

## *A New Phase of Pre-Employment Education in Mineral Industries*

### **Steps Taken to Encourage Miners' Sons to Follow Occupation Of Their Fathers**

By H. B. NORTHRUP

THERE is a romantic aspect to the occupation of mining coal which is somewhat akin to the romance of the sea. Just as the men who man the ships at sea today come mainly from a long line of seafaring families, the men employed in the mines of Pennsylvania today are the descendants of long generations of coal miners.

During the more than one hundred years that coal has been mined in Pennsylvania, the mining operations have become more difficult and the coal harder to mine. Shafts have become deeper and working places farther from the bottom, thus increasing the need for more technically trained miners and mine officials to cope with the new problems which are arising constantly. Fortunately, the severe mining laws of the Commonwealth and the rigid mine inspection system have decreased the hazards which previously caused many fatalities in the past, so that now mining is regarded as one of the safest of occupational pursuits. Still, 60 per cent of all mine accidents are caused by carelessness and ignorance, thus indicating that a more careful selection of better-trained men is necessary if that percentage is to be reduced.

### **Sons Educated Against Mining**

It is the common practice, in homes of miners, for the father and the family to attempt to educate the boy away from the mines. This view is entirely unwarranted, for where would anyone be able to obtain employees to operate the mines other than in a mining community where the romance and tradition of the mines is "in the blood" of the community. The whole question of the education of the boy away from the mines instead of into the mines where he would be happiest, hinges around the fact that frequently the "advisor" or father is not sufficiently familiar with all of the factors necessary to be a good counselor.

A survey of conditions common to the mining communities of the Commonwealth reveals that too many of the good mining stock of the community, boys of high school age, are enrolled in high school curricula which tend to prepare them for such

"white collar" jobs as stenographers, clerks, etc. Upon graduation, some of these boys leave their community and go to the large cities to obtain employment. The chances are that the boys in the city schools have received a better training than did those from the mining communities, and therefore, are more likely to be employed in preference. Furthermore, the city school placement service fills the majority of the jobs and the boys from the mining communities are forced to become drifters.

It is certain that they do drift and after three or four years they drift back home and eventually enter the mines or the preparation plants. They have, in the interim, lost several good years of preparation for a good mining job. The boys who stayed at home have gained an advantage and have possibly improved their positions through attendance at "night mining school" classes.

### **Developments in High School Studies**

A movement is now on foot to recognize the necessity of a high school curriculum which will offer an opportunity to the student to learn some of the fundamentals of mining during his enforced school attendance under the law. Such a curriculum should be designed to offer the regular high school subjects and to graduate the student with sufficient credits to satisfy college entrance requirements. It should, at the same time, include in the curriculum of scientific subjects a "flavor" of mining and provide a shop where the student can learn some of those mechanical phases of mining which would take him at least two years to learn after he enters the mines.

The stress of competition has entered the mining industry seriously. Wherever conditions warrant, every mining company is now considering seriously the application of mechanical mining units to its equipment. Experience has shown that men cannot be trained overnight to operate these expensive machines. Personnel must be selected with more care than in the days of pick mining, and the mental aptitudes of the operators of such machines must be higher. There is no short cut to education! Therefore, why not start educating the boy for the newer order of events while he is still in the formative stage?

A plan to provide such a curriculum is now under consideration. Many of the details have been worked out and it is

## **THE MINERAL INDUSTRIES LIBRARY**

### **An Important Branch of the School's Service**

SINCE no service goes on for long without change, an occasional perspective glance at familiar things may bring out points of interest. However, in the case of the Mineral Industries Library there can be no accusation of the dullness of an unchanging scene since for the past two years either its own walls have been undergoing violent treatment or those just outside its doors have been pounded upon almost without interruption.

There has been benefit to the library, though, from the remodeling of the building in the addition of another small room to its quarters into which it expanded with comfort and an uneasy suspicion that it would soon again be in its accustomed crowded state. Steady acquisition of volumes has brought the total to date, April 1940, to 7800. Currently, 145 periodicals are being received, and with most of these accounting for at least one bound volume on the shelves each year there is obvious reason for additional shelf space being needed from time to time. Besides periodicals all of the most significant books published in geology, geography, metallurgy, mining, ceramics, petroleum production, and fuel technology are bought. Certain back files of periodicals are also purchased as funds for them are available. Such a constant change as growth, gradual and constant, provides assurance that the library service will not be static; it, too, must grow.

