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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

December 1, 1980

B-201298

The Honorable Herman E. Talmadge
Chairman, Committee on Agriculture,
Nutrition and Forestry
United States Senate

Dear Mr. Chairman:

Subject: Your request for phosphate information and comments on Section 5 of H.R. 5341

In response to your request of August 29, 1980, we are providing our comments on Section 5 of H.R. 5341 and information on the phosphate situation in the United States. You also requested a technical discussion of how phosphates are graded. This is discussed in an enclosure and includes our analysis of some implications.

Section 5 would prohibit the issuance of phosphate leases in the Osceola National Forest unless and until the United States by subsequent legislation determines that the mining of the affected phosphate would be necessary to the national interest. It would give the Secretary of Interior 3 years to determine whether valuable deposits have been discovered on 41 preference right lease applications and, if so, to exchange them for leases covering other minerals elsewhere. In the event that exchanges cannot be negotiated, the holders of the lease applications would be entitled to monetary compensation.

The Department of the Interior has not made a convincing case that it would be environmentally damaging to mine the phosphates now, nor what advantage rests in postponing a mining decision. We believe that it is premature for the Congress to favorably consider such action because of the possible adverse affects on the supply of phosphates. In addition, we consider that Section 5(b) could raise constitutional issues if preference right lease applications are held to have valid rights to non-preference leases.

Our November 30, 1979 report entitled, "Phosphates: A Case Study of a Valuable, Depleting Mineral In America," EMD-80-21, summarized our analysis of phosphate policy issues and concluded that ensuring an adequate supply of such essential minerals as

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phosphate rock is a problem facing this country now and will be of greater significance in the next 20 years as high-grade, easy to mine domestic sources become more scarce. The report recommended that the highest levels of Government promptly begin an assessment of land access impediments to phosphate availability. Section 5 of H.R. 5341 creates just such an impediment.

Our report also called for a review of the Nation's long-range phosphate position. The Department of the Interior informed us that it is in the process of conducting such a review. Currently, most high-grade, easy to mine phosphate is mined in Florida and North Carolina. However, as these deposits are exhausted, the country will have to start mining of more costly deposits and/or import phosphates (which may, in either case, mean higher prices unless technology is improved).

The Osceola National Forest is located in northern Florida. Various evaluations have raised questions with respect to the magnitude and value of the phosphate deposits in the Forest. In our November 30, 1979 report, we pointed out that one Interior Department study concluded that phosphate mining would not appreciably impact the aquifer and another Interior Department study indicated that adequate protective measures could be taken to protect the endangered species.

At your request we have performed further evaluation of these studies and the documents used by the Department of the Interior to consider phosphate mining in the Osceola National Forest. We believe that the Department of the Interior documents do not make a convincing case of the need to prohibit phosphate mining in the Osceola National Forest at this time. We are further concerned that the documents indicate that the Department has paid little attention to the need for balancing the country's need for such minerals as phosphates with competing demands for other valid goals and objectives. We are in the process of preparing another report to the Congress which will evaluate the inadequacy of current policies to enable such a balanced, rational approach.

Preference Right Lease Applications

Although the Department of the Interior does not know the total fair market value of the potential phosphate leases in the Osceola National Forest, two of the four lease applicants have submitted estimates of the value of their potential leases in the Osceola National Forest totaling $393 million. Industry and the U.S. Geological Survey apparently agree that the lands contain large amounts of phosphates. This means that it is, therefore, likely that a decision to disallow mining on these lands will affect the overall supply of phosphates in this

country, at least for the near term, particularly if the deposits are highgrade, easily mined phosphates.

During the 1965-68 period, 92 prospecting permits were issued in the Osceola National Forest. Eventually 51 of the permits were dropped, and the remaining 41 resulted in noncompetitive lease applications. Data acquired by exploration on the lands covered by 41 prospecting permits were submitted to the U.S. Geological Survey as prescribed in the Mineral Leasing Act and the regulations in force at the time in order to support applications for preference right leases to mine these phosphates. The Survey had evaluated company submissions and certified 21 permits as containing valuable deposits when, in 1971, the Secretary's office directed that certification of the remaining prospecting permits stop, pending preparation and issuance of an environmental impact statement, which was subsequently issued in 1974. A supplement was issued in 1979.

The Department of Interior now asserts that it is obligated to adjudicate these preference right lease applications under the more stringent 1976 regulations to determine whether a discovery of valuable deposits has been made.

