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40-1341

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

5N 157B Lookout Place

RETURN ORIGINAL TO PDR, HQ.

FEB 05 1988

Mr. R. Dale Smith
U.S. Nuclear Regulatory Commission
Uranium Recovery Field Office
P.O. Box 25325
Denver, Colorado 80225

Dear Mr. Smith:

In the Matter of) Docket No. 40-1341
Tennessee Valley Authority)

The Edgemont Uranium Mill Decommissioning Project Source Material License SUA-816, Amendment No. 27, requires, by license condition 21, that TVA determine the extent of, and shall clean up windblown tailings and contaminated soil at the mill site as outlined in the TVA/DOE cooperative agreement dated April 24, 1987, and in accordance with the procedures outlined in section 2.2.2.6 of the Final Environmental Statement (FES).

TVA has evaluated the windblown contamination in the Pine Hills area east of and adjacent to the mill site and has determined that an alternate radiological cleanup plan is necessary. For the level area and draws, radiological cleanup would be equivalent to that performed on the mill site. However, for the steep forested Pine Hills, no remedial action is proposed because of environmental, safety, and radiological considerations. These considerations are detailed in the enclosed report.

To fully implement this proposal, TVA requests that license condition 21 be revised as follows:

> The licensee shall clean up windblown tailings and contaminated soil at the mill site as outlined in the TVA/DOE cooperative agreement dated April 24, 1987, and in accordance with the submittal dated February 5, 1988.

Pursuant to discussions between Gary Hartman and Tom Olsen on January 28, 1988, it is requested that your review of this proposal be completed by June 1, 1988, so that decommissioning activities may continue as scheduled.

DESIGNATED ORIGINAL

Certified By Mary C. Ward

FEE EXEMPT
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88-0443

Mr. R. Dale Smith

FEB 05 1988

If you have any questions concerning the enclosed report, please telephone Gary S. Hartman at 615/751-2699.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Director
Nuclear Licensing and
Regulatory Affairs

Enclosure

EDGEMONT MILL DECOMMISSIONING
REMEDIAL ACTION FOR WINDBLOWN TAILINGS
PINE HILLS AREA

Introduction

The Nuclear Regulatory Commission's (NRC) source material license, SUA-816 License Condition 21 for the Edgemont Uranium Mill, requires that TVA clean the Pine Hills and adjacent properties of contaminated material in accordance with the Final Environmental Statement related to the decommissioning of the Edgemont Uranium Mill (FES) Section 2.2.2.6. Section 2.2.2.6 defines Action Level 1 (AL1) and Action Level 2 (AL2) and proposes cleanup of areas with contamination above AL2 "unless it is not feasible to conduct the operations."

This report contains TVA's proposal for remedial action for a portion of the windblown tailings contaminated area near the Edgemont mill and an alternative to remedial action for the Pine Hills. The windblown tailings contamination is located in an uninhabited area generally east and southeast of the millsite and consists of a level area near the mill boundary extending upward into a valley and other smaller draws which are bounded by steep shale hills covered with ponderosa pine. The level area, valley, and draws are vegetated with various grasses and shrubs. The bulk of the offsite windblown tailings contamination material is located in the level area, valley, and draws, and is easily accessible. The steep tree-covered slopes, referred to as the Pine Hills, are far less accessible.

In accordance with SUA-816 License Condition 21, TVA will remove contaminated material from the level area, valley, and draws (approximately 29 acres) as set forth in NRC's FES, Section 2.2.2.6. This section also governs the Pine Hills remedial action. Section 2.2.2.6 provides in pertinent part:

> If exposure levels exceed 20 μR/h above background . . . TVA proposes to conduct cleanup unless it is not feasible to conduct the operations. Because the area is uninhabited and the terrain is very rough, safety of workers will be the primary consideration in determining feasibility . . . no cleanup will be required [of areas with high activity due to rock outcroppings].

Cleanup Plan

TVA will comply with the requirements of 10 CFR Part 40, Appendix A, which reflect the standards set forth in 40 CFR Part 192, in performing remedial action for the approximate 29 acres that comprise the level area, valley, and draws near the millsite.

Data from radiological surveys performed by MacLaren Engineers, Inc. (MacLaren Engineers Report No. 6), shows that the average contamination within the 29 acres is approximately 20 pCi/g. TVA will use loaders, excavators, and 35-ton trucks to remove windblown contamination from this area. Excavation depths will vary from approximately 1/2 foot to 2-1/2 feet throughout this area. Approximately 48,500 bank cubic yards (BCY) of contaminated material will be removed at an estimated cost of $400,000 ($8.25 unit cost). Removal of this material will effectively reduce the concentration to approximately 5 pCi/g above background, thereby reducing the radiological exposure to the maximum individual (nearest Edgemont resident west of millsite) by approximately 3.0 mrem/yr.

The areas proposed for full remedial action (level area, draws, and valley) are shown on attachment 1 as shaded areas with the estimated average depths of excavation indicated. To the left of the shaded areas is the eastern boundary of the millsite. The area east of the millsite encompassed by the solid line is the extent of windblown contamination as determined by MacLaren Engineers. The area referred to as the Pine Hills is the nonshaded area east of the millsite encompassed by the solid line.

Also shown to the south of the Pine Hills on attachment 1 are three small irregularly shaped contaminated areas, which are included in the radiological assessment of the Pine Hills.

The solid circles, squares, and triangle symbols shown on attachment 1 are locations that were measured for radiological contamination by the MacLaren Engineers on a 100-foot by 100-foot grid pattern.

Attachment 2 gives the numerical level of the MacLaren radiation survey points converted to picocuries per gram (pCi/g). Attachment 2 is presented as a grid corresponding to the grid system shown on attachment 1. Also summarized on attachment 2 and shown on attachment 1 are 66 TVA-numbered soil samples taken in 1986 and 1987.

