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July 20, 1982

Mr. Claude A. Flory
Uranium Recovery Licensing Branch
Division of Waste Management
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Eadie:

Enclosed is the letter report on the "Edgemont Remedial Action Program" for June 1982. Also enclosed is a copy of some comments on the new EPA final standard that I prepared for PNL staff and which was part of a set of comments transmitted to Bruce Wachholz and Bill Mott of the DOE. I will be receiving a copy of the full set shortly and will forward it to you at that time.

Very truly yours,

P. O. Jackson/m

P. O. Jackson
Senior Research Scientist
Physical Sciences Department

R. W. Perkins
Associate Department Manager

POJ:mfm

Encl.

N. A. Wogman
Project Manager

cc: Mr. Ross A. Scarano, NMSS
Office of the Director, NMSS
Attn: Program Support
Dr. H. J. Pettengill, NMSS
Mr. J. B. Martin, NMSS

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MONTHLY REPORT
EDGEMONT REMEDIAL ACTION PROGRAM
June, 1982

Project Manager: N. A. Wogman
Principal Investigator: P. O. Jacksaon

FIN No. B-2217

STUDY OBJECTIVES

The objectives of this program are to survey an area within the city limits of Edgemont, South Dakota, using radiological analysis equipment, and to provide the necessary engineering assessments.

ACCOMPLISHMENTS DURING THE REPORT PERIOD

1. In June, the field program emphasized engineering assessment measurements and radiological surveys at vacant lots and blocks. Since most of the field measurement program is approaching a concluding phase, it has been necessary to re-establish the status of the measurement program. The data for each property has been reviewed in an on-going effort to determine that protocols have been followed and adequate measurements taken.

   The review has shown that a change is necessary in the status of Table I for working level measurements to make it consistent with the present status of properties. The status of all properties is shown in the table below

Total number of residence units	712
Residence units surveyed by the State and not by PNL	122
Residence units with completed surveys	504
Residence units with owner refusing surveys	13
Residence units with owner not responding	4
Residence units partially completed	55

Residence units not surveyed		14
Total number of vacant properties	185 lots	62 blocks
Vacant properties completed	152 lots	44 blocks
Vacant properties with owner refusing testing	6 lots	3 blocks
Vacant prcperties with owner not responding	3 lots	1 block
Vacant property surveys partially completed	0 lots	1 block
Vacant properties not surveyed	24 lots	13 blocks

The causes of the needed changes were as follows. First, those properties in the Cottonwood section and others adjacent to the north end of the uranium mill site have never received outdoor gamma dose rate surveys or ^{226}Ra measurements because of interfering background radiations from the mill tailings areas. It has been my understanding from discussions with Gregory Eadie that the Cottonwood site survey was to be deferred because of this problem and because the cleanup of the windblown tailings would take place as a part of the cleanup of the mill site. Since the working level measurements had been completed, those 12 properties were originally listed in Table I as completed. We have now removed them from the tally to reflect the need for additional measurements. In addition, there have apparently been a number of properties which were inadvertently entered more than one time in Table I because the working level measurements were repeated when we discovered a protocol violation during the originally reported measurement. This has primarily resulted in a positive bias in the status of the homes in the lowest (<0.01 WL) classification, many of which had to be repeated because they were measured when the wind speed exceeded 8 mph, a limit that had been added to the initial radiation survey protocol. The increase in the portion of those properties with 0.01 to 0.033 WL which also had indications of residual radioactive materials is an artifact caused by the inclusion of one multi-residence property that had several living units associated with a single deposit of residual radioactive material.

The new totals obtained from the review of our records are shown in Table I and reflect the status at the time of the completion of the review on 7-15-82. Because of the uncertainty as to the accuracy of the original monthly tabulations, they have been eliminated. During the remainder of the program, each property that is reported as complete in monthly tallies will be compared with a new status master list to be certain that it has not been previously tabulated.

The total number of properties increased by two, to 712. We have also increased the number of properties surveyed by the state and not by PNL by two units, to 122. That number reflects two properties where PNL had performed only partial surveys. A change has also been made in Table II that reflects some vacant land formerly thought to be platted as block sized parcels, but were in fact surveyed as lots.

2. The use of RPISU units for all properties where radon progeny exposure rates were between 0.01 and 0.033 WL and where ^{226}Ra in soil or gamma exposure rates did not exceed their respective criteria on grab surveys will require a considerable number of RPISU units in addition to the 20 now on loan from the EPA. In discussions with EPA personnel in Las Vegas, we have determined that the necesary additional units are available to the program. The EPA staff suggests, however, that necessary maintenance costs for the RPISU units in Edgemont should be borne as a program expense. The primary maintenance problem has been the failure of rubber diaphragm air pumps. EPA staff estimates the costs to refurbish the units at about $400 each. The total cost for all 50 units which are required for the program would be $20,000. This is a substantial program expense, and we request NRC's consideration of it and a written authorization before PNL proceeds with this expenditure.

HIGHLIGHT CONCLUSIONS

None.

PROJECTED WORK FOR JULY

During July, engineering assessments and radiological surveys will be tabulated as completed after they have been checked by PNL staff in Edgemont during the first week ofAugust.

REPORTS ISSUED DURING THE MONTH

None.

