

## DOCUMENT RESUME

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The Uranium Mill Tailings Cleanup: Federal Leadership at Last? EMD-78-90; B-164052. June 20, 1978. 25 pp. + 2 appendices (14 pp.).

Report to Rep. John D. Dingell, Chairman, House Committee on Interstate and Foreign Commerce: Energy and Power Subcommittee; by Robert F. Keller, Acting Comptroller General.

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The Department of Energy (DOE) has proposed legislation that would allow it to enter into cooperative agreements with various States to clean up residual radioactive materials called uranium mill tailings at 22 inactive uranium mills. About 25 million tons of mill tailings have accumulated at these sites since the 1940's. Under the proposed legislation, the Federal Government would pay up to 75% of the cost of the joint program and the States would contribute the rest. Findings/Conclusions: Advantages of the proposed program include: reducing a public health hazard, taking a step toward resolving problems of radioactive waste disposal, and improving the depressed value of land on or near which the tailings are located. Disadvantages include its estimated cost of up to \$126 billion, the precedent for the Federal Government to pay for cleaning up other nuclear facilities, and the lack of full development of needed technology. The proposed legislation could accomplish its objectives, but the following areas require clarification: the legislation does not put a time limit on States' participation, it excludes some sites from the cleanup program, some sites do not have to be owned by the State or Federal Government and this could result in a future health hazard, the allocation of costs among governments is not clearly defined, there are no requirements for DOE progress reports to the Congress nor for GAO access to all pertinent documents, and unlimited Federal funding is authorized. In an existing cleanup program at Grand Junction, Colorado, only half of the project is finished after 6

years, and problems may prevent effective completion of the rest. Recommendations: The Secretary of Energy should report to the Congress whether mill tailings cleanup research and development has reached a point whereby the cleanup program can proceed with a high probability of success at this time, and if not, describe what remains to be done and make recommendations to assure timely completion. He should see that the cleanup program at Grand Junction is aggressively carried out and report on actions he is taking to contact property owners where measurements are incomplete and encourage them to apply for assistance, expedite the contracting process to complete remedial action work, and assess the significance of the tailings locations not under the purview of the current program. The Congress should amend the proposed legislation to: put a time limit on when sites must be cleaned up, require reports to the Congress on plans to clean up sites excluded by legislation, require either Federal or State ownership of lands on which tailings are to be placed for long-term stabilization, specify costs to be borne by the States and by the Federal Government, and improve congressional control over the program. (HTW)

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REPORT BY THE

# Comptroller General

OF THE UNITED STATES

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## The Uranium Mill Tailings Cleanup: Federal Leadership At Last?

The Department of Energy has proposed legislation that would allow it to enter into cooperative agreements with various States to clean up residual radioactive materials--commonly called uranium mill tailings--at 22 inactive uranium mills. About 25 million tons of mill tailings have accumulated at these sites since the 1940s.

GAO analyzed the need for, and adequacy of, the proposed legislation and recommends that the cleanup program be endorsed. While the Federal Government has no apparent legal responsibility for such a cleanup, it does have a moral responsibility since the mills primarily produced uranium for Federal programs. Further, it is the only organization able to undertake such a cleanup program on a comprehensive basis. GAO also suggests several areas where the proposed legislation could be strengthened.



E: MD-78-90

JUNE 20, 1978



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

B-164052

The Honorable John D. Dingell  
Chairman, Subcommittee on Energy  
and Power  
Committee on Interstate and  
Foreign Commerce  
House of Representatives

Dear Mr. Chairman:

On May 5, 1978, you requested that we review the need for, and adequacy of, the proposed Residual Radioactive Materials Act of 1978 (H.R. 12535). This legislation would authorize the Department of Energy to enter into cooperative agreements with a number of States to clean up residual radioactive materials --commonly called uranium mill tailings--at 22 inactive uranium mill sites.

In response to your request, this report primarily discusses the

- need for a Federal uranium mill tailings cleanup program;
- adequacy of the Department of Energy's proposed legislation; and
- progress and problems of an existing, but much smaller, cleanup program at Grand Junction, Colorado.

Other questions you asked are also discussed in the report.

We plan to send copies of this report to interested parties and make copies available to others upon request.

Sincerely yours,

A handwritten signature in black ink, appearing to read "R. F. K..." with a stylized flourish at the end.

ACTING Comptroller General  
of the United States

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

FOR RELEASE ON DELIVERY  
Expected at 9:30 a.m.  
Tuesday, June 20, 1978

STATEMENT OF  
MONTE CANFIELD, JR., DIRECTOR  
ENERGY AND MINERALS DIVISION  
BEFORE THE  
SUBCOMMITTEE ON ENERGY AND POWER  
HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE  
ON  
CLEANING UP INACTIVE URANIUM MILL TAILINGS SITES

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to be here today to discuss the need for, and adequacy of, the Department of Energy's proposed "Residual Radioactive Materials Act of 1978" (H.R. 12535).

BACKGROUND

Uranium mills are an often overlooked, but vital part of the nuclear fuel cycle. These mills extract uranium from ore for eventual use in nuclear weapons or nuclear powerplants. Today, we are concerned primarily with the 22 mills that have closed down since the 1940s, leaving about 25 million tons of radioactive sand-like waste--commonly called uranium mill tailings--in unattended piles and ponds. These tailings, which, according to the Department of Energy, are a possible health hazard, were produced primarily as a result of the Federal Government's Manhattan Engineering District and Atomic Energy Commission programs from the early 1940s through the early 1970s.

As a point of reference, there are 16 mills currently in operation throughout the United States, and according to the Nuclear Regulatory Commission, 109 mills will be needed by the year 2000. Although the tailings from these current and future mills will eventually need to be taken care of, we are addressing only those sites which have already been closed down.

On April 27, 1978, the Department of Energy submitted proposed legislation to the Congress that, if enacted, would allow the Department to enter into cooperative agreements with a number of States to clean up these inactive mill tailings sites. The proposed legislation, entitled "The Residual Radioactive Materials Act of 1978" (H.R. 12535), would primarily provide for a joint Federal/State remedial action program in which the Federal Government would pay up to 75 percent of the cost and the States would contribute the rest. Where the sites are located on Indian lands, however, the bill provides for Federal payment of 100 percent of the costs. Unless the Secretary of Energy otherwise determines, the remedial actions will be performed by the Department of Energy or its authorized contractors.

On May 5, 1978, the Chairman of the Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, asked the General Accounting Office (GAO) for its views on the proposed legislation. In response to that request, we prepared a report that addresses

- the need for a Federal program to clean up the 22 inactive uranium mill tailings sites;
- the adequacy of the proposed legislation that would authorize such a program;
- the progress and problems of an existing, but much smaller, cleanup program at Grand Junction, Colorado; and
- several other questions asked by the Subcommittee Chairman.

The report is entitled "The Uranium Mill Tailings Cleanup: Federal Leadership at Last?" (EMD-78-90, June 20, 1978). We have brought a number of copies with us today for your consideration and we are printing additional copies that will be available within the next few weeks.

THE NEED FOR A FEDERAL URANIUM  
MILL TAILINGS CLEANUP PROGRAM

A number of important factors need to be considered before the Congress decides to allow the Department of Energy to enter into cooperative agreements with various States to clean up radioactive tailings at inactive uranium mill sites. Our report identifies and addresses the following seven factors that we believe you should consider:

- To what extent do the mill tailings constitute a hazard to the public's health and safety?

- Is the mill tailings cleanup program necessary for nuclear power to become a substantial source of energy for the future?
- Can productive uses be made of the generally unproductive mill tailings sites?
- To what extent is the Federal Government responsible for creating the mill tailings situation?
- How much will the proposed program cost?
- Are adequate cleanup technologies presently available?
- What is the relationship of the mill tailings cleanup program to other nuclear facilities that may eventually need to be cleaned up?

The report we are providing today contains information on each of these seven factors. We believe that when the seven factors are considered, the Subcommittee will recognize that a decision in this area cannot be clear-cut. While there are sound reasons to go forward with the program, a number of other reasons argue against it.

Advantages of allowing the program to get underway include (1) reducing a possible health hazard to the public as a result of the radiation emission from the tailings, (2) taking a first step toward resolving some of the problems of safely disposing of radioactive wastes--a barrier preventing the United States from placing greater reliance on nuclear power as a substantial energy source, and (3) improving the otherwise depressed value



of some of the land on which the mill tailings are located as well as the value of the adjoining property.