The steep tree-covered slopes (Pine Hills) are contaminated by a thin veneer of windblown material. The Pine Hills area (approximately 41 acres) presents several environmental and safety considerations that constrain remedial action. Therefore, TVA proposes not to disturb the Pine Hills with physical cleanup activities. Implementation of this proposal will result in a relatively small amount (less than 19 percent of the total) of windblown material remaining in the Pine Hills, but provides a practical equivalent to the requirements of 10 CFR Part 40, Appendix A.

This alternative proposal is appropriate for the steep tree-covered Pine Hills because of the following factors: safety risks to workers involved with cleanup of the area, potential environmental damage related to cleanup of the area including soil erosion and vegetation destruction, topography of area, present and projected development and population of the area, aesthetic values, low levels of radiation present in the area, low risk of radiological health effects associated with leaving some windblown material in the Pine Hills, and relative high costs associated with cleanup and subsequent stabilization activities. The subsequent sections discuss major considerations and impacts that would be associated with implementation of cleanup activities in the Pine Hills.

Safety Considerations

Cleanup of the Pine Hills to the requirements of 10 CFR Part 40, Appendix A, would pose an undue risk of injury to workers that cannot be reduced to satisfactory levels by reasonable safety precautions.

The only practicable method to fully clean the Pine Hills would be the use of heavy mechanized equipment (tracked dozers) to remove the contaminated material. Approximately 30 percent of the area exceeds a 1:1 (45-degree)

slope. On slopes approaching 45 degrees, depending on soil conditions, dozers can only safely travel up and down slopes. Turning (lateral movement) is very restricted. Operators control equipment downslope speed by manipulating the dozer blade into the soil, thus creating a braking action by the amount of dirt carried on the blade. In most situations on slopes less than 1:2 (26 degrees), equipment can operate across the face of the slope; however, an operator cannot maintain control of the dozers across the face on steeper slopes. In the Pine Hills, it is likely that operators could not control the dozers on most of the 26-degree across-slope situations due to loose soil conditions and shale outcroppings. Because lateral movement on steep slopes is restricted, most of the trees on the slopes would be destroyed or irreparably damaged. Even on gradual slopes, the dozer's track would slip or the operator could lose sight of trees and the tracks or blade would likely destroy many trees. If operators attempt to avoid trees by maneuvering heavy equipment, the potential for rollover accidents would be greatly increased. Even with safety features such as rollover bars and safety belts, all rollovers are life threatening. An operator can strike objects inside the cab; and pieces of trees, stumps, and rock can protrude into or be thrown into the cab during a rollover. Serious injuries to operators can be expected in most rollover accidents.

Reasonable safety precautions for equipment operators also could include a dozer anchoring system. Dozers operating on slopes could be anchored with cables to other dozers located at the top of slopes. This method would double the amount of equipment involved with cleanup and greatly increase the time required to clean an area. Many additional trees would also be damaged or destroyed by the cables. Dozers working on slopes could also be anchored to trees on or near the top of slopes, but the cables would likewise damage or destroy many additional trees. The use of cables to anchor dozers would require additional time and would increase the cost of cleanup of the Pine Hills by an estimated 1.7 million dollars. The total cost to clean up the Pine Hills utilizing an anchoring system is estimated to be 3.0 million dollars. A summary of the estimated costs is given in attachment 3.

Even though the majority of the contamination in the Pine Hills exists in approximately the uppermost 2 inches of soil, cleanup with dozers would remove approximately the top 12 inches of soil because of the terrain and soil conditions as discussed above. Also, operational experience has shown that the grousers on the dozer's tracks can force some contamination into underlying uncontaminated soil, requiring additional material removal to accomplish full cleanup. The estimated quantity of contaminated material located in the Pine Hills is 11,024 BCY. The estimated amount of material that would be removed if remedial activities are conducted in the Pine Hills using dozers is 66,147 BCY.

Cleanup of the Pine Hills utilizing some type of truck-mounted vacuum system was also considered. This method would present the same type of safety concerns for operators of truck-mounted equipment as with dozers. Similarly, trees would be destroyed by the trucks' movement and the cables anchoring the vehicles. The amount of time required for cleanup would be greatly increased along with a much higher unit cost. This method of cleanup for the Pine Hills was determined not to be a practicable alternative to the use of tracked dozers.

Environmental Considerations

Full remedial action in the Pine Hills would produce excessive environmental damage. The vegetation that exists on the steep sideslopes consists primarily of ponderosa pine, rocky mountain juniper, and eastern red cedar with an understory of grasses including little bluestem, sand dropseed, western wheatgrass, and buffalograss. Topsoil in the windblown contaminated area varies in depth from zero to three or four inches on the top and sides of the slopes of the Pine Hills and at thicker depths in the hollows or the open draws in the area. In the open draws, vegetation consists of big sagebrush, rabbitbush, and an understory of grasses including cheatgrass, western wheatgrass, and downy brome. Soils in the area are classified as Grummit Rock outcrop complex on the 3- to 40-percent slopes according to Soils, an Interpretative Study, Portions of Fall River and Custer County, South Dakota, by the U.S. Department of Agriculture Soil Conservation Service, and as described in Section 3.8 of the FES. Attachments 4 and 5 give a description of the soil and its limited uses.

Wildlife species that inhabit the area may include mule deer, whitetail deer, turkey, mourning dove, coyote, skunk, badger, raccoon, red fox, various species of birds, and small mammals such as the cottontail rabbit and deer mouse. Many of these species use the wooded slopes of the Pine Hills for habitat and cover.

No endangered species are found in the area although the bald eagle may perch in the area during the winter season, and peregrine falcons may migrate through the area. No prairie dog burrows or other colonial rodents are found in the area; therefore, the presence of the black-footed ferret is unlikely.