Under Interior's 1976 regulations, the preference lease applicants must make an initial showing to demonstrate the discovery of minable reserves and then must make a final showing--proof of the current profitability of a mining operation including the costs of operating the mine, of meeting existing governmental regulations, reclamation, Forest Service stipulations, and environmental standards.

None of the preference right lease applications have been processed under the current requirements, and the question of whether or not this is legal is in litigation. In July-September 1980, the Department's Bureau of Land Management notified all four of the applicant companies of deficiencies in their initial data submissions for all 41 preference right lease applications and requested them to submit additional information from existing data. (The prospecting permits have expired, ruling out any new field work or drilling to acquire additional information.) This additional information is required by the 1976 regulations which call for reserve estimates based on different standards than previous guidelines, and it is unclear if the applicants can do additional work on the lands, even if they so desired. The notices state that failure to submit the necessary information will result in the rejection of their preference right lease applications.

The lease applicants contend that they have complied with the law and regulations of the Department of Interior in effect

at the time of their applications, that the 1976 regulations, therefore, do not apply to them; and finally that the delay in issuing the leases is purely the responsibility of the Department of the Interior. These matters are now the subjects of a law suit initiated by one of the applicants. 1/

Section 5(b) may affect the legal rights of permit holders to non-competitive phosphate leases. It would give the Secretary of Interior 3 years to determine whether valuable deposits have been discovered on 41 preference right lease applications. A permit holder, who is alleging that the Geological Survey certified to a valuable deposit in 1971 (or would have done so, if certification had not stopped), could claim Section 5(b) adversely affects him. Section 5(b) could be read to require that the Geological Survey reperform its "valuable deposit" determination (possibly employing criteria different than those employed in 1971). Section 5(b) could raise constitutional issues if the permit holder is held to have a valid right to a non-preference lease under Interior's 1971 rules. But, the question of whether leases can issue under the 1971 rules is still undecided.

Therefore, if Congress decides to pass this legislation, we recommend that Section 5(b) be amended to give the Secretary of the Interior the authority only to provide leases for other Mineral Leasing Act minerals in exchange for the legal rights any of the applicants for phosphate preference right leases may subsequently be determined to have. This change will provide the Secretary with authority to effectuate an exchange, if the applicants are entitled to phosphate leases in the Osceola National Forest. The rest of the bill would not be changed and the Secretary would continue to have the authority to take the leases for just compensation, if exchanges could not be negotiated within a prescribed time.

Summary

Our November 30, 1979 report called for the Secretary of the Interior to make a thorough review of the Nation's long-range phosphate position and report to the Congress no later than December 31, 1981. While Interior has informed us that they are currently making the required study, they are planning to submit their overall report to the Congress by December 31, 1982, rather than 1981. Our current work continues to show that Interior must better attempt to balance the country's need for minerals with other goals and objectives.

1/ Global Exploration and Development Corporation vs. Cecil S. Andrus, Secretary of the Interior, filed April 1980 in the United States District Court for the District of Columbia.

Based on the findings of the November 30, 1979 report and after analyzing Section 5 and Interior's decisionmaking documents regarding phosphate mining in the Osceola National Forest, we believe that it is premature for the Congress to favorably consider enacting this section. Instead, the Congress should require the expeditious adjudication of the applications for preference right leases and reserve action on Section 5 until a better determination is made of the value of the affected phosphate deposits.

We hope this information will be useful to you and others in the Congress.

Sincerely,

Comptroller General
of the United States

Enclosure

ENCLOSURE I

Phosphate Reserves and Some Implications

Phosphorus is one of three primary plant nutrients, along with nitrogen and potassium, used in chemical fertilizer. As such it is absolutely vital to sustaining the Nation's agricultural output.

In 1979, the United States produced over 51 million metric tons of phosphate rock which represents nearly one-half of the phosphate production of the world. The largest part of this production came from Florida.

Past availability of phosphates depended only on whether or not it was profitable to produce them. Today we define reserves as "deposits that can be economically and legally extracted at the time of determination." Thus, the reserve figures are constantly being modified to reflect the technical or environmental problems that may prevent the production of phosphates.

Recent data available shows reserves in the United States as 1.8 billion metric tons; enough to last for more than 35 years with the present rate of extraction, however, the needs of the Nation grow every year, and the identified reserves will probably be adequate for only the next 20 years. Production in the United States is expected to peak within 10 years and begin declining thereafter. Over the next 30 years we will be in a period of transition from cheap, convenient, readily-available sources to higher-cost, harder-to-get-at deposits. Closing the Osceola National Forest to phosphate development would represent the loss of nearly 120 million tons of phosphates, as estimated by the Department of Interior.

