real one. Review courses are aimed to give the students basic tools for developing good engineering judgement, and to approach and think of their problems as good engineers do.



Developing modern cities in the developing countries.

After this review, other basic courses such as energy conversion and resources, gas piping systems, natural gas properties, pressure regulation and measurements, corrosion control of underground piping systems, transmission and distribution systems, and gas utilization are presented to give the spectrum needed for formulating this specialty in gas transmission and distribution.

CONCLUSION

AT BOUMERDES a huge and attractive building is about to be finished. It is destined to be the major headquarters for the Algerian Petroleum Institute. This large building will house administrative offices whether for the engineering or technicians' programs. It will also have classrooms and laboratories for the engineers and for research and development. This future home of IAP, which will be finished in less than two years, is in the midst of a scientific and technical complex

which contains various institutes. Among these are the National Institute of Hydrocarbons (INH), the National Institute of Light Industries (INIL), the National Institute of Productivity and Industrial Development (INPED), along with the central laboratories for Sonatrach, Sonarem and the National Society for Materials of Construction.

Fine talents from throughout the world and Algeria have been chosen to bring about an Algerian Petroleum Institute which will train the brain-trusts who will develop the petroleum and gas industry and bring more progress to their homeland. The students that IAP recruits are dedicated and hard working. They will be a fine asset to the future of Algeria. Many of these students rank among the top ten percent found in American engineering schools.

In the years to come, IAP should play a great role in the training of engineers and technicians, not only for Algeria, but some of the oil producing countries and the third world as a whole. Its accomplishments are impressive and its future is a bright one indeed. □

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ASEE AWARDS

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the Department of Technology and Human Affairs, and director of the Center for Development Technology at Washington University. The award is sponsored by the Xerox Corporation.

DR. GEORGE BURNET, Anson Marston Distinguished Professor and Head of the Department of Chemical and Nuclear Engineering at Iowa State, has been elected to Honorary Membership in ASEE. Nominations are made to the Committee on Honorary Membership and the Committee in turn recommends candidates to the Board of Directors, which elects not more than two Honorary Members each year. They are chosen for eminent service to mankind in engineering education or other engineering fields.

The Western Electric Fund Awards were presented to the following: **ROBERT G. SQUIRES** in the Illinois-Indiana Section and **GORDON R. YOUNGQUIST** in the St. Lawrence Section.