Offsetting these advantages, however, are some disadvantages. The proposed program is estimated to cost up to \$126 million, with the Federal Government bearing the heaviest burden, while receiving the least direct benefits. More important, the cleanup program could be considered as a precedent for the Federal Government to pay for cleaning up other nuclear facilities--a far more costly endeavor than the mill tailings cleanup. This is extremely important because the question of who should pay for cleaning up nuclear facilities has not yet been answered, primarily because very little decommissioning of these facilities has been done to date.

Finally, while not as serious as the above, the technology to stabilize the mill tailings has not been fully developed, possibly preventing a truly satisfactory resolution of the problem at this time.

According to the Department of Energy, the Federal Government's liability for the mill tailings problem has not been established. While the mill tailings resulted primarily from the Federal Government's Manhattan Engineering District and Atomic Energy Commission programs, no one required--either through regulations or a contract--industry to clean up the tailings. According to Department of Energy and Nuclear Regulatory Commission officials, this happened because the effects of the radioactivity in the mill tailings were believed to be

minimal or nonexistent. Only recently--after most of the mills had been shut down--has major concern developed about the possible adverse health effects of radiation in the tailings. Given these circumstances, GAO believes that the Federal Government has a strong moral responsibility to at least assist in cleaning up the abandoned tailings. Further, it is probably the only organization with the ability to carry out such a cleanup on a comprehensive basis.

THE ADEQUACY OF THE PROPOSED  
LEGISLATION

For the Federal Government to help clean up the 22 inactive uranium mill tailings sites, legislation is clearly needed. Although other legislation has been proposed to allow the Federal Government to begin a mill tailings cleanup program, we concentrated on reviewing the Department of Energy's proposed "Residual Radioactive Materials Act of 1978" (H.R. 12535) that provides primarily for a joint Federal/State cleanup program.

We reviewed this legislation from the standpoint of our previous and ongoing involvement in evaluating the mill tailings and radioactive waste disposal problems and programs, concentrating on:

- Will the proposed legislation, if enacted, help accomplish the objective of cleaning up the abandoned mill tailings in an effective and economical manner?

--Will the proposed legislation, if enacted, assure that the public's interest is adequately protected?

Assuming that existing technology for cleaning up mill tailings is adequate--a concern I will discuss later--we believe that the proposed legislation could accomplish the objective of cleaning up the abandoned mill tailings and protect the public's interest. There are areas in the proposed legislation, however, that need to be clarified. Specifically:

--First, the proposed legislation does not put a time limit on when the States are required to participate, thus allowing the program to run indefinitely.

--Second, the proposed legislation excludes some mill tailings sites from the cleanup program. Unless they are addressed at this time, these sites may not be adequately cleaned up.

--Third, some of the sites will not have to be owned by the State or the Federal Government. This could result in a future health hazard because the sites could be inadvertently disturbed by future generations.

--Fourth, the costs to be borne by the Federal Government and the States are not clearly defined in the proposed legislation, leaving questions about who will pay for various aspects of the cleanup program.

--Finally, the proposed legislation (1) does not require the Department to report to the Congress on the program's progress, (2) does not provide for GAO access to all

pertinent documents, and (3) authorizes unlimited Federal funding of the program. The lack of such provisions diminishes necessary congressional control over the program.

PROGRESS AND PROBLEMS OF THE GRAND  
JUNCTION REMEDIAL ACTION PROGRAM

Public Law 92-314, as amended, authorized the Federal Government to enter into a cooperative agreement with the State of Colorado to clean up uranium mill tailings used for construction purposes in the Grand Junction, Colorado, area. Tailings removed during this cleanup are deposited at the Grand Junction mill tailings site and will ultimately be disposed of with these tailings. As of May 1978 about \$6.5 million of the total authorized Federal and State funding of about \$12 million has been spent. During the past 6 years remedial action has been taken at only 315 locations, leaving about 385 more to be done.

As a result of the Subcommittee's recent request, we identified a number of problems that have impeded the successful completion of the Grand Junction program. First and foremost, the managers of the program have been unable to fully plan for the needed remedial actions, primarily because the program is voluntary. Property owners have to apply for assistance before the total number of locations and estimated costs can be determined. Second, the program is having considerable difficulty in getting enough contractors to do the cleanup work, because they appear to be more interested in doing other work.

MATTERS FOR CONSIDERATION BY THE  
SUBCOMMITTEE ON ENERGY AND POWER  
AND THE CONGRESS

We recommend that the Congress endorse legislation which would have the Federal Government take the lead in cleaning up the uranium mill tailings at the inactive mill sites. We believe the Federal Government has a moral responsibility to provide this assistance. Further, the Federal Government is the only organization with the ability to undertake the cleanup on a comprehensive basis. The Congress should make clear that this is a unique situation, and establishes no precedent for the Federal Government assuming the financial responsibility of cleaning up other nuclear facilities and wastes.

We also recommend that the Subcommittee take steps to amend the proposed legislation to

--put a time limit on when the sites must be cleaned up;

--require the Nuclear Regulatory Commission, with assistance from the Department of Energy and the Environmental Protection Agency, to report to the Congress on the need, and adequacy of plans, to clean up mill tailings sites excluded by the legislation, and to make recommendations, if needed, for additional legislation or executive branch actions to insure the cleanup of all sites;

--require either Federal or State ownership of all lands on which mill tailings are to be placed for long-term stabilization;

--specify the types of costs to be included in the program and those to be borne by the States and by the Federal Government; and

--improve congressional control over the program by (1) requiring the Department of Energy to periodically report to the Congress on the progress of the cleanup program, (2) require annual authorization and appropriation of funds for the program, and (3) allow GAO to have access to all pertinent documents relating to the program.

We also recommend that, because of uncertainties about the adequacy of the current technology for cleaning up mill tailings, the Secretary of Energy should report to the Congress, through the Subcommittee on Energy and Power and its Senate counterpart, whether mill tailings cleanup research and development has reached a satisfactory point whereby the mill tailings cleanup program can proceed with a high probability of success at this time. If this report shows that the research and development has not reached a satisfactory point, the Secretary should describe what remains to be done and make recommendations to assure that the necessary research and development work is completed in a timely manner. The Secretary should also report to the Congress on the actions it has taken to see that the Grand Junction remedial action program is aggressively carried out.

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Before concluding my statement, let me again emphasize what I believe to be a very important point. The legislation only deals with the responsibility of the Federal Government for assisting in cleaning up mill tailings at inactive uranium mills. The broader question of who should be responsible for expenses incurred at the so-called "back end" of the fuel cycle, such as decommissioning and decontaminating nuclear powerplants and other nuclear facilities, remains to be addressed. To be licensed, currently operating uranium mills must agree to clean up all of their radioactive materials--an approach we favor. For nuclear powerplants and other nuclear facilities, however, as highlighted in our June 1977 report to the Congress on "Cleaning Up the Remains of Nuclear Facilities --A Multibillion Dollar Problem," the question of basic responsibility for decommissioning has yet to be addressed.

This concludes my prepared statement. We would be pleased to respond to any questions you might have.

**REPORT TO THE SUBCOMMITTEE ON ENERGY AND POWER  
HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE**

**ON**

**THE URANIUM MILL TAILINGS CLEANUP:  
FEDERAL LEADERSHIP AT LAST?**

**UNITED STATES GENERAL ACCOUNTING OFFICE**



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## CHAPTER 1

### INTRODUCTION

If nuclear power is to become a viable energy source for the future, many major problems must be overcome. One of these problems is the lack of progress by the United States in developing and operating acceptable radioactive waste disposal systems--even though such wastes have been accumulating for more than 30 years.

Uranium mill tailings are an often overlooked aspect of the waste disposal problem. Since the 1940s, 39 privately owned mills have produced and sold uranium to the U.S. Government. Twenty-two of these mills have since closed down, leaving about 25 million tons of radioactive sand-like waste --commonly called mill tailings--in unattended piles and ponds. Until recently these tailings were believed to be of such low radiation that they were not considered to be harmful to the public. However, recent concern about the possible adverse effects of low level radiation over long periods of time has served as an impetus for various organizations to seek ways to prevent the tailings from causing any harm to the public. It is a complex and expensive undertaking.

Because of problems with uranium mill tailings, the Nuclear Regulatory Commission (NRC) has instituted new procedures aimed at protecting the public from the hazards of these tailings. By 1978 all new and existing uranium mill licensees will require a tailings reclamation plan and bonding arrangements to finance the tailings reclamation after the mills are shut down. There are 16 mills in operation throughout the United States, and NRC estimates that 109 mills will be needed by the year 2000. This report only addresses the tailings associated with the 22 inactive uranium mill sites.