Chemical compounds used to express the grade of phosphate ores

The name and terms used by the phosphate industry were developed during a period of more than a hundred years and with the contribution of many countries. The resulting jargon is not always in agreement with chemical nomenclature and presents many difficulties to the newcomer.

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The term phosphates refers to phosphorus bearing ores and stands for "derivatives of phosphoric acid."

The most important phosphate is the tricalcium phosphate, $Ca_3(PO_4)_2$ also known as bone phosphate of lime (BPL), a name that comes from the time when the compound was thought to be the main component of bones. The tricalcium phosphate is a white salt, that is almost insoluble in water, and unless treated with acids, plants have a difficult time absorbing it. When tricalcium phosphate is treated with limited amounts of sulfuric acid, it changes into monocalcium phosphate and gypsum.

$$Ca_3 (PO_4)_2 + 2H_2 SO_4 = Ca (H_2 PO_4)_2 + 2Ca SO_4$$

The resulting mixture is called super phosphate. The monocalcium phosphate is soluable in water and thus makes an excellent fertilizer.

Another phosphorus compound that one must be acquainted with prior to understanding grades of phosphate ores is P_2O_5, also known as phosphorus pentoxide or phosphoric anhydride. P_2O_5 is nothing more than phosphoric acid without water: $2H_3PO_4 - 3H_2O = P_2O_5$. The P_2O_5 is a white stable and odorless salt.

The last compound that is necessary to know is phosphoric acid H_3PO_4 which is the most important of the twelve acids that derive from phosphorus. At normal temperatures, the acid forms hard, transparent and odorless crystals which are very soluble in water. In its liquid form, the acid can be concentrated to a maximum of 85 to 90 percent, and at this concentration it is a highly viscous liquid that becomes solid at temperatures colder than 108.14°F.

The grade of phosphorus compounds

The grade of industrial phosphorus compounds is expressed in terms of BPL (tricalcium phosphate, P_2O_5 (phosphoric anhydride), H_3PO_4 (phosphoric acid) and P (phosphorus).

—BPL: It is said that a phosphorus compound has 72 BPL when 72 percent of its weight is $Ca_3(PO_4)_2$ or when it could yield 72 percent of its weight in $Ca_3(PO_4)_2$ upon a complete transformation of its phosphorus.

—P_2O_5: Similar to the BPL case explained above, the percentage of P_2O_5 refers to the theoretical amount of P_2O_5 that can be obtained by transforming the compound. Working with the molecular weights the following relationship is found: 1 BPL is equivalent to .4576 units of P_2O_5 and the above rock of 72 BPL is equivalent to 72 X .4576 = 32.95P_2O_5. Many people in the phosphate trade incorrectly refer to P_2O_5 content as acid content, a practice that is confusing since H_3PO_4 is the real acid and P_2O_5 is its anhydride. The term APA which stands for "available phosphoric acid" is widely used in the industry, but it actually stands for P_2O_5 content.

—Phosphoric acid content: This term is used mainly to express the concentration of phosphoric acid, which also is expressed in P_2O_5 units or BPL units. It is said that one unit of phosphoric acid is equivalent to .7243 of P_2O_5 and 1.5826 units of BPL.

Phosphoric acid of 45.49 percent concentration is said to have

45.49 X .7243 = 32.95 units of P_2O_5 and

45.49 X 1.5826 = 72 units of BPL

—Phosphorus content: Refers to the content of atomic phosphorus in the compound.

One BPL is equivalent to .1997 units of phosphorus and using the same example as before:

72 BPL = 72 X .1997 percent P = 14.38 percent P

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Minable phosphate rock in the United States varies from 20 BPL to 35 BPL. As conditions change, like price, cost and metallurgy, the above limits will also change. Another factor affecting recoverability is the amount of impurities found with the phosphate ore. Impurities consist mainly of organic matter; oxides of aluminum, iron, calcium and magnesium; phosphates of iron or aluminum; carbonates of calcium and magnesium; and flourine compounds. After concentration, the phosphate rock is marketed according to its BPL content, which varies from 77 BPL to less than 64 BPL. Iron oxide and alumina content of phosphate rock affect the quality of the product. A level of 3 percent of these oxides is acceptable in rock of 73-77 BPL, but an excess of these impurities, up to a maximum of 4 percent is adjusted in the price at a rate of 2 grades of BPL for one unit of iron and aluminum oxides.