The Pine Hills are in the primary visual site corridor for the City of Edgemont and the Cottonwood Community. The area is an important visual asset to the citizens of the area, and the Mayor of Edgemont has specifically expressed concern that the aesthetic value be considered in the planning and implementation of cleanup activities for the Pine Hills (see attachment 6).

As previously discussed, cleanup of the steep sideslopes and ridge tops of the Pine Hills would necessitate the removal and/or elimination of a large portion of the existing ponderosa pine. The Ponderosa Community is widespread throughout the Black Hills on the east and north sides of the Cheyenne River, but is rather unique on the southwestern side of the river. Ponderosa pine is a very shallow rooted species and even for those trees not initially removed, the disturbance and removal of root-covering materials will result in high mortality. Replacement of the pine trees would be expected to take 40 to 80 years for the trees to attain adequate size to provide cover similar to that presently existing. Establishment of any type of vegetative cover on the disturbed shale slopes would be difficult and expensive given the lack of sufficient topsoil and steepness of the area. In the interim period, the denuded slopes would be exposed to wind and water erosion, with the resultant loss of any remaining topsoil. Eroded material would impact reclamation success on other disturbed areas. Cleanup of the steep tree-covered Pine Hills to the requirements of 10 CFR Part 40, Appendix A, would produce

environmental damage that is clearly excessive when compared to the health benefits derived from such remedial action (see radiological considerations discussion). It is appropriate that the alternative proposal to leave the Pine Hills undisturbed be implemented to minimize aesthetic damage, habitat destruction, and soil erosion.

Radiological Considerations

Full remedial action on the Pine Hills is not justified from a radiological standpoint. The evaluation of the radiological considerations utilized the data base and 100-foot by 100-foot sample grid compiled and presented in the MacLaren Engineers Report No. 6, Volume A&B, Mill Site Open Land and Radiological Assessment, and the Edgemont decommissioning FES.

Attachment 1 shows the total windblown tailings area, including the Pine Hills and the area where TVA will perform full remedial action. Attachment 2 gives the level of radiation at points measured by MacLaren and corresponds to the grid system shown on attachment 1. Also shown on attachment 1 are 66 randomly located soil samples (shown by numbered symbols) that were collected and analyzed by TVA. These soil samples generally agree with the values given in the MacLaren Engineers Report No. 6.

The MacLaren survey indicates that the Ra-226 concentration in the soil for the 41-acre Pine Hills area ranges from approximately 2.0 pCi/g to 46 pCi/g with an average concentration of 8.6 pCi/g. The Skull Creek and Mowry Shale formations which outcrop on the sideslopes and lower ridge tops of the Pine Hills have a naturally high background radon emanation rate. Surveys conducted in the immediate and surrounding uncontaminated areas, have shown background values averaging 16.8 μR/hr and ranging from 14.8 μR/hr to 19.2 μR/hr; radium values for the formations in the Pine Hills are between 4 and 5 pCi/g. The mean background level measured in soil samples from the Edgemont area is approximately 2.4 pCi/g. The background level used for the evaluation of the Pine Hills area was 2 pCi/g, and the values given in attachments 2 and 7 have been adjusted to account for this background value as uniform over the Pine Hills area.

TVA's radiological assessment was based on the assumptions given in the Edgemont decommissioning FES. The results of this assessment presented in attachment 7 indicate that the whole body dose to a maximum offsite individual (nearest Edgemont residence west of millsite) due to an average level of 8.6 pCi/g residual Ra-226 activity in the forested Pine Hills soil is approximately 2.8 mrem/yr. This is less than 0.56 percent of the 500 mrem/yr NRC 10 CFR Part 20 limit. The maximum value surveyed in the Pine Hills by MacLaren Engineers corresponds to 46 pCi/g. Assuming this value was uniform throughout the Pine Hills, a 14.9 mrem/yr exposure to the maximum individual (approximately 3.0 percent of the 10 CFR Part 20 limit) would result. For comparison, the exposure from natural background radiation in the region is between 150 to 190 mrem/yr.

Estimates contained in the FES applicable to the entire decommissioning site state that the whole body dose to a maximum offsite individual is 8.4 mrem/yr, based on the assumption that the entire millsite is reclaimed to the 5 pCi/g level. This can be compared to the estimate (contained in attachment 7) of 9.6 mrem/yr, which is based on reclaiming the millsite to 5 pCi/g (exclusive of the wooded Pine Hills) and allowing an average 8.6 pCi/g residual level in the forested Pine Hills. This represents an approximate 14-percent increase in the radiological impacts reported in the FES. (An average 46 pCi/g residual activity level in the forested Pine Hills would result in 21.7 mrem/yr whole body dose to a maximum offsite individual). The environmental impacts (aesthetic, habitat, and erosion) and health and safety risks that would result from the removal of contaminated material from the Pine Hills are considered excessive when compared to the potential whole body radiological dose from leaving the material in place.

The radiological impacts associated with allowing the current residual activity levels to remain in the wooded Pine Hills are small as compared to the 10 CFR Part 20 limits and natural background. Further, the radiological impacts associated with the average current Ra-226 levels would result in a small increase over those estimated in the FES.

As previously stated, the total cost to clean up the Pine Hills using conventional methods (dozers, loaders, and trucks) is estimated to be 3.0 million dollars. The cost of cleanup of tree-covered steep slopes to the requirements of 10 CFR Part 40, Appendix A, is unreasonably high relative to the benefits, and the residual radioactive materials do not pose a clear radiological hazard.

