DOMESTIC URANIUM FUEL SUPPLY PROBLEMS 1976 THROUGH 1990

According to announcements made by the United States Energy Research and Development Administration (ERDA), the Federal Energy Administration (FEA), and the Energy Resources Council (ERC), there are more than sufficient domestic uranium resources to supply existing and planned nuclear reactors until 1990. The latest statement of this position, Uranium Reserves, Resources, and Production, was released on June 15, 1976, by ERC. Headlines throughout the nation state: “U. S. Uranium Resources Sufficient for Future Needs Until 1990,” or similar words and phrases. The ERC report cites January 1976 estimates by ERDA which indicate the existence of a total of 1,840,000 tons of economically recoverable uranium oxide (U\text{3}O\text{8}). This would be sufficient, the report states, to supply at least 300 large nuclear plants over their 30-year lifetimes. That figure, 300, is more than the number of plants projected for operation by 1990.

The report also states that after 1990, further uranium resources will have to be developed through expanded exploration by industry. Demand, the report comments, will quadruple over the next 20 years. New mining and milling capacity will be required. Now, where did these figures come from and what do they mean?

According to ERDA usage, the word “resources” includes reserves (ore deposits that have been discovered, defined reasonably well as to size, extent, and grade, or blocked out by detailed drilling) and potential resources which are not yet even discovered, or, in a few cases, may have a drill hole or two that show some ore is present. The “potential resources” estimate is totally speculative and in no way represents ore reserves.

“Potential resources” are defined further by ERDA as probable, possible, and speculative, in decreasing order of likelihood of existence. “Probable potential resources” are estimated to exist (1) as extensions of, or adjacent to, known uranium deposits; or (2) in new deposits within defined mineralized trends. This means that conditions are favorable for ore to exist in these places. Evidence and experience both suggest that the ore could be there. But no one knows whether the ore is present or not! In fact, during the last two years (1975 and 1976), more than 50 million feet of exploratory drilling for uranium have been completed, with the greater percentage of drilling in the probable potential resources areas. In that time and with all that drilling, no new uranium mineral districts have been found. Only two or three new deposits of high-grade uranium ore have been located, and only a few new low-grade deposits of consequence have been discovered. In other words, extensive drilling in our most favorable ground has failed to turn up the new uranium that the estimators called for.

Yes, some new uranium has been found, but it is of lower and lower grade, from deeper and deeper deposits, and some of it has complex mining and milling problems. Even the best new large deposit of higher grade ore is 4,000 feet deep. The amount of drilling done just has not paid off in new, large supplies of uranium.

Some of the potential resources have been raised to reserve status, because of an increase in the selling price of “yellow cake” (the form the mineral takes after milling). A pound of yellow cake that sold for about $7 in 1974 had risen to $40 in early 1976 and to a reported $50 in August 1976. This price increase has encouraged considerable drilling to further define some of the previously known low-grade deposits and find new ones. With yellow cake selling at $40 to $50 per pound, deposits with an average grade of less than one pound of U\text{3}O\text{8} per ton of rock material are now becoming viable ore bodies. Thus many low-grade deposits have become economically producible and have been raised from the status of potential resources to reserves. But in spite of this price increase, very few new uranium deposits of any kind are being found.

Now let us examine some other figures. ERDA estimates that our reserves of uranium are 640,000 tons of U\text{3}O\text{8}. The reserves estimate is thought to be accurate to within 20%. That means that as much as 768,000 tons or as little as 512,000 tons could exist. Historically, the accuracy to within 20% has been a reasonable figure. The methods used by ERDA in evaluating mining properties are sound and as reliable as existing technology permits. So, we will accept the 640,000-ton figure. In addition, the technology for the recovery of uranium as a by-product of phosphate and copper mining has been accomplished, and by the year 2000, ERDA estimates that as much as 140,000 additional tons of uranium may be recoverable from this source. These two figures are added by ERDA to the undiscovered probable potential estimate of 1,060,000 tons to arrive at a total of 1,840,000 tons of so-called economically recoverable uranium. This is the figure that is difficult to accept. To call this amount a valid resource base for prudent planning of nuclear power plant construction programs for as many as 300 large nuclear plants over their 30-year lifetime, suggests a total lack of understanding of the figures and of the facts.

The ERC report states that a 1,000-megawatt nuclear power plant will consume from 4,000 to 6,000 tons (8,000,000 to 12,000,000 pounds) of uranium during its lifetime. According to nuclear fuel experts in the electric generating industry, the figure is closer to 10,000,000 pounds, and depending on the percentage of operating capacity for the plant, its consumption may be as high as 12,000,000 pounds. If a nuclear plant runs at an optimal 70-percent capacity, 13,500,000 pounds of uranium yellow cake will be needed to fuel the plant if no reprocessing facilities for spent-fuel are available. At the present time there are no commercial reprocessing plants in operation and no one knows when, if ever, one will be operating. Basic technology for reprocessing is known, but scale-up to commercial size has not been successful at the General Electric Company plant at Morris, Illinois, and the partially completed plant at Barnwell, South Carolina, stands idle for technical and economic reasons. A third plant at West Valley, New York, operated on a small scale for several years, and is now undergoing remodelling scale-up. The date for its return to operational status is uncertain.

Without reprocessing, then, we have enough uranium

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