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

ENERGY AND MINERALS
DIVISION

APRIL 5, 1979

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The Honorable John W. Wydler
House of Representatives

Dear Mr. Wydler:

On February 5, 1979, we issued a report entitled "Cleaning Up Commingled Uranium Mill Tailings: Is Federal Assistance Necessary?" (EMD-79-29). In that report, we recommended that the Congress provide assistance to active mill owners to share the cost of cleaning up the portion of commingled uranium mill tailings generated as a result of processing uranium for sale to the Federal Government. There are about 54 million tons of these low-level radioactive wastes at 12 active sites throughout the United States.

On February 23, 1979, you notified us that you were in general agreement with our recommendations. However, you also asked us for our comments on your views about the report. These views generally pertain to the need for additional information on the

--various methods to cleanup, or control, the uranium mill tailings; and

--estimates of premature deaths caused by the radiation at the uranium mill tailings sites.

URANIUM MILL TAILINGS CONTROL METHODS

As we stated in our report, about 85 percent of the total radioactivity originally in uranium ore remains in the tailings after removal of the uranium. This happens because radium and thorium--the principal contributors of radioactive emissions--are not normally removed from the ore during milling. Of the two, radium is the more significant radioactive waste product in the tailings. It has a very long life, taking thousands of years before it loses its radioactivity.

This loss--called radioactive decay--produces two distinct types of hazards. The first type is highly penetrating gamma radiation which, with sufficient exposure, can

cause cancers, such as leukemia. The second hazard--radon gas--produces other radioactive products which attach to particles in the air and are deposited in the lungs when inhaled. Exposure to large concentrations of these radon products can increase the risk of lung cancer.

Thus, it is important to prevent the radioactive emissions. Every reasonable effort should be made to provide for the stabilization, disposal, and control of the tailings in a safe and environmentally sound manner.

While a full discussion of the various cleanup and control methods was beyond the scope of our report on commingled mill tailings, we agree with you that a more detailed discussion is needed. Unfortunately very little stabilization, disposal, and control has taken place to date, however, many alternative cleanup and control methods are possible. According to a preliminary draft generic environmental impact statement, the Nuclear Regulatory Commission is studying about 10 different tailings' management approaches. These approaches range from the relatively simple and inexpensive to those that are costly and complex.

To provide you with an understanding of the many different approaches, we selected a few that are now being considered by the Commission for one of the existing uranium mills. The possible approaches include

--covering the tailings with an earthen overburden,

--capping the tailings with clay and then covering with overburden,

--removing the tailings to a prelined impoundment site, and

--removing the tailings to a mine pit.

Covering the tailings with an earthen overburden

After milling ceases, the tailings are dried for 6 to 8 years. The dried tailing piles are subsequently leveled into a gently sloping plain and 5.5 feet of earthen overburden is placed on top. Six inches of topsoil is then placed on the overburden and covered with vegetation. The covered tailings piles are then fenced to prohibit unauthorized entry by humans or animals.

The Nuclear Regulatory Commission estimates that this approach will reduce the mill site gamma radiation level to the estimated natural background radiation level. The 6 feet of topsoil and overburden will considerably reduce radon gas release, but to only about 50 times the natural background level.

The Commission estimates that this approach could cost $1.8 million.

Capping the tailings with clay and covering with overburden

This approach's only differing feature from the above is a 1-foot clay overburden. The clay is spread over the tailings prior to the earthen overburden. The Commission believes that this extra step will eliminate the radon gas problem by reducing radon emanation to near-background levels.

While this approach is expected to cost $2 million--a slight increase above the first alternative--it also presents an additional problem. The clay "cap" might slide off the tailings and take the overburden with it if sufficient amounts of water collect between the impermeable clay and the tailings.

Remove the tailings to a prelined impoundment site

Under this approach the tailings are transferred to a 2 to 3 feet excavated clay-lined site. They are then covered with clay, then overburden, topsoil, and finally vegetation. This approach retains the advantages of the first two and also eliminates the possibility of the clay cap sliding off the tailings. According to the Commission, this approach could cost $10.9 million.

Removing the tailings to a mine pit

Under this approach the tailings are moved to a mine and either (1) "fixed" in concrete or asphalt or (2) sealed in clay. Both options require backfilling of the mine with overburden, covering with topsoil, and revegetation. This approach, which substantially forecloses all future approaches, reduces the radon hazard, isolates the tailings from the environment, and prevents inadvertent access. The Commission estimates that this approach could cost $10.9 million for the clay lining, $39.8 million if fixed in asphalt, and $48.1 million for concrete fixation.

ESTIMATES OF PREMATURE CANCER DEATHS

In our view, the present lack of information makes it impossible to estimate, with certainty, the number of premature cancer cases which could be avoided if effective mill tailings stabilization is undertaken at the 12 active mills.

For example, in our June 20, 1978, report to the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, entitled "The Uranium Mill Tailings Cleanup: Federal Leadership at Last?" (EMD-78-90), we noted that the possible health effects of the radiation at 22 inactive mill tailings sites had been predicted. Using a Department of Energy contractor's estimates, based on detailed engineering assessments for each of the 22 inactive sites, we noted that 46 cancer cases could be avoided over a 50-year period and 339 cases could be avoided over a 100-year period. However, it is important to note that, even though the estimates were based on detailed engineering assessments for each specific site, Department of Energy officials told us that, in their opinion, these estimates could vary by a factor of about three or four.

During our review of the issues surrounding the commingled uranium mill tailings at active mill sites, we found that far less data existed for estimates of potential cancer cases at active mills. Notably, there were no detailed engineering assessments for each of the active sites at which commingled tailings were located. While we found a few environmental impact statements for specific active sites, none estimated premature cancer deaths.

Accordingly, we used what we believed to be the best information available; namely, a Nuclear Regulatory Commission preliminary draft generic environmental impact statement on uranium milling which predicted that--over a 1,000-year period--some 4,700 cumulative premature cancer deaths would occur if 68 mills were to operate in the United States with the resulting tailings piles left uncovered. However, if the tailings piles were covered to reduce the radon gas releases to just above the background level, the estimated health effects would be reduced to only about 21 deaths.

We noted in our report that the radiation from 12 active mills with commingled tailings would likely cause a significantly lower number of deaths. Although detailed estimates are not available, if one assumes that the 12 active mills with commingled tailings are representative of the 68 mills used in the Commission's estimate, then about 830 premature

cancer deaths might occur if the tailings were left uncovered. As you indicated in your letter to us, reducing the radiation level to naturally occurring background level would essentially prevent the vast majority of these deaths.

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I hope that these additional comments on the commingled uranium mill tailings issue are responsive to your needs. If you have any additional questions, we would certainly be pleased to discuss them with you.

Sincerely yours,

J. Dexter Peach
Director