On April 27, 1978, the Department of Energy (DOE) submitted proposed legislation to the Congress to allow it to enter into cooperative arrangements with a number of States to clean up the inactive mill tailings sites. The proposed legislation, entitled the "Residual Radioactive Materials Act of 1978" (H.R. 12535), is now being considered by the Congress and its committees. If enacted, the cleanup program could cost an estimated \$126 million. A copy of the proposed legislation is contained in Appendix I.

As input to the Congress' deliberations on this proposed legislation, the Chairman of the Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce asked the General Accounting Office (GAO) for its views on

the proposed legislation. In response to the Chairman's May 5, 1978, request, this report addresses

- the need for a Federal program to clean up the 22 inactive uranium mill tailings sites (See ch. 2.);
- the adequacy of the proposed legislation that would authorize such a program (See ch. 3.);
- the progress and problems of an existing, but much smaller, cleanup program at Grand Junction, Colorado (See ch. 4.); and
- several other questions asked by the Subcommittee Chairman.

### SCOPE OF REVIEW

We obtained the information contained in this report by reviewing key documents, studies, reports, correspondence, and other records, and by interviewing officials at

- DOE headquarters, Washington, D.C. and Germantown, Maryland;
- Colorado Department of Health offices in Denver, and Grand Junction, Colorado;
- DOE operations office, Grand Junction, Colorado;
- Environmental Protection Agency headquarters, Washington, D.C.; and
- NRC offices, Bethesda, Maryland.

Much of our work was based on our previous involvement in evaluating the uranium mill tailings and radioactive waste disposal problems and programs.

### AGENCY COMMENTS

We furnished copies of a draft of this report to DOE and NRC. Because of the extremely short timeframe to do this assignment, we did not seek their formal comments on the report; nevertheless, both agencies informally told us that they generally agreed with this report.

## CHAPTER 2

### THE NEED FOR A FEDERAL URANIUM MILL

#### TAILINGS CLEANUP PROGRAM

During the past 5 years there has been considerable congressional and public interest in the uranium mill tailings issue. GAO has also been interested in this area and has issued three reports since May 1975 that have dealt with the subject of cleaning up radioactive uranium mill tailings 1/, and a number of other reports discussing various radioactive waste disposal problems.

#### A BACKGROUND ON URANIUM MILL TAILINGS CLEANUP PROGRAMS

The fiscal year 1973 authorization act for the former Atomic Energy Commission (P.L. 92-314) created the first Federal mill tailings cleanup program. The act authorized the Commission to enter into a cooperative agreement with Colorado to limit the exposure of individuals to radiation from uranium mill tailings which had been used in constructing houses and other buildings in Grand Junction, Colorado. As of May 31, 1978, 315 of about 700 locations have been cleaned up, at a cost of about \$6.5 million. Chapter 4 discusses the Grand Junction cleanup program in more detail.

In 1974 legislation (H.R. 11387, S. 2566) was proposed in the Congress that would have primarily allowed the Federal Government to enter into a cooperative agreement with Utah to clean up the so-called Vitro tailings site in Salt Lake City, Utah. However, at hearings before the former Joint Committee on Atomic Energy, officials from DOE and the Environmental Protection Agency (EPA) stated that many other sites had similar problems, and that all of the sites should be assessed and, if necessary, cleaned up. The proposed legislation was not enacted.

In January 1978, almost 4 years after the Joint Committee hearings, DOE submitted engineering assessment reports on 22 inactive mill tailings sites to the Congress. According to DOE,

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1/"Comments on Proposed Legislation to Amend Public Law 92-314 and for Other Purposes" (EMD-77-52, July 19, 1977), "Cleaning Up the Remains of Nuclear Facilities--A Multibillion Dollar Problem" (EMD-77-46, June 16, 1977), and "Controlling the Radiation Hazard from Uranium Mill Tailings" (RED-75-365, May 21, 1975).

the general finding of these 22 reports--prepared for DOE by a contractor--was that the tailings are not adequately stabilized for long-term storage at any of the sites. Further, according to DOE, wind and water erosion has spread tailings beyond property boundaries, increasing the risk of lung cancer for persons living within one-half mile of a tailings pile by about 100 percent. DOE also indicated that most of the sites are in demand for alternative uses.

On April 27, 1978, DOE submitted proposed legislation to the Congress entitled the "Residual Radioactive Materials Act of 1978." The proposed legislation, if enacted, will provide for a cooperative Federal/State cleanup program with the Federal Government paying up to 75 percent of the cost and the States contributing the rest. Where the sites are located on Indian lands, the Federal Government will pay 100 percent of the cost.

SHOULD THE CONGRESS ALLOW DOE TO  
BEGIN A URANIUM MILL TAILINGS  
CLEANUP PROGRAM?

There are a number of factors that need to be considered before the Congress decides on whether to allow DOE to enter into cooperative agreements with a number of States to clean up radioactive tailings at inactive uranium mill sites. In our view the following seven factors are important:

- To what extent do the mill tailings constitute a significant hazard to the public's health and safety?
- Is the mill tailings cleanup program necessary for nuclear power to become a substantial source of energy for the future?
- Can productive uses be made of the generally unproductive mill tailings sites?
- To what extent is the Federal Government responsible for creating the mill tailings situation?
- How much will the proposed cleanup program cost?
- Are adequate mill tailings cleanup technologies presently available?
- What is the relationship of the mill tailings cleanup program to other nuclear facilities that may eventually need to be cleaned up?

## The effect of the mill tailings on the public's health and safety

In our view, the most important factor to be considered is the effect of radiation emitted from the mill tailings on the public's health and safety. About 85 percent of the total radioactivity originally in uranium ore remains in the tailings after removal of the uranium because radium and thorium--the principal contributors to radioactive emissions--were not normally removed from the uranium ore during milling.

Of the two, radium is the most significant radioactive waste product in the tailings. It has a very long radioactive 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. Exposure to sufficient amounts of gamma radiation can cause cancer, 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.

The possible health effects of the radiation at the 22 mill tailings sites have been postulated. The following table shows the number of cancer cases that could theoretically be avoided during the next 25, 50, and 100 years assuming the most effective remedial action alternatives are selected. The cost of the remedial action is also shown. These estimates were taken by us from the studies of all 22 sites done for DOE by a contractor.

Potential cancer cases avoided as a  
result of most effective remedial action

<u>Site</u>	<u>Number of cases avoided</u>			<u>Maximum cost of remedial action (millions)</u>
	<u>After 25 years</u>	<u>After 50 years</u>	<u>After 100 years</u>	
Durango, Colorado	6	13	27	\$ 13.6
Grand Junction, Colorado	3	7	15	18.1
Rifle, Colorado	4	9	20	32.6
Salt Lake City, Utah	25	60	160	31.5
Shiprock, New Mexico	5	18	99	12.5
Other	<u>3</u>	<u>7</u>	<u>18</u>	<u>17.7</u>
Totals	<u>46</u>	<u>114</u>	<u>339</u>	<u>\$126.0</u>

It is important to note that DOE officials told us that in their opinion, these estimates could vary by a factor of about 3 or 4, meaning that 3 or 4 times fewer, or more, cancer cases could be avoided.

Nuclear power as a substantial  
future energy source

As of March 1978, 69 nuclear powerplants were in operation in the United States. Another 140 were either being built or on order. Nuclear power currently provides about 10 percent of the Nation's electricity. Whether it will continue to grow to become a substantial energy source for the future is dependent on the resolution of several serious problems. Foremost among these problems is the United States' lack of progress in developing and operating waste disposal systems to adequately manage radioactive wastes.

Uranium mill tailings are only one of the types of radioactive wastes that have to be managed. However, failure to clean them up could continue to foster the impression that the radioactive waste problem is unsolvable and that the nuclear power option is, therefore, unacceptable. Cleaning up mill tailings, while not the answer to the whole problem, is a step in the right direction for making nuclear power a more acceptable energy source.

## Using the sites for other purposes

As long as the radioactive mill tailings occupy the sites, particularly if they are not covered up, the site's use is restricted. While most of the sites are in very rural areas and limited use of them is expected, a few of the sites could likely be used for other, more productive purposes. A good example is a site in Salt Lake City, Utah.