Summary

An area approximately 70 acres in size east of and adjacent to the Edgemont millsite is contaminated with windblown tailings material. In compliance with SUA-816 condition 21, TVA will conduct remedial actions in this area. TVA will remove the contaminated material from the level area, valley, and draws (48,500 BCY) cleaning this area to the requirements of 10 CFR Part 40, Appendix A. For the remaining 41-acre steep, wooded Pine Hills area, TVA proposes to avoid physical disturbance of this area and leave a relatively small amount (11,024 BCY) of windblown contamination in the Pine Hills. This proposal provides a practicable equivalent alternative as provided for in 10 CFR Part 40, Appendix A.

This proposed alternative is based on an assessment of the safety hazards to workers, environmental impacts (loss of trees and vegetation, soil erosion, and visual impacts), and high cost for cleanup compared to the relatively low radiological risks associated with leaving the contaminated material in place. If cleanup activities were implemented in the Pine Hills, the most practicable method would be the use of tracked dozers, loaders, and trucks. This would present significant, unavoidable safety hazards to dozer operators because of the steep slopes of the Pine Hills area. Even with reasonable safety precautions, rollover accidents and serious injuries are possible.

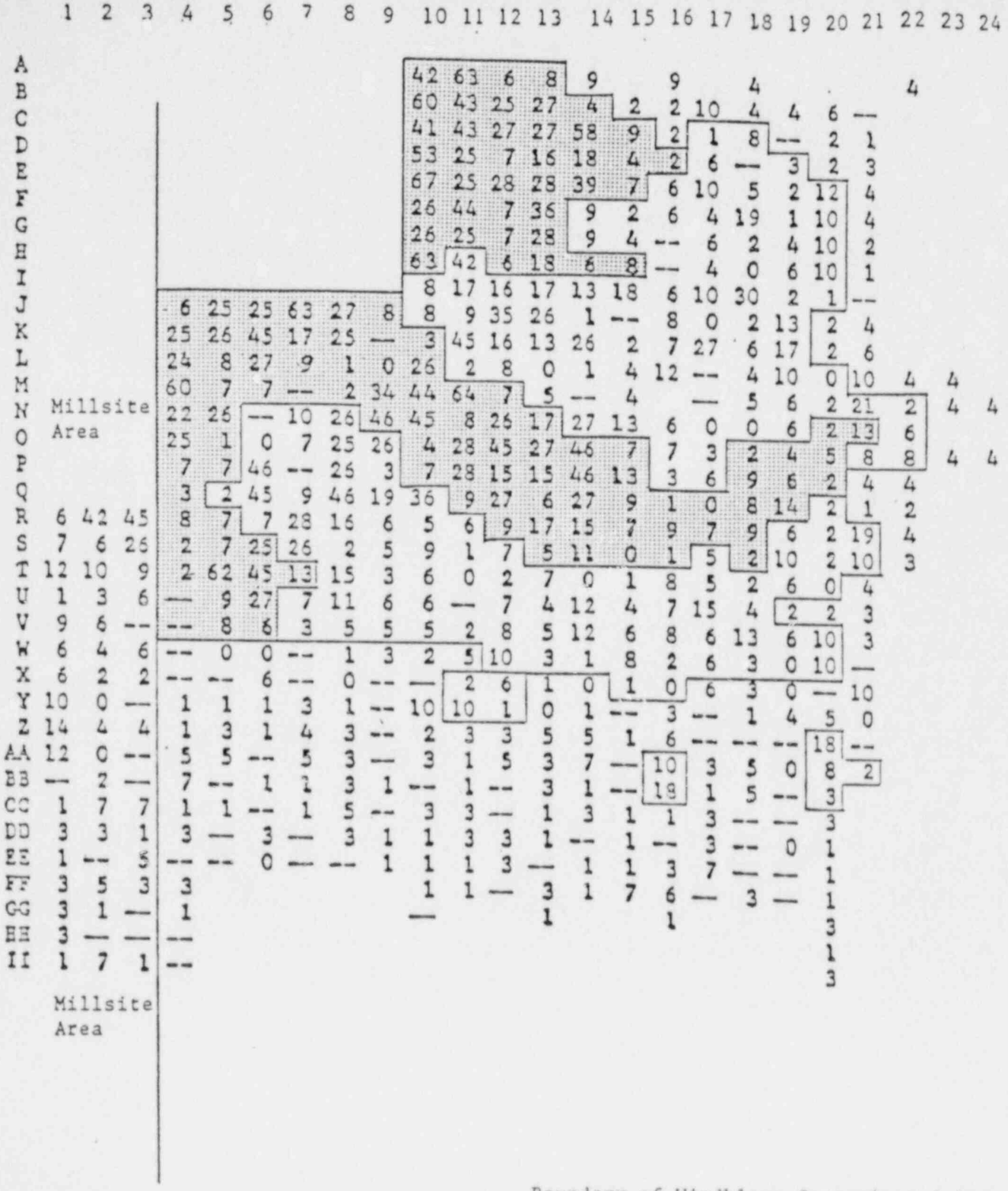
The vegetative growth in the Pine Hills is extremely sparse except for the ponderosa pine trees. The ponderosa pine is a unique vegetative community for the area near the City of Edgemont, south of the Cheyenne River. Any significant cleanup activities in the Pine Hills will destroy most of the existing pine trees. Any disturbance of the thin layer of topsoil and the shallow root system of the trees will result in the destruction of most of any remaining ponderosa pines. Topsoil in the steep Pine Hills area is very shallow, and reestablishment of any type of vegetation would be extremely difficult. The Mayor of the City of Edgemont has expressly requested that the ponderosa pine in the Pine Hills be preserved as an aesthetic resource to the City of Edgemont.

The amount of contaminated material estimated to remain in the Pine Hills is relatively small (11,024 BCY compared to 48,500 BCY of material to be removed from the level area, valley, and draws), and the radiological contamination is low (averaging 8.6 pCi/g compared to an average value of 20 pCi/g to be removed from the level area, valley, and draws).

