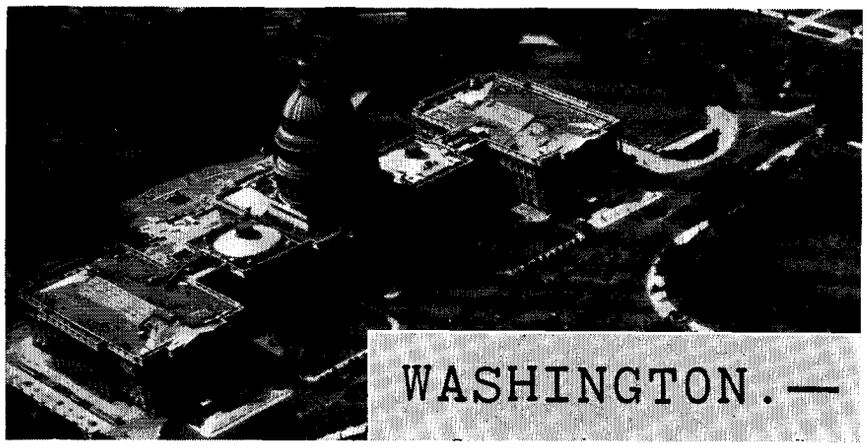

Production of uranium as by-product of phosphate fertilizer industry making steady progress

WITH ONE PLANT in operation for several months and three others coming along, production of uranium from phosphate rock is now a fact. What impact this development will have on the phosphatic fertilizer industry is a matter of much speculation.

This development actually started several years ago with the discovery that marine phosphate deposits, such as those in Florida and in the Western states, contained 0.01 to 0.02% uranium (0.2 to 0.4 pound of uranium per ton of rock). Tennessee phosphate rock, not a marine type, contains practically no uranium.

The Atomic Energy Commission, desirous of developing all potential sources of uranium, initiated a variety of research projects to explore this potential source. In 1947, for example, the Geological Survey studied Florida phosphate formations to determine how and where uranium is present. Mining companies then determined the uranium content of various deposits and what happened to the uranium in processing.

AEC, through contracts with the Massachusetts Institute of Technology, Battelle Memorial Institute, and Dow Chemical Co., initiated research to develop commercial-scale methods of recovering uranium as a by-product in the production of phosphatic fertilizers and phosphatic chemicals. With the exception of the basic research work at Dow, the other projects have been completed.

A two-year research program by the U. S. Department of Agriculture and several state experiment stations showed that the presence or absence of uranium in phosphatic fertilizers does not affect plant life.

Wet Process Found Best

In producing normal superphosphate, equal amounts by weight of phosphate rock and sulfuric acid are allowed to react. No separation of the resulting products is made. Research projects, including those of Mathieson Chemical Corp. and Armour Fertilizer Works, show that at present there is no effective economic way of extracting uranium from normal superphosphate.

In the preparation of double (triple) superphosphate, excess sulfuric acid is used, producing gypsum and phosphoric acid. In this so-called wet process, uranium is found in the phosphoric acid portion and may be extracted.

Several companies, including Dow (Pittsburgh, Calif.), U. S. Phosphoric Products Division of the Tennessee Corp. (Tampa, Fla.), and Allied Chemical and Dye Corp.'s General Chemical Division, have all carried out laboratory or pilot plant research on the wet process.

Blockson Chemical Co., producers of phosphate chemicals, began production of uranium from phosphoric acid last September. Blockson is the only company actually in production. This company, as the first in the field, was given a cost-plus-fixed-fee type of contract with AEC.

Three other companies, all producers of fertilizer, now have wet process plants under construction. These are International Minerals & Chemical Corp. and Virginia-Carolina Chemical Corp. They are building plants near Mulberry, Fla. Texas City Chemical, Inc., has a plant under construction at Texas City, Tex. These companies have incentive (sliding scale) type contracts which return to the companies a portion of any savings effected by improved production techniques.

Other producers of phosphate chemicals and plant food products in Florida and several Western states are considering building plants. Davison Chemical Corp., for example, is considering construction of a double superphosphate plant with uranium recovery facilities. Most negotiations in this regard are in the talking stage and no contracts have been let.

One problem, from AEC's viewpoint, is that most phosphatic fertilizers made are of the superphosphate and not the double superphosphate type, from which uranium is recovered. Increasing freight rates and a growing demand for high analysis fertilizers may hasten the trend toward increased superphosphatic production. The issuance of certificates of necessity for construction of these plants will also have an effect. One desirable feature of the wet process is that it produces phosphatic acid, which can be used together with sulfuric acid to process more rock, thus effecting a saving in sulfuric acid. This may be an important consideration in future years if sulfur supplies should become short or more expensive.

Increasing demand for fertilizers may lead to application of the nitric acid acidulation of phosphate rock. AEC is interested in this method and its potentialities for extracting uranium from phosphate rock but is not yet doing much in this field.

Uranium Potential High

Because AEC classifies data on production and prices of uranium and the amounts needed to manufacture atomic weapons, no figures are available on AEC's needs for uranium. The amount of uranium potentially available from this one source, however, can be estimated.

In 1951, 8.2 million long tons of phosphate rock were mined in Florida, of which 5.5 million tons went into the production of normal and double superphosphate. Western states' production of phosphate rock amounted to 1.1 million tons, of which almost 300,000 tons were used in making superphosphate fertilizer. The uranium content of these two sources alone runs between 1 million and 2 million pounds of uranium.

The latest annual figures (1951) show that normal superphosphate production is running about 9.4 million tons a year, compared with only 717,000 tons of the concentrated (double) superphosphate. It is from the latter portion that uranium is extracted. Until more wet process production begins or a method of extracting uranium from normal superphosphate is developed, uranium production from this source will be limited.

Likewise, informed officials state, it must be remembered that uranium production is only a by-product in the manufacture of phosphatic fertilizers or phosphate chemicals. Even though the income from the sale of uranium may augment producers' financial returns, it appears unlikely that such income will ever be more than a fraction of income from their normal operations.