This site occupies 128 acres about 4 miles southwest of the Salt Lake City downtown area. A ban has been placed on all future construction within one-half mile of the tailings site. If the site is cleaned up and the radioactive tailings are removed, the construction ban could be lifted and the area could, according to the contractor that assessed the site, feasibly become a high-density residential area. The site is currently assessed at \$25 per acre and nearby land is assessed at \$4,300 to \$5,700 per acre. By cleaning up the site the value of both the site and nearby land, according to a DOE contractor, could conceivably become equal in value to land in the Salt Lake City area selling for \$13,000 to \$25,000 per acre.

The Salt Lake City site, of course, is an extreme case. While most of the sites could likely be put to some other use --agricultural, recreational, commercial, or residential--most of the sites are in rural areas and there appears to be little pressure to use them for other purposes. The Grand Junction and Durango, Colorado, sites are perhaps the closest to the Salt Lake City situation, as these sites are in more heavily populated communities.

## The responsibility for creating the mill tailings problem

Three basic groups theoretically could be asked to pay for the cleanup program--industry (or past and present site owners), the States (or local communities), and/or the Federal Government. Determining who should pay for the mill tailings program, however, is a complex undertaking. The following points are important.

- The Federal Government was the principal purchaser of the uranium from these mills for its Manhattan Engineering District and Atomic Energy Commission programs.
- The possible adverse health effects of low level radiation from mill tailings was not generally recognized until very recently when most, if not all, of the mills were shut down.



- Requirements for cleaning up the tailings were not included in the Government's uranium procurement contracts.
- Neither the Atomic Energy Commission nor its regulatory successor, NRC, exercised regulatory jurisdiction over these tailings.
- Industry and the States also benefited from the mill tailings operations either through profits, taxes, or improved employment.
- According to DOE, the owners of most sites are either unwilling or financially unable to clean up the sites, and the Federal Government does not have the contractual or regulatory authority to require them to do so.
- No legal action has been taken by the courts to determine responsibility.

These facts indicate that no one has a clear legal responsibility for cleaning up the sites. This was previously recognized by the Congress when it authorized the former Energy Research and Development Administration to begin a small cleanup program at Grand Junction, Colorado, and is also recognized in DOE's proposed legislation. The proposed legislation states that the United States has a compassionate responsibility to provide assistance to the States for the cleanup program.

The idea of the United States having a moral responsibility, when considered with the fact that only the Federal Government has the ability to handle such a comprehensive, broad-based program, leads us to believe that the Federal Government should take a strong leadership role in cleaning up the abandoned mill tailings, while ensuring that this situation will not happen again.

#### The cost of the program

One of the most important factors to be considered in making the decision to allow the cleanup program to begin is the cost of the program. DOE gave us an estimate of \$80 to \$126 million in 1977 dollars. The range of costs is due to the different types of remedial actions available to clean up the sites.

Remedial actions cover a range from (a) decontamination of the site only, to (b) further stabilization of the tailings piles in their present locations and in their present configurations, to (c) removal of all radioactive materials to an area where they could be isolated from the public. Not all of these

alternatives pertain to all sites, however, because conditions at each are different.

### Adequacy of mill tailings cleanup technology

The objective of cleaning up the uranium mill tailings is to prevent radioactive and other toxic particles from adversely impacting on the environment. Ideally, complete stabilization of radioactive tailings would eliminate the possibilities of (1) wind and water erosion, (2) leaching of radioactive materials and other chemicals, (3) radon emanation from the tailings piles, and (4) gamma radiation being emitted from the tailings.

We believe that the mill tailings cleanup program should, if enacted, be conducted as a one-time effort. The Federal Government should not be asked, nor expected, to clean up mill tailings sites more than once. To do otherwise would be far too costly. Therefore, adequate technology must be available to dispose of or stabilize the tailings without the need for further costly remedial action. Our review of some of the key documents underlying the proposed legislation, however, suggests that this technology is not now available.

A DOE contractor, in its assessment of each of the 22 inactive mill tailings sites, stated that it reviewed all present methods, technology, and research data on uranium mill tailings site stabilization. It found that much research and development remains to be performed before complete stabilization of radioactive mill tailings can be realized. In particular, the contractor found that (1) reasonably effective means of wind and water erosion control are available, although they will involve continued maintenance costs; and (2) possible methods exist for the control of leaching. Up to this time, however, no attempt has been made to contain radon in a tailings pile. Although a thick earth cover is theoretically effective, it has never been attempted.

DOE officials are confident that the problems of uranium mill tailings stabilization can be resolved in a timely manner by practicable methods. However, they also indicated that they do not know all of the answers for tailings stabilization, including

- the practicality of extracting all radioactive elements from tailings,
- how a site should be contoured to minimize radon emanation,

--whether practicable tailings' surface sealants exist,  
and

--whether quick growing self-sustaining vegetative covers  
can be developed.

There have been no attempts at long-term stabilization of  
tailings at the sites.

### Cleaning up other nuclear facilities

Any materials, equipment, or facilities that come into  
contact with a nuclear reaction or radioactive material could  
become contaminated or radioactive. They cannot be abandoned  
or reused unless the radiation has been removed or reduced to  
acceptable levels. This cleanup process usually consists of  
decontamination and/or decommissioning. Decontamination is  
the process of cleaning up surface contamination--a process  
that often consists of scrubbing and washing. Decommissioning  
is a term indicating the closing or shutting down of a facility  
with some actions taken to prevent--at least temporarily  
--health and safety problems.

Our report "Cleaning Up the Remains of Nuclear Facilities  
--A Multibillion Dollar Problem" (EMD-77-46, June 16, 1977) dis-  
cusses the many aspects of decontaminating and decommissioning  
nuclear equipment, materials, and facilities. It indicates  
that the question of who should pay for decommissioning nu-  
clear facilities has not yet been answered, nor is the total  
cost yet known, primarily because very little decommissioning  
has been done to date.

We found that there is no requirement for and generally  
no effort being made today, with the exception of uranium  
mills, to provide for the cost of future decommissioning of  
privately owned nuclear facilities. The failure to make such  
a provision can result in the Federal and/or State Governments  
assuming responsibility that rightly belongs to private indus-  
try. The mill tailings situation is an example of the Federal  
Government having to bear the greatest cost to pay for the  
cleanup of facilities abandoned by industry.

The mill tailings cleanup program can be viewed as a prec-  
edent for the Federal Government becoming involved in the de-  
commissioning of other nuclear facilities. Perhaps the great-  
est immediate danger of this idea taking hold pertains to the  
nuclear fuel reprocessing plant at West Valley, New York.  
This plant, the only commercial reprocessing plant to operate  
in the United States, was shut down in 1972. According to DOE,  
it will cost from \$90 million to \$600 million to dispose of

all the radioactive material, including dismantling and removing the structures. 1/

Who is going to pay for the cleanup program at West Valley is still not certain. When the plant owner decided in 1976 to transfer control of the site to the New York State Energy Research and Development Authority, it imposed a very large financial burden on the State. Because of this, the New York Authority has asked the Federal Government to completely take over the West Valley site. DOE has not accepted this request, but has agreed to discuss the problem with the Authority.

In our view, the Grand Junction remedial action program, the proposed mill tailings cleanup program, and the West Valley situation--if all are paid for primarily by the Federal Government--might serve as a strong precedent and trend for the Federal Government to pay for most, if not all, decommissioning activities.

### CONCLUSIONS

The proposed legislation, if enacted, would allow DOE to enter into cooperative arrangements with a number of States to clean up 22 inactive uranium mill tailings sites. The question now before the Congress is whether the proposed legislation should be adopted, modified, or rejected.

GAO believes that when the seven factors identified above are considered, it is apparent that while there are sound reasons to go forward with the program, a number of other reasons argue against it. A decision in this area cannot be clear cut.

Advantages include (1) reducing a possible health hazard to the public as a result of the radiation emissions from the mill tailings; (2) taking a first step towards resolving some of the problems of safely disposing of radioactive wastes--a barrier preventing the United States from placing greater reliance on nuclear power as a substantial energy source; and (3) improving the otherwise depressed value of some of the land on which the mill tailings are located, as well as the value of the adjoining property, particularly for the few sites where there is pressure for their use.

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1/We have issued a report on this subject entitled "Issues Related to the Closing of the Nuclear Fuel Services, Incorporated, Reprocessing Plant at West Valley, New York" (EMD-77-27, March 8, 1977).

Offsetting these advantages, however, are some disadvantages. The program could cost up to an estimated \$126 million, of which the Federal Government will bear the heaviest burden, while receiving the least direct benefits. Further, the cleanup program could be considered as a precedent for the Federal Government to pay for cleaning up other nuclear facilities--a far more costly endeavor than the mill tailings cleanup. This is extremely important because the question of who should pay for cleaning up nuclear facilities has not yet been answered, primarily because very little decommissioning of these facilities has been done to date. Finally, while not as serious as the above, the technology to stabilize the mill tailings has not been fully developed, possibly preventing a truly satisfactory resolution of the problem at this time.