The whole body exposure that would result from leaving the contaminated material in the Pine Hills is approximately 2.8 mrem/yr. The total whole body radiation exposure to the maximum individual due to the Pine Hills and decommissioned site residual materials would be approximately 1.9 percent of the NRC 10 CFR Part 20 limit and approximately 6.3 percent of the natural background in the Edgemont area.

The total estimated cost to fully clean the Pine Hills would be approximately 3.0 million dollars. The unit cost to fully clean the Pine Hills is approximately 5.5 times the unit cost to fully clean the level area, valley, and draws to the requirements of 10 C.F.R. pt. 40, Appendix A. The costs and impacts to fully clean the Pine Hills are considered to be excessive when compared to the relatively small benefits that could be achieved by disturbing the Pine Hills area to remove the windblown contamination.

Attachment 2



Boundary of Windblown Contaminated Area

Areas To Be Cleaned To Requirements of 10 C.F.R. pt. 40 Appendix A

Values in pCi/g as determined by MacLaren Engineers radiological survey (MacLaren Engineers Report No. 6), less background of 2 pCi/g

Attachment 2 (contd.)

TVA Soil Samples

Sample No.	Radiation Level[1] pCi/g	Sample No.	Radiation Level[1] pCi/g	Sample No.	Radiation Level[1] pCi/g
1	0.8	28	3.7	55	11.5
2	11.3	29	5.4	56	18.6
3	19.1	30	5.5	57	13.6
4	16.8	31	1.4	58	2.9
5	12.7	32	2.4	59	1.4
6	20.8	33	15.0	60	25.1
7	7.4	34	3.1	61	11.4
8	11.2	35	13.1	62	31.6
9	20.4	36	1.6	63	6.2
10	11.2	37	8.5	64	4.7
11	16.6	38	3.6	65	5.3
12	3.1	39	12.2	66	12.0
13	9.7	40	10.1		
14	10.2	41	11.0		
15	2.9	42	10.7		
16	10.2	43	5.5		
17	12.3	44	5.9		
18	16.2	45	52.3		
19	11.3	46	12.8		
20	11.6	47	18.2		
21	18.0	48	31.0		
22	8.3	49	11.6		
23	3.4	50	2.8		
24	10.2	51	27.1		
25	17.8	52	10.6		
26	1.8	53	13.6		
27	7.7	54	3.8		

(1) Measured Ra-226 concentrations, less background of 2 pCi/g.

Attachment 3

PINE HILLS AREA
Cleanup Costs
(1988 Dollars)

Scenario	Area (Acres)	Cleanup Depth (inches)	Contamination Bank Cubic Yards (BCY)	Cost ($)	Unit Cost ($)/BCY
Conventional cleanup of Pine Hills to requirements of 10 C.F.R. pt. 40, app. A	41	12[a]	66,147	3,000,000	45.35[b]
Vacuum cleanup of Pine Hills to requirements of 10 C.F.R. pt. 40, app. A (41 acres)	41	2	11,024	1,000,000	90.71[c]

a. Although two (2) inches is the average depth of contamination in the Pine Hills, twelve (12) inches would be excavated.

b. Cost includes direct, overhead, and reclamation not including the cost to plant new trees and monitor for vegetation success.

c. Direct cost provided by subcontractor. Total cost includes two (2) workers and equipment provided by TVA's Contractor, Silver King Mines, Inc. (SKM), and reclamation. Reclamation does not include the cost to plant new trees and monitor for vegetation success.

NOTE: TVA estimates expenditure of $28,000,000 to remove approximately 3,100,000 BCY of contaminated material from the millsite and offsite areas for an average unit cost of $9.03/BCY.

Fall River Co., SD
1/77
Preliminary, subject to change

(91) Grummit-Rock outcrop complex, 3 to 40 percent slopes. This shallow, well drained, very gently to steep sloping soil and Rock outcrop are on acid shale uplands and hills. This mapping unit is generally dissected by steep walled gullies and canyons. The mapped areas are irregular in shape and range from 20 to 300 acres in size. This mapping unit has about 55 to 75 percent Grummit soil, 20 to 40 percent Rock outcrop. Slopes are short to long and rough or broken.

Typically, the Grummit soil has a surface layer of light brownish gray clay about 6 inches thick. The underlying material is grayish brown clay about 3 inches thick. It has a few yellowish brown stains and mottles. Below this to a depth of 60 inches is light gray shale. This soil is very strongly acid in the upper part and extremely acid in the lower part. In some areas, shale is at depths of over 20 inches.

The Rock outcrop is steep walls or outcrops of acid shale.

Included with this mapping unit and making up less than 10 percent of any given area are Broadhurst, Pierre, and Samsil soils. The Broadhurst soil is deep to shale and is on low, flat alluvial sediments. The Pierre soil has more lime and also has shale at depths of 20 to 40 inches. It is on lower, more gentle slopes. The Samsil soil has more lime and is on steeper slopes and ridgetops.

The Grummit soil is low in fertility and organic matter content. It has very low available water capacity. Permeability is moderate. Grummit soil shrinks and swells highly upon wetting and drying, and has slow runoff.

All areas of this mapping unit are in rangeland and trees and the soil has fair to poor potential for this use. The Grummit soil has poor potential for windbreaks and other environmental plantings, recreation sites, openland wildlife, and fair potential for rangeland wildlife. The potential for most engineering uses is poor.

The Grummit part of this unit has fair suitability for use as rangeland, especially on less steep slopes. The native vegetation is ponderosa pine and an understory of tall and mid grasses. Control of erosion, conserving moisture, and maintaining dominant grass species are the main concerns of management. Proper grazing use helps keep these hazards and limitations at a minimum.

This unit is not suited for cropland, windbreaks and other woody plantings, and openland wildlife, and recreation sites because of steep slopes, clayey texture, and shallow depth to rock.