Increased use of the library by students has been noteworthy, the change having begun about two years ago. During the year 1938-39, 1959 books were signed out from the library, and for the first semester of the present year 1078 were circulated. An effort is being made to give students a better opportunity to learn how to use the literature in their respective fields. The

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fairly certain that the plans will have been completed in time to initiate the program in a few trial centers during the next school year.

The idea is fundamental and should have the enthusiastic support of educators and operators alike. It is not to be supposed that the idea applies alone to mining; it can be made equally effective in preparing future workers in all phases of the great mineral industries of the Commonwealth.

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### Pennsylvania's School of Mineral Industries and Experiment Station

Dedicated to the exploration, development, and conservation of Pennsylvania's natural mineral resources, and their preparation, processing, and efficient utilization.

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## TRENDS and OBJECTIVES

By DEAN EDWARD STEIDLE

### SOME PRACTICAL ASPECTS OF THE MORRILL ACT

THE Nineteenth Century was characterized by the progressive movement westward of our frontiers. The utilization of our endowment of mineral resources developed slowly as the frontier advanced. The first quarter of the century may be considered as a period of "exploration," the second quarter as "appropriation," and the last half as "exploitation." Based on the same reasoning the first quarter of the Twentieth Century may be viewed as a "twilight" period which culminated in our present uncertainties. Whether the future is to be "disintegration" or "integration" depends upon the ingenuity, industry, and capacity of the American people to solve the problems with which they are confronted.

Congress enacted the Morrill Act in 1862, under the provisions of which an institution of higher learning was proposed for each of the states of the Union. It was



# DEPARTMENT NEWS

## CERAMICS

The Toronto meeting of the American Ceramic Society afforded the opportunity of renewal of friendships with a number of alumni of the Ceramics department. Among those present were Dr. Harry C. Whittaker, now with the Crane Co., Chicago, Ill.; Dr. Francis J. Williams of the National Lead Co., Brooklyn, N. Y.; Dr. George J. Bair, Pittsburgh Plate Glass Co., Mellon Institute, Pittsburgh; Mr. Joseph E. Weis, Oxford Mining and Milling Co., West Paris, Maine; Mr. Lee O. Upton, Bausch and Lomb Optical Co., Rochester, N. Y.; Dr. Bennett S. Ellefson and Mr. Robert Doran, Hygrade Sylvania Co., Emporium, Pa.; Mr. R. C. Hutchison, Bethlehem Steel Corp., Bethlehem, Pa.; Mr. Marvin O. Lewis, Rutgers University, New Brunswick, N. J.; and others.

Dr. Nelson W. Taylor was elected a Fellow of the American Ceramic Society at the Toronto meeting. The text of the certificate bears the statement "in recognition of productive scholarship in ceramic

the working classes. It is evident from a study of the Morrill Act and pertinent literature of the period that mechanic arts was visualized as including the development of the material resources of the nation. In this the winning, processing, and utilization of mineral resources is fundamental. Agriculture is considered the first basic industry. Mining, which deals with the extraction of irreplaceable mineral assets, is obviously the second basic industry.

The Legislature designated The Pennsylvania State College this State's institution of higher learning under the provisions of the Morrill Act on April 1, 1863, and the "faith of the State was thereby pledged to carry the same into effect." Records indicate that the desire to develop the mineral industries constituted one of the strongest motivating forces back of the Morrill Act in Pennsylvania.

Experience has proved the wisdom of the Morrill Act but the statesmen of the day could not envision the incredible demands that would be made on the mineral resources of the country in the Twentieth Century. That these demands should have made serious inroads in the great mineral endowment of Pennsylvania is only natural. In our Commonwealth some of our low-cost and highest quality minerals have been exhausted. Sufficient remains to supply industry for centuries but what we lack in natural assets must now be supplemented by improved technology and conservation. The ceramics department has

science and notable contributions to the ceramic arts and industry."

Mr. Francis C. Flint, chief chemist, Hazel Atlas Glass Co., and former President of the American Ceramic Society, spent some time visiting the Ceramics department recently, in connection with a study of the curriculum and the new laboratories. Mr. Flint stated that he was very favorably impressed by the general setup of the department.

Dr. Harold Moulton, research department of the American Optical Company, Southbridge, Mass., gave a talk during April on the manufacture of ophthalmic glass and spectacles before the advanced students and faculty of the Department of Ceramics, and also to the students taking the course "Ceramics in the Home."