It is important to note that the Federal Government's liability for the mill tailings problem has not been established. While the mill tailings resulted primarily from the Federal Government's Manhattan Engineering District and Atomic Energy Commission programs, no one required--either through regulations or contracts--industry to clean up the tailings. According to L. and NRC officials, this happened because the effects of the radioactivity in the mill tailings were believed to be minimal or nonexistent. Only recently--after most of the mills had been shut down--has major concern developed about the possible adverse health effects of radiation in the tailings. Because of this GAO believes that the Federal Government has a strong moral responsibility to at least assist in cleaning up the abandoned tailings. Further, it is probably the only organization with the ability to carry out such a cleanup on a comprehensive basis.

MAJTER FOR CONSIDERATION BY THE  
SUBCOMMITTEE ON ENERGY AND POWER  
AND THE CONGRESS

We recommend that the Subcommittee on Energy and Power and the Congress endorse the basic idea of having the Federal Government take the lead in cleaning up the uranium mill tailings at the inactive mill sites. The Federal Government has a moral responsibility to provide this assistance. Further, the Federal Government is the only organization with the ability to undertake the cleanup on a comprehensive basis. The Congress should make clear that this is a unique situation, and establishes no precedent for the Federal Government assuming the financial responsibility of cleaning up other nuclear facilities and wastes.

RECOMMENDATION TO THE  
SECRETARY OF ENERGY

We recommend that, because of uncertainties about the adequacy of the current technology for cleaning up mill tailings, the Secretary of Energy report, before the proposed legislation is enacted, to the Congress, through the Subcommittee on Energy and Power and its Senate counterpart, whether mill tailings cleanup research and development has reached a satisfactory point whereby the mill tailings cleanup program can proceed with a high probability of success at this time. If this report shows that the research and development has not reached a satisfactory point, the Secretary should describe what remains to be done and make recommendations to assure that the necessary research and development work is completed in a timely manner.

## CHAPTER 3

### THE ADEQUACY OF THE PROPOSED

#### RESIDUAL RADIOACTIVE MATERIALS ACT OF 1978

The proposed Residual Radioactive Materials Act of 1978, if enacted, would authorize the Secretary of Energy to enter into cooperative agreements with a number of States to (1) assess radiation levels at inactive uranium mill tailings sites and (2) perform appropriate remedial action to clean up the sites to protect the public's health. It primarily provides for a joint Federal/State program in which the Federal Government would pay up to 75 percent of the costs and the States would contribute the rest. Unless the Secretary of Energy otherwise determines, the remedial action will be performed by DOE. Where the sites are located on Indian lands, the bill provides for Federal payment of 100 percent of the costs and Federal management of the program.

We reviewed the legislation primarily from the standpoint of our previous involvement in evaluating the mill tailings and radioactive waste disposal problems and programs. We did not conduct a comprehensive review of the proposed legislation, or any supporting documentation, because we were limited by the time requirements imposed by the Subcommittee's request. To determine whether the bill is adequate, we generally reviewed it with the following factors in mind:

- Will the proposed legislation, if enacted, help accomplish the objective of cleaning up the abandoned mill tailings in an effective and economical manner?
- Will the proposed legislation, if enacted, ensure that the public's interest is adequately protected?

Assuming that existing technology for cleaning up mill tailings is adequate--a concern discussed in the previous chapter--we believe that the proposed legislation could accomplish the objective of cleaning up the abandoned mill tailings and protect the public's interest. However, there are a number of areas in the proposed legislation that need clarification, as discussed below.

#### SOME MILL TAILINGS SITES ARE EXCLUDED FROM THE PROGRAM

The proposed legislation specifically excludes a number of uranium mill tailings sites from the cleanup program, namely:

- Those sites that are currently licensed by either NRC or States that have a licensing agreement with NRC. This would exclude all mills currently in operation, as well as an inactive mill site at Edgemont, South Dakota, which is still licensed.
- Sites that are owned by the Federal Government, including the DOE site at Monticello, Utah, and the Tennessee Valley Authority site at Edgemont, South Dakota.
- Sites that never had a contract with the Federal Government, namely the Ray Point, Texas, site owned by Exxon Corporation.

According to DOE, these sites are excluded for a number of reasons. Licensed sites are either required by NRC to be cleaned up or are a State responsibility. For federally-owned sites, the States should not be expected to participate financially in their stabilization. Finally the Federal Government has no responsibility for cleaning up mill sites in which it had no contractual involvement.

We do not disagree with the reasons for excluding these sites. However, we believe that the Congress should receive adequate assurance at this time from the executive agencies --DOE, EPA and NRC--that these sites will either not pose a potential health problem or they will be adequately cleaned up and stabilized.

We believe that this assurance can best be made if NRC, with assistance from DOE and EPA, reports to the Congress within 6 months of the proposed legislation's enactment, on the problems or potential problems at each excluded site, including those that are Government-owned. Such a report should also assess the need for, and adequacy of, plans to clean up and stabilize the excluded sites and make recommendations, if necessary, to have adequate and timely cleanup programs implemented.

#### MORE SPECIFIC DEFINITION OF COSTS NEEDED

The proposed legislation states that the Federal Government will provide up to 75 percent of the costs of a joint Federal/State program to assess radiation levels and to perform appropriate remedial actions to clean up the mill tailings sites.

We are concerned that if the Congress approves this funding ratio, the legislation will not specify the types of



costs to be borne by the Federal Government, particularly for the remedial action program. The remedial action program could be considered to include all of the costs to clean up the site and to take care of it into perpetuity. The engineering assessment reports, which serve as key documents supporting the overall cleanup program, state that for each cleanup option, the following costs are included: engineering, remedial action, environmental assessment and preparation of an environmental impact statement, a contingency item, and a perpetual care fund. It is also not clear whether the State's cost to purchase the tailings site will be included in their 25 percent contribution, be paid for partly by the Federal Government, or be a cost in addition to that paid for under the 75/25 funding provision.

#### LACK OF A TIME LIMIT ON THE CLEANUP PROGRAM

DOE estimates that the entire cleanup program can be finished within 5 years after enactment of the proposed legislation. The legislation, however, does not place a time limit on either the States or the Federal Government as to when the program should be finished. This could clearly lead to a cleanup program that, particularly if some States are unwilling to participate, could run indefinitely. This would not be conducive to running an effective and economical program.

It may be desirable for a time limit--perhaps 10 years--to be placed on the overall cleanup program. Assuming all of the necessary research and development work is done, this should be ample time for all of the remedial actions to be finished. The legislation should also specify a time--perhaps 3 to 4 years--in which the States must apply for Federal assistance. This would help assure that the program is completed in a reasonable time, while allowing DOE to properly plan for its cleanup effort.

#### PERPETUAL OWNERSHIP OF THE TAILINGS DISPOSAL SITES

The proposed legislation states that unless otherwise determined by the Secretary of Energy, the various States will be responsible for (1) designating the mill tailings disposal site within the State, and (2) ownership of any mill tailings that are removed. The State shall also retain ownership of the land on which the tailings are to be located. According to DOE and NRC, the State will be required to own the land on which the tailings are located because the tailings will continue to be radioactive for thousands of years and should not be disturbed in the future.

The specific language of the proposed legislation, however, does not appear to cover ownership of those sites where the tailings are to be stabilized in place, not removed. Thus, these types of sites would not have to be owned by the States, but could remain in the possession of various corporations or individuals. Thus, assurances that the tailings sites would not be inadvertently disturbed--assurance that is perhaps best gained by State or Federal ownership--is not found in the legislation. (App. II shows past and present ownership of the sites.)

NRC officials, who had assumed that all sites were to be owned by the States or the Federal Government, told us that they would prefer to see such ownership so that the public's health and safety is protected.

#### IMPROVING CONGRESSIONAL CONTROL OVER THE CLEANUP PROGRAM

In order to see that the public's interest in such an expensive undertaking is protected, the proposed legislation should be amended to allow for improved congressional control over the cleanup program.

First and foremost, the proposed legislation states that, while only \$3 million is authorized to be appropriated in fiscal year 1979, as much money as may be necessary to carry out the purposes of the act is also authorized. This unlimited amount of money will remain available until expended.

If the authorization committees of the Congress want to stay actively involved in this program, they could do so through yearly authorization of funds. This would allow the Congress to, perhaps, stop the program or otherwise modify it if necessary.