* From Soils, an Interpertative Study, Portions of Fall River and Custer County, South Dakota by the U.S. Department of Agriculture Soil Conservation Service

Fall River Co., SD
1/77
(91)-2

The Grummit soil has severe limitation for septic tank absorption fields, sewage lagoons, building construction, sanitary landfills, daily cover for landfills, shallow excavations, roadfill, and embankments because of excess slope, shallow depth to rock, high shrink-swell potential, or low strength. Selecting an alternate location with better soils solves this problem. Grummit soil in Capability unit VIIe-5, Shallow range site; Rock outcrop in Capability unit VIIIs-1, not assigned to a range site.

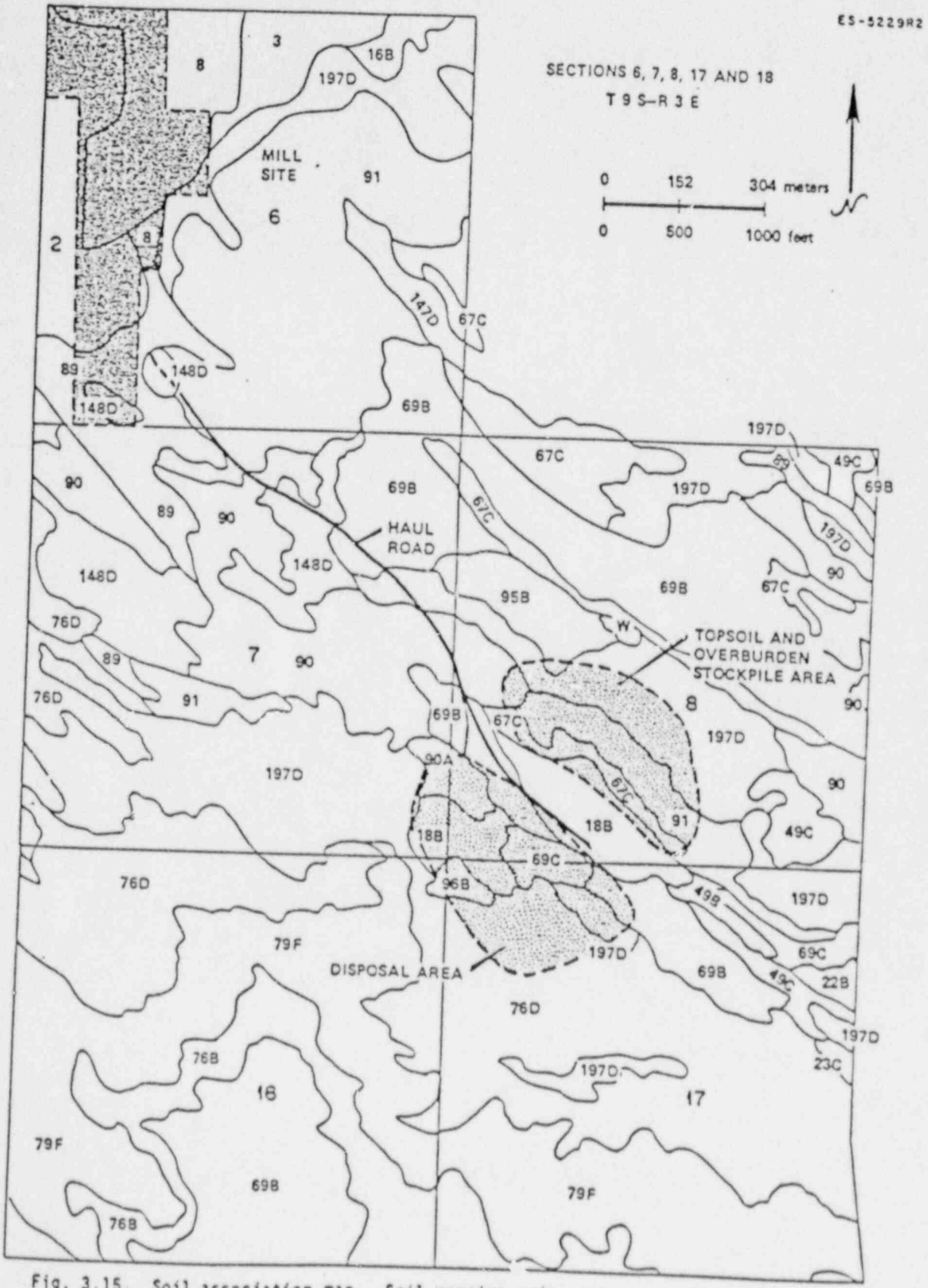


Fig. 3.15. Soil association map. Soil mapping unit, name, and characteristics are given in Table 3.20. Source: Modified from ER, Fig. 3.3-4 and L. M. Mills, TVA, personal communication, March 20, 1980.

* From Final Environmental Statement related to the decommissioning of the Edgemont Uranium Mill U.S. Nuclear Regulatory Commission

Table 3.20. Characteristics of soils expected to be disturbed by project-related activities