In connection with the national meeting of the American Society of Agricultural Engineers, which is to be held on the Penn State campus during the week of June 17, the Ceramics department has been asked to prepare an exhibit of old American glass and also to sponsor a demonstration of pottery throwing on the wheel. It is hoped that the Stahl brothers of Powder Valley, who gave a highly successful demonstration here last fall, will be able to return to the campus to give another show on Monday, June 17.

Employment prospects for ceramic graduates appear to be very good this year. Even before the middle of April, half of the seniors had already obtained jobs, and the remainder had very promising contacts. The demand for students with graduate training is, and always has been, very satisfactory.

## EXTENSION

The Division of Mineral Industries Extension is bringing to a close one of the most successful years in its history. Starting from scratch nine years ago on an organized basis, with a heritage of only one subject available for extension classes and an enrollment of less than 500 students, the division has grown into a well-organized integral branch of the School of Mineral Industries, offering six three-year curricula of extension instruction in Ceramics, Coal Mining, Ferrous Metallurgy, Petroleum Production, Petroleum Refining, and Natural Gas Engineering.

The correspondence instruction branch of the extension division, not in existence nine years ago, now lists 31 active students enrolled in 15 courses and has available for correspondence instruction 38 subject matter courses which cover practical every phase of these mineral industries.

students in 10 states, the District of Columbia, and Canada.

In extension class instruction this year, the following tabulation shows the extent to which the work has grown in the nine-year period. All of the work is projected on an organized basis, the students all pursuing the three-year curriculum in the subjects designated:

CURRICULUM	CENTERS	CLASSES	COUNTIES	TEACHERS	ENROLLMENT
Ceramics .....	10	10	9	10	171
Metallurgy .....	17	56	12	56	1302
Mining .....	65	85	17	63	1934
Pet. & Nat. Gas ..	7	22	7	24	557
	99	173	45	153	3964

Of the 45 counties listed, work is actually being carried on in 34; there is more than one program in force in 11 of the counties of the State.

Textbooks for all Mineral Industries Extension classes are prepared by the several supervisors of the respective curricula. In addition, several other states and countries are using our extension texts either for class instruction or for reference. Our records indicate that extension textbooks prepared by this division, covering all of its extension curricula, have been supplied to persons in 28 states, as well as to Cyprus, Chile, England, Mexico, Russia, Canada, and Nova Scotia.

## FUEL TECHNOLOGY

The 1940 fuel technology graduates, eight in number, constitute the largest class that has been graduated up to this time from this curriculum. Members of this class are James Campbell, Fred Graves, Harry Hauth, Walter Jones, Jack MacLachlan, Charles Shinnamon, Edward Siemon, and Martin Valeri. These men all have been assured of jobs—several have chosen from between two to four offers—and it is interesting to note the variety of fields of work which have been represented by offers made by industrial organizations.

Definite offers of positions have been made to one or more of these graduates by two steel companies, a prominent manufacturer of furnaces, boilers and accessories, two coal producing companies, a commercial testing and analysis laboratory, a fuel sales and marketing organization, and a coal carbonization company. The fields of work embodied in these offers are fuel sales engineering, coal cleaning and preparation, coal carbonization, testing and design of combustion equipment, and fuel and combustion engineering.

The number of offers received by senior fuel technologists illustrates the rapidly increasing opportunities offered by this field of work. Fuels producers and consumers are more interested than ever in men trained in the technology of fuels. At least two papers which have been devoted to the opportunities offered in fuel technology and combustion engineering have been presented

and technical societies. The experience of the 1940 class in fuel technology has shown that training in the preparation, processing, and utilization of fuels is answering a demand that is increasing in many fields of work.

## PETROLEUM AND NATURAL GAS ENGINEERING

On April 11 and 12, Dr. S. T. Yuster and Mr. C. R. Horn attended the A.P.I. meeting (Eastern Division) at Columbus, Ohio. The Columbus meeting initiated the annual senior field trip of the senior class under the direction of Professor C. R. Horn.

Twenty-three senior students were on the trip and on their return from Columbus, visited oil and gas operations in the southern part of Pennsylvania, distributing, manufacturing, and research organizations in Pittsburgh, repressuring oil properties in the Oil City district, and water flooding properties in the Bradford district as well as refineries and concerns manufacturing oil and gas field equipment. The trip closed on April 18 with a visit to the Clark Brothers Company, Inc., in Olean, N. Y.