Second, the proposed legislation does not mention whether any executive agency will be required to report to the Congress on the progress of the cleanup program. Such a requirement is needed in order for the Congress to effectively oversee and authorize additional funds for the cleanup program.

Finally, the proposed legislation states that DOE will be provided such reports, accounting, and rights of inspection as DOE deems appropriate. It does not mention that GAO should have access to any documents relating to the program. While various laws give GAO the authority to have access to the cleanup program's records, we believe that this legislation should also specifically provide for GAO to have access to any and all documents relating to the program.

DESIGNATION OF EPA TO PRESCRIBE  
STANDARDS AND CRITERIA

The proposed legislation gives the responsibility to EPA to prescribe all of the standards and criteria necessary to protect the public health and safety, as well as the environment. NRC is only to be consulted during the preparation of these standards and criteria, and shall subsequently be responsible for their enforcement.

According to DOE officials, EPA was designated to do this job because existing legislation--the Resource Conservation and Recovery Act of 1976 and the Clean Air Act of 1970, as amended--gives EPA the authority to develop standards for residual radioactive materials. In fact, EPA has already developed some standards applicable to the uranium fuel cycle, which may be found in the Code of Federal Regulations (40 C.F.R. 190).

NRC officials told us they agree with the designation of EPA to prescribe the inactive mill tailings standards, even though active mill sites are licensed and regulated by NRC. In this capacity, NRC is presently drafting legislation to establish a national Federal minimum standard for operation of new uranium mills. These officials stated that their draft legislation would apply to the inactive mill sites even if the proposed legislation (H.R. 12535) is enacted and the tailings are cleaned up.

GAO believes that EPA should be responsible for setting the standards and criteria for the inactive mill sites, with NRC implementation. The proposed legislation appears to reinforce existing legislation. Further, it is a sound management practice for one organization to set standards while another implements them.

CONCLUSIONS AND MATTERS FOR  
CONSIDERATION BY THE SUB-  
COMMITTEE ON ENERGY AND POWER  
AND THE CONGRESS

DOE has submitted proposed legislation to allow it to enter into cooperative arrangements with a number of States to clean up 22 inactive uranium mill tailings sites. If the Congress believes that a strong Federal role is needed in this area, legislation is necessary to allow the cleanup program to begin. As discussed above, however, some changes could be made to the proposed Residual Radioactive Materials Act of 1978. These changes could do much to strengthen the Federal Government's role in cleaning up radioactive mill tailings while ensuring that the public's interest is adequately

protected. We recommend that the proposed legislation be amended to

- put a time limit on when the sites must be cleaned up;
- require NRC, with assistance from DOE and EPA, to report to the Congress on the need, and adequacy of plans, to clean up mill tailings sites excluded by the legislation, and to make recommendations, if needed, for additional legislation or executive branch actions to insure the cleanup of all sites;
- require either Federal or State ownership of all lands on which mill tailings are to be placed for long-term stabilization;
- specify the types of costs to be included in the program and those to be borne by the States and by the Federal Government; and
- improve congressional control over the program by (1) requiring DOE to periodically report to the Congress on the progress of the cleanup program, (2) require annual authorization of funds for the program, and (3) allow GAO to have access to all pertinent documents relating to the program.

## CHAPTER 4

### PROGRESS AND PROBLEMS OF THE GRAND

#### JUNCTION REMEDIAL ACTION PROGRAM

Because uranium mill tailings compact easily, they can serve as a good fill material in construction projects. For example, they were used extensively for construction purposes --houses, schools, businesses, sidewalks, and highways--in the Grand Junction, Colorado, area between 1952 and 1966. Because of a possible health hazard resulting from the radiation in these mill tailings, the Congress authorized the Federal Government to enter into a cooperative agreement with Colorado to clean up the Grand Junction mill tailings used for construction purposes (Public Law 92-314, as amended). This cleanup program--called the Grand Junction remedial action program--is managed by the Colorado Department of Health and DOE.

In May 1975 GAO reported to the Congress on the Grand Junction remedial action program. <sup>1/</sup> As a result of the Subcommittee's request, we reexamined the program. This chapter highlights

- the progress of the Grand Junction remedial action program through the end of May 1978, and
- the current problems preventing the program from being completed in an effective and economical manner.

#### BACKGROUND

About 85 percent of the radioactivity in uranium ore remains in the uranium mill tailings--a waste product of the milling process. Since the potential health hazard caused by the presence of radiation in the tailings was not recognized, the tailings at Grand Junction, Colorado, were used extensively for construction purposes throughout the Grand Junction area between 1952 and 1966.

In 1966 representatives of the Colorado Department of Health and the U.S. Public Health Service determined that radiation levels in structures where tailings had been used were higher than naturally occurring background radiation levels. The uranium mill tailings had been removed from a uranium

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<sup>1/</sup>"Controlling the Radiation Hazard from Uranium Mill Tailings" (RED-75-365, May 21, 1975).

mill which was producing uranium for the Federal Government. In recognition of the compassionate, not legal, responsibility of the Federal Government to provide financial assistance to Colorado to assess the magnitude of the tailings-use problem, and to take corrective actions where necessary, the Congress established the remedial action program (P.L. 92-314, June 16, 1972).

This law provided for a \$6.7 million cooperative Federal/State program with 75 percent Federal funding and 25 percent State funding, and required that remedial action would only be taken if the property owners applied for assistance by June 16, 1976. Recent amendments to this law, however, have increased the total Federal funding to \$9.5 million for a program total of about \$12 million, and extended the deadline for application by property owners to June 16, 1980.

### PROGRESS OF THE REMEDIAL ACTION PROGRAM

The purpose of the Grand Junction remedial action program is twofold. First, the need to limit the exposure of people to radiation hazards which resulted from the use of uranium mill tailings for construction purposes in the area of Grand Junction, Colorado, must be assessed. Then, remedial action is taken, if necessary.

#### Assessing the need for remedial action

In order to determine whether remedial action is necessary, initial radiation surveys to identify tailings-use locations need to be made. Where radiation levels indicate a potential problem, more detailed measurements are made. As of May 31, 1978, program officials had assessed the need for remedial action at about 18,500, or 97 percent, of the estimated 19,100 locations in or around Grand Junction. From this assessment and estimates of uncompleted locations, they determined that about 700 locations will eventually need remedial action.

Unfortunately, the need for remedial action at about 600 locations cannot be precisely determined because the owners or occupants refuse to allow measurements or they could not be contacted. Colorado Department of Health officials told us that they periodically send reminder letters and make visits to these locations in an attempt to complete the measurements.

## Remedial actions are only about half complete

The Grand Junction program has been underway for almost 6 years, yet it is only about half finished. As of May 31, 1978, remedial action had been taken on 315 locations at an estimated total cost of about \$6.5 million. Recent estimates show that remedial action will eventually need to be taken on about 700 locations at an estimated total cost of about \$14 million. Because of an extension in the time permitted for property owners to apply for assistance under the program to June 16, 1980, and because detailed radiation measurements can take as long as a year, Colorado Department of Health officials estimate that the program will not be completed until after 1981.

At the time the program was established in 1972, program officials estimated that about 500 locations would need remedial action, taking about 4 years. However, in our 1975 report on the program, we recommended that an additional 3,600 locations be surveyed to determine radiation levels and that 436 locations--where radiation surveys had already been conducted--be reevaluated to determine whether they were eligible for remedial action.

Based on these additional radiation surveys and reevaluations of potentially eligible properties, program officials now estimate that there will be approximately 700, not 500, total locations where remedial action will eventually be necessary.

## PROBLEMS AFFECTING THE PROGRAM'S OBJECTIVES

The Grand Junction remedial action program is currently faced with several significant problems that may prevent it from meeting its objectives. These problems are caused by the voluntary nature of the program and by the lack of local contractors to do the remedial work.

Failure to meet program objectives could either result in (1) not cleaning up all of the radioactive mill tailings, and thereby continuing a possible health hazard; or (2) continuing the program at an increased cost to the Federal and State Governments.

### Voluntary nature of the program

The remedial action program is a voluntary, not mandatory, program. Property owners must apply for assistance. They are not required to clean up their property or to seek help from

the remedial action program. Property owners currently have until June 16, 1980, to apply for remedial action.

This voluntary nature is the cause of the most significant problem in bringing the program to its successful conclusion--the program's management is unable to determine the extent of remaining remedial work required.