Map symbol[a]	Soil mapping unit name	Cropland capability unit[b]	Pasture and hay land groups[c]	Slope (%)	Thickness of "A" horizon (cm)	Suitability as topsoil[d]	Depth to bedrock (cm)	Suitability of soil material for plant growth[e]
2	Lohmiller silty clay loam	IIIc2	F	0–2	20	Fair	>152	Fair
3	Haverson loam	IIIc2	F	0–2	15	Good	>152	Good
8	Glenburg fine sandy loam	IVe6	H	0–2	15	Good	>152	Good
188	Nunn clay loam	IIIe1	F	2–6	20	Fair	>152	Fair
67C	Colby-Norka silt loams, Colby part	VIe3	GN	6–15	18	Fair	>152	Fair
69B	Norka silt loam	IIIe1	F	2–6	15	Good	>152	Good
69C	Norka silt loam	IVe1	F	6–9	15	Good	>152	Good
76D	Minnequa-Midway silty complex, Minnequa part	VIe3	GN	6–25	33	Poor	51–102	Poor
89	Bradhurst clay	VIs6	NS	2–9	10	Poor	>152	Poor
90	Grummit-Snomo clays, Grummit part	VIe12	NS	3–15	15	Poor	<51	Poor
91	Grummit-rock outcrop complex, Grummit part	VIIe5	NS	3–40	15	Poor	<51	Poor
95A	Kyle clay	IVs3	I	0–2	10	Poor	>152	Poor
95B	Kyle clay	IVe3	I	2–6	10	Poor	>152	Poor
148D	Dwyer loamy fine sand	VIIe3	NS	2–6	15	Poor	>152	Fair
197D	Pierre-Grummit clay Pierre part	VIe4	IN	6–25	10	Poor	51–102	Poor

[a] See Fig. 3.16.

[b] The capability of each of the following mapping units for agricultural uses reflects on its suitability for use in reclamation:

IIIc2 Deep, loamy soils on nearly level (0 to 2%) bottom lands and foot slopes that sometimes receive beneficial overflow. The main limitation is inadequate moisture, and the main hazard is wind erosion.

IIIe1 Deep and moderately deep, loamy soils on gently sloping (2 to 6%) uplands. The main limitation is moisture shortage, and the main hazards are wind and water erosion.

IVe1 Moderately deep and deep, loamy soils on undulating and sloping (6 to 9%) uplands. They have severe water and moderate wind erosion hazards. The main limitation is inadequate moisture.

IVe3 Deep and moderately deep, clayey soils on gently sloping (2 to 6%) uplands. The main limitations are inadequate moisture and an unfavorable rooting zone, and the main hazards are water and wind erosion.

IVe6 Deep and moderately deep, moderately sandy soils on nearly level (0 to 2%) bottom lands, terraces, and uplands. They have severe wind erosion hazards. The main limitations are inadequate moisture and low water-holding capacity.

IVs3 Moderately deep, clayey soils on nearly level (0 to 2%) uplands. The main limitations are inadequate moisture and unfavorable rooting zone, and the main hazard is wind erosion.

IVe3 Deep and moderately deep, clayey soils on gently sloping (2 to 6%) uplands. The main limitations are inadequate moisture and an unfavorable rooting zone, and the main hazards are water and wind erosion.

VIe3 Moderately deep and deep, calcareous, loamy soils on undulating to hilly (6 to 25%) uplands. These soils have severe water and moderate wind erosion hazards. The main limitations are inadequate moisture and steep slopes.

VIe4 Deep and moderately deep, clayey soils on sloping to steep (6 to 25%) uplands. These soils have severe water and wind erosion hazards. The main limitations are inadequate rainfall and unfavorable rooting zones.

VIe12 Shallow, clayey soils on nearly level to moderately steep (0 to 25%) uplands. These soils have a severe water erosion hazard, limited rooting depth, and are not suited for cultivation.

VIs6 Dense clay soils on nearly level to sloping (0 to 9%) uplands and toe slopes. The main limitations are unfavorable rooting zone and salts, and the main hazard is water erosion.

VIIe3 Shallow to deep, sandy soils on steep (25 to 40%) uplands. They have severe wind and water erosion hazards. The main limitations are low or very low available water capacity and steep slopes.

VIIe5 Shallow, clayey soils on steep and very steep (25 to 50%) uplands. They have a severe water erosion hazard.

[c] The following grouping of soils for use as pastureland and hay land reflects on their suitability for use in reclamation:

Group F Loamy or silty soils well suited for all climatically adapted plants.

Group H Sandy soils with choice of species and yields limited by limited available water capacity and wind erosion hazard.

Group GN Steeper slope phases (9 to 40%) of limy soils with thin surface layers not recommended for pasture plantings because of erosion hazard.

Group NS Soils not suited for pasture plantings because of severe limitations in depth of rooting zone, water intake rate, available water capacity, or low fertility.

Group I Clayey soils with choice of species and yields limited by very slow water intake rate and slow permeability.

Group IN Steeper slope phases (6 to 40%) of clayey soils not recommended for pasture plantings because of erosion hazard.

[d] Suitability for use as topsoils refers generally to the A horizon.

[e] This column refers to suitability of materials to 152 cm or to bedrock that will support vegetation or is a medium of plant growth, based upon general texture, structure, erodibility, available water capacity, soluble salt content, depth, and accessibility or availability.

Attachment 6

CITY OF EDGEMONT

EDGEMONT, S. D., 57735

October 1, 1986

David L. Scheuerman
Project Manager
Edgemont Decommissioning
Tennessee Valley Authority
P. O. Box 2957
Casper, Wyo. 82602

Dear Mr. Scheuerman:

Thank you very much for taking the time for you and Mr. Wolff to meet with me on Sept. 24th, 1986. I am always very reluctant to ask for such a meeting because I realize the multitude of problems you face each day in cleaning up the mill properties. TVA has always been so forthright and honest in the effort to accomplish this, that we in the City have felt little need to be involved in the discussions even though our future is very much involved. However, since there may be a major change in the responsibility for the wind-blown tailings east of the mill property in the Pine Hills and in the city lagoon area, we may find ourselves more heavily involved.

For a couple years we have delayed construction of our new sewer lagoons, sewer lines, and lift station. There seemed no practical way to accomplish it without better access and the ground being cleared of contamination first. The State has generally gone along with us in delaying these projects, but if a new Contractor through the Department of Energy is brought in, it changes many things. In that case we need to clarify many things as reasonably soon as possible. Unless it is necessary I see no reason to take an official action but feel I should state a few guidelines on our thoughts.

