



UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

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ENERGY AND MINERALS
DIVISION

APRIL 10, 1979

B-159687

The Honorable James R. Schlesinger
The Secretary of Energy *Abc 00912*



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Dear Mr. Secretary:

Back

The adequacy of the uranium resource base has become a significant issue in the discussion of the long-term role of nuclear power. The necessity for and timing of reprocessing and breeders are closely related to the adequacy of the domestic and world uranium resource base. ~~The General Accounting Office is completing an assessment of the future role of nuclear power in the United States.~~ *is now being completed*
In the course of this work, we have found that many studies do not account for the uranium losses from milling the uranium-bearing ore to extract U3O8 ("yellow cake"). As a result these studies understate the actual demand on the uranium resource base of the lifetime demand of a nuclear reactor by citing the uranium purchased from a mill, not mined from a resource base.

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The widely-cited Ford/MITRE study ("Nuclear Power: Issues and Choices"), for example, which appears to have had significant influence on Government nuclear policy, used uranium demand at the mill, not at the mine. A Department of Energy (DOE) official told us that DOE uranium demand estimates, which are consistent with the Ford/MITRE study estimate, are demand at the mill, not at the mine. However, he said DOE was considering introducing mill losses. He also said that the International Nuclear Fuel Cycle Evaluation (INFCE) program, which is assessing future prospects for nuclear power, uses mill demand in its assessment of the demand on the uranium resource base. ~~We confirmed this~~ *was confirmed* by examining the data used as input for the INFCE assessments, and we indeed found that no correction is being made for milling losses.

Since 1966, milling losses have steadily increased, reaching 8.2 percent in 1977. This is more than double the 1966 losses. At the same time uranium ore grade has fallen by a third to 0.155 percent (3.1 pounds U3O8 per

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ton of ore). Preliminary DOE data for 1978 indicates that the grade has fallen further to 0.133 percent.

The current average grade of U.S. uranium reserves is 0.07 percent. Therefore, it appears quite likely that the grade of mined uranium ore will continue to decline. As this grade declines, mill losses would continue to grow and the discrepancy between demand at the mill and demand at the mine will increase.

Current DOE estimates are that a 1000 MWe reactor would use about 5500 tons U3O8 over its 30-year lifetime. Using the 8.2 percent loss in the uranium mill, the actual demand on the resource base is almost 6000 tons. If the current average grade of uranium reserves (0.07 percent) is a reasonable indication of the uranium ore grade which would be mined in the 1990's and beyond, then, using the relations between ore grade and mill loss observed since 1966 in the United States, mill losses would rise to 17 percent. This would mean that the 1000 MWe reactor cited by DOE would use slightly more than 6600 tons of U3O8, 20 percent more than the current DOE estimate. Such a difference could have a significant impact on any assessment of the adequacy of the uranium resource base.

Because uranium ore grades will probably continue to decline, and, as a result, mill losses continue to grow, we recommend that: *DOE Secretary:*

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All future uranium demand estimates, particularly those in long term policy assessments where declining grade would be important, be made and so designated on the basis of demand at the mine, not at the mill. This would result in a more accurate assessment of resource depletion. *ensure that*

--Your staff take steps to insure that the INFCE assessment of World uranium demand use mine demand, not mill demand.

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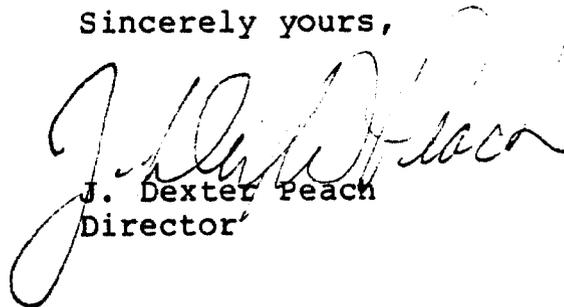
--Any major policy analyses that have contributed to the development of the Administration's nuclear policies be reassessed to see if it was mine or mill demand that was used in the analysis. If it was mill, the analysis should be redone to see if the conclusions are affected.

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As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement of actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

Copies of this letter are being sent to the Nuclear Regulatory Commission, the Office of Management and Budget, and selected congressional committees.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "J. Dexter Peach". The signature is written in dark ink and is positioned above the typed name and title.

J. Dexter Peach
Director