As of May 31, 1978, about 600 locations near Grand Junction had not been completely surveyed to determine whether remedial action is necessary. These surveys have not been completed because owners or occupants refused to allow the survey or because program officials had been unable to contact property owners.

Further, program officials estimate that as many as 700 --or 385 more--locations may need remedial action. These include estimates of locations based on calculations of (1) unsurveyed locations and (2) those where the property owners had been told there was no reason to be concerned, but that the radiation measurements on their property slightly exceeded the permissible amount. In addition, program officials do not know how many property owners will remove their own tailings and apply to the program for reimbursement.

Because participation in the program is voluntary, properties which are not cleaned up could be sold to unsuspecting buyers, thus exposing them to the radiation hazard from uranium mill tailings. Although real estate organizations have been cooperative in using the results of radiation assessments in Grand Junction in connection with property transfers, there is no mechanism to ensure that tailings involvement is considered in all property exchanges, especially those that do not involve real estate organizations. Representatives of the Colorado Attorney General's Office told us that State legislation would be necessary to make the tailings and radiation condition of all properties in the Grand Junction area a permanent part of the property records.

#### Lack of construction contractors

Another problem the program has encountered is a dwindling number of contractors in the Grand Junction area who desire this type of work. A program official told us that during 1974 to 1975 there were 9 to 13 active participants, but that this has now dropped to only 3. According to program officials, contractors are more interested in other construction in the Grand Junction area, primarily related to increased demands in response to energy development. One State official told us many contractors have declined to bid on remedial action work



because they are already at their bond limits as a result of the extensive construction in the area.

Program officials have discussed methods of improving the contracting process, including the merits of a single construction contractor to do all remedial action work as opposed to the current procedure of competitive bidding each location. Also, an engineering firm under contract to the program will be contacting local contractors and assessing how construction might be expedited through changes in contracting procedures.

#### LACK OF CONTROL OVER RELATED TAILINGS

An additional area of concern adding to program uncertainties has been the tailings locations that do not come under the purview of the remedial action program because the tailings are not under or near structures. The Colorado Department of Health has identified over 2,300 such locations where any cleanup is now at the property owner's expense. Many of these are vacant lots or are in locations that someday may be developed. Although the Grand Junction building department has cooperated with the program in getting radiation surveys made before building permits are issued, the effort is not mandatory. Program officials told us in 1974 that an ordinance was under consideration to require such surveys since participation was voluntary; however, no such ordinance has yet been developed. A program official told us the requirement for radiation surveys under the building permit program can still be waived by the builder.

Program officials recently discovered that Grand Junction water department employees had removed tailings from around some sewer lines they were repairing and deposited them near the river or on private property. As a result, the program provided measuring instruments to the city and instructed city officials to measure radiation levels before such work is done in the future to preclude improper disposal. This problem could be significant in the future since tailings were used in many street and sidewalk projects.

A representative of the Colorado Attorney General's Office told us that the Colorado Department of Health has the authority to develop regulations to make the building permit program mandatory. We were also told that the Department has the authority to require local governmental organizations to ascertain whether tailings are present prior to removing fill material to nonrepository locations, and to require these organizations to remedy situations where tailings have been inadvertently moved to improper locations.

## CONCLUSIONS

The Grand Junction remedial action program started in 1972 with the basic objective of cleaning up tailings-contaminated locations where a potential health hazard existed. In 6 years only half of the project is finished and significant problems exist that may prevent the rest from being completed in an effective and economical manner.

## RECOMMENDATION TO THE SECRETARY OF ENERGY

We believe that DOE should give renewed attention to seeing that the cleanup program is aggressively carried out. Further, we recommend that the Secretary of Energy report to the Congress on the actions he is taking to

- contact those property owners where measurements are incomplete and encourage them to apply for assistance;
- obtain additional contractors and expedite the contracting process to complete the remedial action work in a timely manner; and
- assess the significance of the tailings locations not under the purview of the current program and take actions, if necessary, to assure that these tailings are not dispersed.

This report could be included in the report DOE must submit to the Congress under Public Law 95-236 by February 1979.

THE PROPOSED RESIDUAL RADIOACTIVE  
MATERIALS ACT OF 1978 (H.R. 12535)

To authorize the Secretary of Energy to enter into cooperative arrangements to contain and to reduce potential radiation exposure from residual radioactive materials, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Residual Radioactive Materials Act of 1978".

SEC. 2. The Congress recognizes and assumes the compassionate responsibility of the United States to provide financial assistance to the States of Arizona, Colorado, Idaho, New Mexico, Oregon, Texas, Utah, Wyoming, Pennsylvania, and any other State determined to be in a similar situation by the Secretary of Energy for the purpose of limiting the exposure of the public to radiation emanating from residual radioactive materials, as hereinafter defined, from former uranium ore processing sites situated in such States.

SEC. 3. As used in this Act:

(a) the term "processing site" shall mean a site on which uranium ore was processed but shall not include a site;

(i) where no uranium was produced for sale under contract to the United States Government;

(ii) where the site was owned on January 1, 1978 by the United States Government or any agency or department thereof; or

(iii) where a license issued by the U.S. Nuclear Regulatory Commission, the Atomic Energy Commission or by a State under Section 274 of the Atomic Energy Act of 1954, as amended, was in effect on or is issued after January 1, 1978, for the production of a uranium product derived from ores other than residual radioactive materials, as hereinafter defined;

(b) the term "residual radioactive materials" shall include the accumulated tailings resulting from processing of ores for extraction of uranium and other valuable constituents, and also other radioactive materials such as residual stock of unprocessed ores or low grade materials, and ground in the vicinity of the mill or processing site which has become contaminated with radionuclides, including radium-226, derived from the site;

(c) the term "Secretary" shall mean the Secretary of Energy.

SEC. 4. The Secretary is hereby authorized and directed to enter into cooperative arrangements with any State identified in or pursuant to Section 2 of this Act

under which the Secretary will provide not in excess of 75 per centum of the costs of joint Federal/State programs to assess radiation levels and to perform appropriate remedial action to limit exposure of individuals to radiation emanating from residual radioactive materials.

SEC. 5. Each cooperative arrangement referred to in Section 4 of this Act shall include, but not be limited to, terms which provide that:

(a) the selection of appropriate remedial action shall be determined by the Secretary upon consultation with the State, the Environmental Protection Agency, and others, as appropriate and shall be submitted to the Nuclear Regulatory Commission for review and concurrence;

(b) the Secretary may determine that, for some sites, the appropriate remedial action is to move the residual radioactive materials to a more suitable location for long-term stabilization or other disposition. Unless otherwise determined by the Secretary, State ownership of the residual radioactive materials and the land upon which those materials are originally located must be accomplished before a remedial action is undertaken involving the removal of tailings from an existing site. The requirement for State ownership shall not apply to lands in the general vicinity of the processing site which may require decontamination activities as a result of incidental spread of radioactive substances, or to

lands or structures where radioactive materials removed from the processing site have been used for construction-related purposes. Subject to the Secretary's approval, the requirement for State ownership of the land may be met by means of a purchase option exercisable at any time within two years after remedial work is completed;

(c) unless otherwise determined by the Secretary, any remedial action shall be performed by the Department of Energy or its authorized contractor and shall be paid for in accordance with the provisions of Section 4 of this Act;

(d) the Secretary shall have a right of approval of any disposal or custody plan;

(e) in the event that any lands are acquired by a State as required by subsection (b) of this section, and the proceeds of subsequent sale or disposal in any manner exceed the cost of acquisition, the Secretary shall be reimbursed out of such proceeds by the State in proportion to the Secretary's share of the total costs involved in the program of assessment and performance of remedial action on such lands; and in the event the State does not dispose of the lands within two years after the acquisition thereof or the completion of remedial action, whichever comes later, the Secretary shall be so reimbursed by the State on the basis of the increase in value of the lands over the acquisition costs;

(f) the United States shall be released from any radioactive materials-related liability or claim thereof related to any remedial action from the date of enactment of this Act through and including the completion of any remedial action authorized by this Act. The United States as used herein includes the executive departments, the military departments, the independent establishments of the United States, and corporations primarily acting as instrumentalities or agencies of the United States, but does not include any contractor with the United States;

(g) unless otherwise determined by the Secretary in consultation with the Nuclear Regulatory Commission and the Environmental Protection Agency, the State shall have responsibility for the designation of the disposal site within the State and ownership of any residual radioactive materials involved in any remedial action effort pursuant to subsection (b) of this section, and shall retain ownership of the land on which they are located;

(h) the law of the State in which the processing site is located shall be applied to determine all questions of title, rights of heirs, and trespass; and

(i) the Secretary will be provided such reports, accounting and rights of inspection as the Secretary deems appropriate.