We do not mind a change in responsibility of cleanup as long as it does not increase costs to the City or delay the projects. We want to be cooperative.

We will have to have a planned cooperation and time schedule on being able to construct new lines, pump facilities etc. Nobody wants a new line built and have it left contaminated.

We would need construction of one or both of our new lagoons in order to have storage while the existing pond is cleaned, assuming that was on the program.

If it were possible for TVA to clean and clear for use the old #3 and #1 Ponds for use as sewer lagoons, then that might avoid the need for any new lagoon construction. It should at least be considered as it would be very cost saving for both the City and TVA. Both Ponds would have to be clean and rip-rapped before use.

The Public in general will be very negative to denuding the Pine Hills and increase erosion. We would favor any plan to avoid this. We would generally favor localized "hot" spots being cleaned.

If the detour drainage ditch around the Pine Hills is catching contamination, then it should be extended to the draw to the East. It should not be removed allowing ground that some day will be clean to become recontaminated.

I realize that these are just a few of the many things that must be resolved but I think we have to answer them. I would try to be available almost any time discussion is necessary and will get the City Council involved for approval as needed.

Sincerely

Peter W. Zeimet

Peter W. Zeimet, Mayor

PZ:de
CC: Chuck Wolff
Joel Smith

Attachment 7

Assumptions:

1. Tailings impoundment area, excluding disposal site, 213 acres.[a]
2. Forested area in the Pine Hills, 41.0 acres.
3. Exposures to the maximum individual[b] (post-decommissioning) due to the entire site (reflecting cleanup to 5 pCi/g Ra-226 in soil):

Organ	Exposure[a]	NRC limit[a]	Background Exposure[a]
Whole Body	8.4 mrem/yr	500	153
Bone	16.6 mrem/yr	3000	168
Lung	8.4 mrem/yr	1500	154
Bronchial Epith.	6.9×10^{-6} WL	3.3×10^{-2}	4.5×10^{-3}

4. Radioactive emission levels are proportional to the residual Ra-226 soil concentration (pCi/g) and the total surface area of emission source.

5. Exposure to maximum individual[b] is proportional to the radioactive emission level of source.

6. Ra-226 concentration in soil in forested Pine Hills:
   8.6 pCi/g (average)[c]
   46.0 pCi/g (maximum)[c]

7. The estimated radioactive emission level of the forested Pine Hills can be approximated by multiplying the emission level of the entire decommissioned site by:

   (41.0 acres/213 acres) (8.6 pCi/g / 5 pCi/g) = 0.33 (average)
   (41.0 acres/213 acres) (46.0 pCi/g / 5 pCi/g) = 1.77 (maximum)

8. The exposure to the maximum individual[b] from the Pine Hills can be approximated by multiplying the exposure due to the entire decommissioned site by the above factors.

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a. Final Environmental Statement related to the decommissioning of the Edgemont Uranium Mill, NUREG-0846, June 1982.

b. Nearest Edgemont resident west of millsite.

c. Values from MacLaren 100-foot by 100-foot grid survey. See attachments 1 and 2.

Attachment 7

Assumptions:

1. Tailings impoundment area, excluding disposal site, 213 acres.[a]
2. Forested area in the Pine Hills, 41.0 acres.
3. Exposures to the maximum individual[b] (post-decommissioning) due to the entire site (reflecting cleanup to 5 pCi/g Ra-226 in soil):

Organ	Exposure[a]	NRC limit[a]	Background Exposure[a]
Whole Body	8.4 mrem/yr	500	153
Bone	16.6 mrem/yr	3000	188
Lung	8.4 mrem/yr	1500	154
Bronchial Epith.	6.9×10^{-6} WL	3.3×10^{-2}	4.5×10^{-3}

4. Radioactive emission levels are proportional to the residual Ra-226 soil concentration (pCi/g) and the total surface area of emission source.

5. Exposure to maximum individual[b] is proportional to the radioactive emission level of source.

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a. Final Environmental Statement related to the decommissioning of the Edgemont Uranium Mill, NUREG-0846, June 1982.

b. Nearest Edgemont resident west of millsite.

c. Values from MacLaren 100-foot by 100-foot grid survey. See Attachments 1 and 2.

Exposures:

A. Exposures[a] to Maximum Individual[b] due to Residual Radioactivity in the Forested Pine Hills.

Organ	Exposure (for 8.6 pCi/g Ra-266)	Exposure (for 46.0 pCi/g Ra-226)	NRC Limit 10 CFR 20	Background Exposure
Whole Body	2.8 mrem/yr	14.9 mrem/yr	500	153
Bone	5.5 mrem/yr	29.4 mrem/yr	3000	188
Lung	2.8 mrem/yr	14.9 mrem/yr	1500	154
Bronchial Epith.	2.3×10^{-6} WL	1.22×10^{-5} WL	3.3×10^{-2}	4.5×10^{-3}

B. Exposures [a,c] to the Maximum Individual[b] due to Residual Radioactivity in Forested Pine Hills and 5 pCi/g Level for Decommissioned Site.

Organ	Exposure (for 8.6 pCi/g Ra-266)	Exposure (for 46.0 pCi/g Ra-226)	NRC Limit 10 CFR 20	Background Exposure
Whole Body	9.6 mrem/yr	21.7 mrem/yr	500	153
Bone	18.9 mrem/yr	42.8 mrem/yr	3000	188
Lung	9.6 mrem/yr	21.7 mrem/yr	1500	154
Bronchial Epith.	7.9×10^{-6} WL	1.78×10^{-5} WL	3.3×10^{-2}	4.5×10^{-3}

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a. Includes inhalation, external ground, air submersion, vegetable ingestion, and meat ingestion pathways.

b. Nearest Edgemont resident west of millsite.

c. Exposure $\left(\frac{213 - 41}{213}\right)^{x}$ FES Exposure + PART A Exposure.

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