

PHASE II - TITLE I  
ENGINEERING ASSESSMENT OF  
INACTIVE URANIUM MILL TAILINGS

SHIPROCK SITE  
SHIPROCK, NEW MEXICO

MARCH 31, 1977

PREPARED FOR

U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION  
GRAND JUNCTION, COLORADO

CONTRACT NO. E(05-1)-1668

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SINCE 1957

**POOR ORIGINAL**

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TABLE 1-2  
SUMMARY OF REMEDIAL ACTION OPTIONS, COSTS, AND EFFECTS

OVER:  
EFFECTS:

BENEFITS

DESCRIPTION OF REMEDIAL ACTION

COST \*  
(\$000)

OPTION  
NUMBER

L M N O P Q

A B C

The work plan for the decontamination of the Shiprock uranium millsite would be completed with the exception of the stabilization of the lower pile. The pile configuration would remain basically as is. NECA would continue to occupy the site and security fencing would be installed.

540

I

M O P Q

A B C D E

The work of Option I would be augmented by the stabilization of the lower pile by covering it with 2 ft of earth, the addition of soil stabilization cover on the upper pile on its steep slopes, the construction of containment dikes around the pile, and the rerouting of drainage around the pile in order to isolate the pile from the area of water runoff.

1,100

II

O P Q

E G J

A B C D

The two piles would be graded together into one pile with resulting slopes that would be less steep in order that the 4 ft stabilization cover would be more permanent and provide greater resistance to water and wind erosion. This cover would provide enough protection to reduce gamma radiation to background levels. Grading would isolate the pile hydrologically. Fencing would be required. A 4 ft of cover would reduce radon exhalation by 30%.

1,600

III

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TABLE 1-2 (Cont)

OPTION NUMBER	COST * (\$000)	DESCRIPTION OF REMEDIAL ACTION	BENEFITS	ADVERSE EFFECTS
IV	3,400	Option IV is the same as Option III except that a 13 ft cover would be provided which would reduce radon exhalation by 95%.	A D J B E C G	P Q
V	5,000	The tailings and contaminated soil and rubble would be moved by truck from the site to the general area of the Many Devils Wash and stabilized with 2 ft of cover. A 6-ft chainlink security fence would be installed. Haul distance is 4 mi.	A F B G C H D I E	M Q
VI	6,100	The tailings and contaminated soil and rubble would be moved by truck from the site to the area of Shiprock campground and stabilized with 2 ft of cover. A 6-ft chainlink security fence would be installed. Haul distance is 6.75 mi.	A F B G C H D E	M Q
VII	6,900	The tailings and contaminated soil and rubble would be moved by truck from the site to the general area of the Rattlesnake Wash oil field area. They would be stabilized with 2 ft of cover and a 6-ft chainlink security fence would be installed. Haul distance is 8.25 mi.	A F B G C H D J E	M Q
VIII	7,000	The tailings and contaminated soil and rubble would be removed by truck from the site to the general area known as the Salt Creek Wash area, north and slightly east of the town of Shiprock. They would be stabilized with 2 ft of cover and a 6-ft chainlink security fence would be installed. Haul distance is 8.5 mi.	A F B G C H D I E	M Q

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TABLE 1-2 (Cont)

ADVER  
EFFEC

BENEFITS

COST \*  
(\$000)

OPTION  
NUMBER

DESCRIPTION REMEDIAL ACTION

M  
Q

F  
G  
H  
I  
A  
B  
C  
D  
E

The tailings and contaminated soil and rubble would be moved by truck from the site to an area approximately 8.5 haul mi south and east of Shiprock. The area is about 1 mi east of the new Shiprock airport in the vicinity of some oil field pumping and storage operations. There are several natural horseshoe-shaped basins in the area which could be adapted for long-term tailings storage. The tailings would be covered with 2 ft of earth cover and a 6-ft chainlink security fence would be installed.

M  
Q

G  
H  
I  
J  
A  
B  
C  
D  
E  
F

The tailings and contaminated soil and rubble would be moved by truck from the site to the general area west of the base of the Hogback Mountains, southeast of the town of Shiprock. Here the tailings would be isolated. They would be stabilized with 2 ft of cover. Fencing would be required, but maintenance would be at a minimum. Haul distance is 16 mi.

none

G  
H  
I  
J  
K  
A  
B  
C  
D  
E  
F

The tailings and contaminated soil and rubble would be removed by truck from the site to an operating open-pit coal mine northeast of the site. They would be buried in the waste areas of the mine. Haul distance is 26 mi.

IX 7,200

X 12,000

XI 12,500

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TABLE 1-2 (Cont)

NOTES. \*All costs are in 1976 dollars

1. For all cost options, the cost includes off-site remedial action, and decontamination of the water supply line which fed the mill water tanks.
2. For all cost options, the decontamination of the office, classroom, old shop, and one other old storage building is included.
3. For cost options No. V to XI, the cost to remove an average of 2 ft of subsoil below the tailings area is included in the basic cost. This would reduce residual radium concentrations in the subsoil to twice background values. The additional cost to reduce these concentrations to background levels are given in Chapter 9 of the report. The cost of backfill to surrounding grade levels is also included in Chapter 9.

Definition of Benefits

- A. Off-site structures decontaminated
- B. Access to the site controlled by fencing and posting
- C. Off-site windblown tailings cleaned up
- D. Wind and water erosion controlled
- E. Gamma radiation reduced
- F. The source of gamma radiation and radon gas removed from the area
- G. No building restrictions on or near the site
- H. The prime use of the final disposal location unchanged
- I. Disposal site maintenance required only on a limited basis; no possibility of contaminating air or water supplies
- J. A reduction in rate of radon exhalation depends on thickness of cover material
- K. Maintenance and fencing eliminated

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TABLE 1-2 (Cont)

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Definitions of Adverse Effects

- L. Little or no decrease in gamma radiation
  - M. Little or no reduction of radon gas emissions
  - N. No wind or water erosion control
  - O. Building restriction in the vicinity
  - P. Limited use of the property
  - Q. Maintenance required indefinitely
- 

1-3-5  
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