The April 1 issue of the *Oil Weekly* carried an article by Dr. Sylvain J. Pirson, entitled "Locating and Counter Balancing Central Pumping Powers." The article covers the theory underlying a petroleum engineering design problem given the senior class. Reprints of this paper are available upon request.

## GEOLOGY, MINERALOGY, GEOGRAPHY

A permanent summer camp for geologic field work and other mineral industries activities has recently been established through the co-operation of the United States Resettlement Administration. The camp is located about 15 miles south of State College, in Stone Valley, on the southeast side of Tussey Mountain, near similar camps for forestry and civil engineering. It is about five miles by road from Whipple's Dam, a favorite picnic and swimming spot, and lies in one of the sparsely inhabited, pleasant, and picturesque sections of our central Pennsylvania mountain region.

The camp buildings and grounds are attractive and comfortable. There is a large main building, with laboratory, dining, and living room facilities. Students will be housed four each in 12x18 foot permanent cabins, within easy access of a larger wash house.

The surrounding area is an excellent one for instruction in geologic mapping and other field work. The rocks near the camp are shales, shaly limestone, sandstone, and red beds of Silurian age. They are repeated time and again by the intricate folding

of the Broad Top Syncline. The rocks include distinctive key horizons and characteristic fossils which make possible the unraveling of fold structures. West of the camp, beyond Tussey Mountain, are outcrops of the Cambro-Ordovician limestones of fertile Nittany Valley. To the southwest are the interesting and complex faults of the Tyrone area, as recently mapped by Butts. To the south toward Huntingdon, are extensive exposures of the shales and sandstones of the Devonian system.

Two field courses, open to students who have satisfactorily completed work in elementary geology, will be offered during the coming summer, and will be in charge of E. F. Williams and P. D. Krynine. The shorter course, Geology 70, involves three weeks of plane table mapping and will be attended by both petroleum engineering and geology students. The geologists will remain in camp for an additional three weeks of geologic mapping. In addition a one-week trip will be arranged to visit the piedmont and coastal plane areas in eastern Pennsylvania and New Jersey.

## MINING AND GEOPHYSICS

Professor D. R. Mitchell and J. W. Buch of the mining staff and R. B. Hewes of the mineral industries extension staff attended the anthracite section of the A.I.M.E. meeting at Scranton, April 12. Two hundred executives and engineers prominent in the anthracite industry were present at this meeting.

Andrew Rostovsky, Pittsburgh Coal Company scholarship student and freshman mining engineer, had the highest standing of the freshmen in the School of Mineral Industries at the end of the first semester with a grade-point average of 2.75 (3.0 is perfect).

M. Kok, senior mining engineer student, and M. Hrebar, junior mining engineer student, took the State examinations for fire boss and mine foreman April 8 and 9.

All of this year's graduating class have accepted employment. Summer employment of underclassmen is proceeding at a satisfactory rate. Approximately 50 per cent of the underclassmen had received offers of summer jobs by May 1. It is desirable for underclassmen to supplement their academic training with actual work in mines, quarries, or mineral preparation plants. There are still a few deserving boys anxious to obtain summer jobs, and members of the mining department staff will appreciate receiving information as to prospective summer jobs for mining students.

Dr. C. G. Rossby, assistant chief of the U. S. Weather Bureau, gave a lecture before students and faculty of the School on April 16. The topic of his talk was "Weather Changes on the Northern Hemisphere." The lecture was jointly spon-

sored by Sigma Gamma Epsilon and the American Meteorological Society.

Dr. H. Landsberg attended the Annual Meeting of the American Geophysical Union, April 26 and 27 in Washington, D. C. He presented a paper on "Seasonal Pressure Changes and Earthquake Occurrence."

Starting April 1, the Geophysical Laboratory has furnished the Department of Forestry every morning with a special weather report and forecast designed to help that department to estimate the forest fire hazard. The data furnished includes forecasts of temperature, relative humidity, wind velocity, and visual range.

## RESEARCH

One of the new additions to the research group investigating the secondary recovery of petroleum by water flooding at the Mineral Industries Experiment Station of The Pennsylvania State College is Dr. Ralph F. Nielson.

Dr. Nielson received the Bachelor of Science and Doctor of Philosophy degrees at the University of Nebraska and the Master of Science degree at the University of California. All of the degrees were in chemistry and the advanced work involved a study of the thermodynamic properties of solutions. He studied for two years at the University of Copenhagen on a Rask-Örsted fellowship with Dr. J. H. Brønsted, one of the world's foremost authorities on solutions.