SEC. 6. The provisions of Sections 2, 3, 4 and 5 of this Act shall not apply to the assessment and performance of remedial action in connection with residual radioactive

materials resulting from uranium ore processing operations formerly conducted on lands (a) held in trust by the United States for any Indian, or for any Indian tribe, band, group, pueblo or community (hereinafter referred to as "Indian tribe"), or (b) owned by any Indian tribe subject to a restriction against alienation imposed by the United States. With respect to such materials, the Secretary is hereby authorized and directed to enter into cooperative arrangements with the Secretary of the Interior and with the Indian tribes residing on such lands, under which the Secretary will provide 100 per centum of the costs of a program to assess radiation levels and to perform appropriate remedial action to limit the exposure of individuals to radiation emanating from residual radioactive materials.

SEC. 7. The cooperative arrangements referred to in Section 6 shall include, but need not be limited to, terms which provide that:

(a) the need for and selection of appropriate remedial action shall be determined by the Secretary, with the concurrence of the Secretary of the Interior, and upon consultation with the Indian tribe, the Environmental Protection Agency, and others, as appropriate and shall be submitted to the Nuclear Regulatory Commission for review and concurrence;

(b) any remedial action shall be performed by the Department of Energy or its authorized contractor and shall be paid for by the Department of Energy;



(c) unless otherwise determined by the Secretary, the Secretary of the Interior shall have the responsibility for the continued custody of any residual radioactive materials involved in any remedial action effort;

(d) the United States shall be released from any radioactive materials-related liability or claim thereof related to any remedial action from the date of enactment of this Act through and including the completion of any remedial action authorized by this Act; however, this provision does not affect the trust responsibilities of the Secretary of the Interior as described in Section 6 of this Act. The United States as used herein includes the executive departments, the military departments, the independent establishments of the United States, and corporations primarily acting as instrumentalities or agencies of the United States, but does not include any contractor with the United States;

(e) the Secretary will be provided such reports, accounting and rights of inspection as the Secretary deems appropriate.

SEC. 8. The Secretary may prescribe such rules and regulations as he deems necessary and appropriate to carry out the provisions of this Act. Notwithstanding the provisions of subsection (a)(2) of Section 553 of Title 5, United States Code, such rules and regulations shall be subject to the notice and public participation requirements of that section.

SEC. 9(a). Not later than 180 days after enactment of this Act, the Environmental Protection Agency shall by notice of proposed rulemaking and opportunity for oral presentation of views, data and arguments, prescribe standards and criteria to assure that the public health, safety and the environment are adequately protected in connection with remedial actions selected pursuant to sections 5(a) and 7(a) of this Act.

(b). Prior to the promulgation of any rule pursuant to subsection (a) of this section the Administrator of the Environmental Protection Agency shall consult with the Nuclear Regulatory Commission.

(c). The Environmental Protection Agency shall minimize duplication of effort and conserve administrative resources in the establishment of the standards and criteria developed pursuant to subsection (a) of this section by ensuring that applicable standards and criteria, if any, developed by the Environmental Protection Agency under other authorities, including the Resource Conservation and Recovery Act of 1976, the Clean Air Act of 1970, as amended, or any other Federal law relating to the protection of the environment and standards and criteria developed pursuant to subsection (a) of this section are consistent, to the maximum extent practicable. The Nuclear Regulatory Commission shall, pursuant to sections 5(a) and 7(a), be responsible

for enforcement of the standards promulgated under subsection (a) of this section and for ensuring that the remedial actions are performed in conformance with the plan selected pursuant to sections 5(a) and 7(a) of this Act.

(d). Judicial review of the Environmental Protection Agency's rulemaking pursuant to subsection (a) of this section may be had by any interested person in the United States Court of Appeals for the Federal judicial circuit in which such person resides or transacts business only upon petition for review by such person filed within 90 days from the date of such rulemaking, or after such date only if such petition is based solely on grounds which arose after such 90th day.

(e). The Department of Energy shall not commence any remedial action pursuant to Sections 5(a) and 7(a) of this Act until 90 days following the promulgation of the standards and criteria established pursuant to subsection (a) of this section.

SEC. 10. There are hereby authorized to be appropriated to the Department \$3 million in fiscal year 1979, and in subsequent years such sums as may be necessary to carry out the purposes of this Act, to remain available until expended.

OWNERS OF INACTIVE URANIUM MILL SITES

<u>Site</u>	<u>Years operated</u>	<u>Tons of tailings (thousands)</u>	<u>Original and subsequent operators</u>	<u>Present owners</u>
<u>Arizona</u>				
Monument	1955-1967	1200	Vanadium Corporation of American and its successor Foote Mineral Company	Navajo Nation
Tuba City	1956-1966	800	Rare Metals Corporation merged into El Paso Natural Gas	Navajo Nation
<u>Colorado</u>				
Durango	1943-1963	1555	U.S. Government/Vanadium Corporation of American and its successor Foote Mineral Company	Ranchers Exploration and Development Corporation of Albuquerque, New Mexico
Grand Junction	1951-1970	1900	Climax Uranium Company/Amax Uranium Corporation	Shumway, Inc. <u>1/</u>
Gunnison	1958-1962	540	Gunnison Mining Company that merged with Kermac Nuclear Fuels Corporation/Colorado Ventures, Inc.	A partnership of three individuals: Clarence A. Decker N. Marcus Bishop Roger L. McEachren
Maybell	1957-1964	2600	Trace Elements Corporation, Union Carbide Corporation	Union Carbide Corporation
Naturita	1939-1963	704	Vanadium Corporation of American and its successor Foote Mineral Company	Rangers Exploration and Development Corporation of Albuquerque, NM <u>2/</u>
New Rifle	1958-1972	2700	Union Carbide Corporation	Union Carbide Corporation

1/Purchased portion of site that contains the tailings pile.

2/Currently possesses a license from the State to reprocess the tailings.

<u>Site</u>	<u>Years operated</u>	<u>Tons of tailings (thousands)</u>	<u>Original and subsequent operators</u>	<u>Present owners</u>
Old Rifle	1924-1958	350	Union Carbide Corporation	Union Carbide Corporation
Slick Rock-North Continent	1931-1943	37	Shattuck Chemical Company, North Continent Mines Inc., and U.S. Government	Union Carbide Corporation
Slick Rock-Union Carbide	1957-1961	350	Union Carbide Corporation	Union Carbide Corporation
<u>Idaho</u>				
Lowman	1955-1960	90	Porter Brothers Corporation of Boise, Idaho, and Michigan Chemical Corporation	Nelsicol Chemical Corporation <u>3/</u> <u>4/</u>
<u>New Mexico</u>				
Ambrosia Lake	1958-1963	2600	Phillips Petroleum Company	United Nuclear Company
Shiprock	1954-1968	1650	Kerr-McGee Oil Industries, Inc., Vanadium Corporation of America and its successor Foote Mineral Company	Navajo Nation
<u>Oregon</u>				
Lakeview	1958-1960	130	Lakeview Mining Company and Atlantic Richfield Company	Precision Pine (a partnership)
<u>Texas</u>				
Falls City	1961-1973	2500	Susquehanna-Western Inc.	Solution Engineering Company <u>5/</u>
Ray Point	1970-1973	490	Susquehanna-Western Inc.	Exxon Company

3/Successor to Michigan Chemical Corporation.

4/Isladelray Ltd. of Englewood, Colorado has a lease with option to buy.

5/Some tailings piles are located on land leased from Lyssy Dairy Farms and Mr. Silvestor Niestroy.

6/Data not included in site report.

<u>Site</u>	<u>Years operated</u>	<u>Tons. of tailings (thousands)</u>	<u>original and subsequent operators</u>	<u>Present owners</u>
<u>Utah</u>				
Green River	1958-1971	123	Union Carbide Corporation	Union Carbide Corporation
Mexican Hat	1957-1965	2200	Texas-Zinc Minerals Corporation, Atlas Corporation	Navajo Nation
Salt Lake City	1951-1968	1700	U.S. Government (Alumina plant)	Salt Lake County Suburban Sanitary District Two individuals: D. Eugene Moenich and David K. Richards
<u>Wyoming</u>				
Converse County	1962-1965	187	Wyoming Mining and Milling Company	Wyoming Mining and Milling Company
Riverton	1958-1963	<u>900</u>	Susquehanna-Western Inc.	Solution Engineering Company
TOTAL		<u>26306</u>		

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