Following his research work abroad, Dr. Nielson taught at Kansas State College, St. Benedict's College, and the University of Tulsa. Before coming to State College, he was research engineer with the Stanolind Oil and Gas Company of Tulsa, Okla., specializing in studies on the equilibrium between liquid and gaseous hydrocarbons and the role of surface forces in oil production. All of this work gives him an excellent background for research in the secondary recovery of petroleum.

A second addition to the research staff in water flooding is Mr. John A. Chamberlain. Mr. Chamberlain received the Bachelor of Science degree in Petroleum and Natural Gas Engineering at The Pennsylvania State College. Before coming to State College he was employed by the Pennsylvania Department of Highways at

inuous inspector at refineries in Baltimore governing the control and shipping of petroleum products to the State of Pennsylvania.

Dr. S. T. Yuster, associate professor of petroleum and natural gas engineering, attended the recent meeting of the Eastern Division of the American Petroleum Institute held at Columbus, Ohio. On the return trip, he stopped at McConnellsville, Ohio, to inspect the experiments and new method of the secondary recovery of petroleum.

The method essentially involves sinking a shaft to the producing formation and then drilling a series of horizontal wells radiating out from the central shaft. Various means of stimulating oil production may then be applied to this system of wells. All of the wells are drilled with diamond bits, and cores are available for studying the horizontal variations in the producing formation.

These horizontal oil wells are the first in the world and the experiments on them are being watched by the oil men with the greatest interest. Mr. Leo Ranney is in charge of the work.

### Dr. Gauger Presents Paper

A paper entitled "Physical Chemistry of Gas Producer Reactions in Relation to Ceramic Firing" was presented by Dr. A. W. Gauger before the American Ceramic Society at Toronto on April 8.

A paper entitled "Second Progress Report on the Determination of Water Vapor in Gaseous Fuels" by A. W. Gauger, F. C. Todd, E. K. Schluntz, and W. J. Wiseman will be presented at the Joint Production and Chemical Committee Conference of the American Gas Association in New York on May 22.

## The Mineral Industries Library

(Continued from p. 1, col. 3)

librarian is compiling a "Guide to the Mineral Industries Literature" which will be distributed to juniors and seniors. To date only a section on the metallurgical literature has been completed in such form that it is available to students. With such a representative collection of mineral industries literature at hand it is desirable that students take full advantage of it, and thought is being given to this matter of encouraging them.

### A Flexible Institution

The Mineral Industries Library is a flexible institution. It is open particularly to suggestions as to how it might be of greater service, and occasionally helpful ideas do come from outside sources. It is

## Nontechnical Course In Gem Stones Given

In view of the increasing popular interest in gems the Department of Geology has introduced a general nontechnical course dealing with gem stones and gem materials.

The course carries two credits and is designed to give the student a cultural training in the appreciation, ornamental and industrial utilization, and historical significance of the precious and semiprecious gems.

A comprehensive illustrative collection of cut stones, including some 50 or more gem species, has been assembled to show color, cutting designs, and other significant features, in addition to laboratory material and apparatus which may be employed by the student for physical testing and identification. The course is being conducted jointly by Professors A. P. Honess and W. M. Myers and is open to all students on the campus and others who for special reasons may desire such training.

helpful to those having either money or books to be disposed. May we ask for your ideas, your books, or your money?

Sometimes books published in an era long gone may have an interest fully as important as the last word from the modern presses, and in the field of technical literature there are books available both ancient and just old, that are worthy of space in a representative collection. Within the past year the Mineral Industries Library has acquired several such items, the oldest and therefore most remarkable being a volume of selections on natural science by George Agricola, who lived from 1490 to 1555. This collection includes sections on fossils and metals which are in such an excellent state of preservation as still to be easily read by him who understands Latin.

### An Early Oil Publication

A book closer to the hearts of Pennsylvanians is titled *The Oil Regions of Pennsylvania, Showing Where Petroleum is Found; How it is Obtained, and at What Cost*, by William Wright. This was published in 1865, and Mr. Wright was an observer whose opinions on the early days of the petroleum industry are to be read with respect. He remarked everything from the treatment of animals to the accommodations in the hotels with a fair-minded candor. He even gave advice to the unwary investor in petroleum stocks. Since its acquisition by the library, the book has already been read with appreciation by some of the members of the staff.

These books were bought chiefly for display in the exhibit cases now available