Edgemont Cleanup Action Program

Monthly Report Summary for June 1982

I. Structures Surveyed by Grab Working Level Measurements

Total Number of Available Structures: 712

Number of Requests for Survey Received: 695

Previous State Surveys: 122

Summary Table of NRC/State Program[2]

	Less than 0.01 WL	0.01 to 0.033	Greater Than[3] 0.033 WL	Number of[4] Retests
Totals[7]	142 (28)[5]	289 (63)	73 (17)	--

II. Vacant Land Gamma Radiation Surveys

Total Number of Available Lots: 185 Lots + 62 Blocks[1]

Number of Requests for Lot Survey Received: 176 Lots + 58 Blocks

Summary Table of NRC/State Program[6]

Date	Less Than 14.5 μR/hr Average	Greater Than 14.5 μR/hr Average	Greater Than 5 pCi/gram ^{226}Ra or Greater Than 34.5 μR/hr Point Reading
Sept. 1980			0
Oct. 1980	19	2	0
Nov. 1980	8	4	0
Dec. 1980	0	0	0
Jan. 1981	18	0	0
Feb. 1981	6	0	0
March 1981	0	0	0
April 1981	25	1	7
May 1981	7	0	0
June 1981	14 blocks	0	3
	+ 7 blocks	0	3
July 1981	15 blocks	0	0
Aug. 1981	0	0	0
Sept. 1981	2 blocks	0	0
Oct. 1981	0	0	0
Nov. 1981	0	0	0
Dec. 1981	0	0	0
Jan. 1982	0	0	0
Feb. 1982	0	0	0
March 1982	0	0	0
April 1982	1 block	0	2
	+ 16 lots		
May 1982	15	0	3
June 1982	10 lots	2 blocks	7 blocks
	+ 24 lots		
Totals	145 lots	7 lots	15 lots
	+ 42 blocks	+ 2 blocks	+ 7 blocks

III. Engineering Assessments

Date	Properties with Residual Radioactive Materials Absent	Properties with Residual Radioactive Materials Present[8]
ARIX Engineering Assessments	3	15
July 1981	0	4
Aug. 1981	17	7
Sept. 1981	13	12
Oct. 1981	13	7
Nov. 1981	2	0
Dec. 1981	0	0
Jan. 1982	0	0
Feb. 1982	0	0
March 1982	2	1
April 1982	13	3
May 1982	6	3
June 1982	6	17
Totals	75	69

IV. Mini-Engineering Assessments

Date	Properties with Residual Radioactive Materials Absent	Properties with Residual Radioactive Materials Present
July 1981	2	0
Aug. 1981	6	0
Sept. 1981	0	0
Oct. 1981	21	0
Nov. 1981	2	0
Dec. 1981	0	0
Jan. 1982	0	0
Feb. 1982	4	0
March 1982	8	0
April 1982	7	0
May 1982	--	--
June 1982	--	--
Totals	50	0

FINANCIAL STATEMENT

Month	Projected Costs to Date	Actual Costs to Date	Projected Costs This Month	Actual Costs This Month	Uncosted Obligations	Man Hours This Month
Aug.-Sept. 1980		39,883		39,883	44,928	691
Oct., 1980		78,347		38,464	45,376	638
Nov., 1980		123,485		45,138	36,678	685
Dec., 1980		160,117		36,632	32,040	702
Jan., 1981		191,817		31,700	21,378	380.5
Feb., 1981		230,370		38,553	19,238	477
March, 1981		265,529		35,159	14,224	341.5
April, 1981		293,598		28,069	21,660	174
May, 1981		338,128		44,530	18,017	445
June, 1981		372,961		34,833	11,821	445.5
July, 1981		408,223		35,262	6,150	405
Aug., 1981		446,918		38,696	11,130	404
Sept., 1981		465,130		18,212	21,004	70
Oct., 1981		468,623		3,493	18,480	45
Nov., 1981		480,384		21,761	20,135	193
Dec., 1981		513,643		23,259	41,600	247
Jan., 1982		530,838		17,195	59,167	285
Feb., 1982		545,329		14,490	53,019	147
March, 1982		559,028		13,699	48.617	152
April, 1982		583,114		24,087	46,416	313
May, 1982		644,402		61,288	50,037	730
June, 1982	831,000*	693,851	40,000	37,157	74,579	529
July, 1982	911,000		80,000			
Aug., 1982	941,000		30,000			
Sept., 1982	961,000		20,000			
Oct., 1982	971,000		10,000			
Nov., 1982	972,000		1,000			
Dec., 1982	973,000		1,000			
Jan., 1983	981,000		8,000			
Feb., 1983	986,000		5,000			

*A significant fraction of this projection was for an architect-engineering subcontract which has just been let. Future expenditures as these services are provided are expected to be reflected by higher monthly costs than the projections indicate.

Footnotes to Tables

1 For survey purposes, a lot is defined as a parcel of land roughly corresponding to one-half city block or less which is given a radiation survey based on a single set of grid points. A block is a larger parcel given a single survey grid.

2 HUD criterion is that the Grab Working Level (WL) times the factor 0.6 must be less than 0.02 WWL (0.033 WL X 0.6 = 0.02 WWL). See the attached flow diagram (Figure 1) for the significance of these screening levels. When the verified grab working level measurement is greater than 0.033 WL, the property receives a detailed engineering assessment to define what remedial action must be taken; otherwise, a long-term monitoring program may be conducted to determine if remedial action is required.

3 These are based on the average of two measurements.

4 RRWL means a single measurement >0.033 WL which must be verified. RRTO means turnover time was too short (<32 minutes) which must be retested at least once. These are the numbers of pending reruns generated each period. When measurements are completed, the retested properties are reported in the appropriate column.

5 Numbers in parentheses indicate the number of measurements included in the number without parentheses which are slated for engineering assessment due to failure of one or more of the other criteria (i.e. ^{226}R in soil >5 pCi/g, gamma dose rate >20 μR/hr above background).

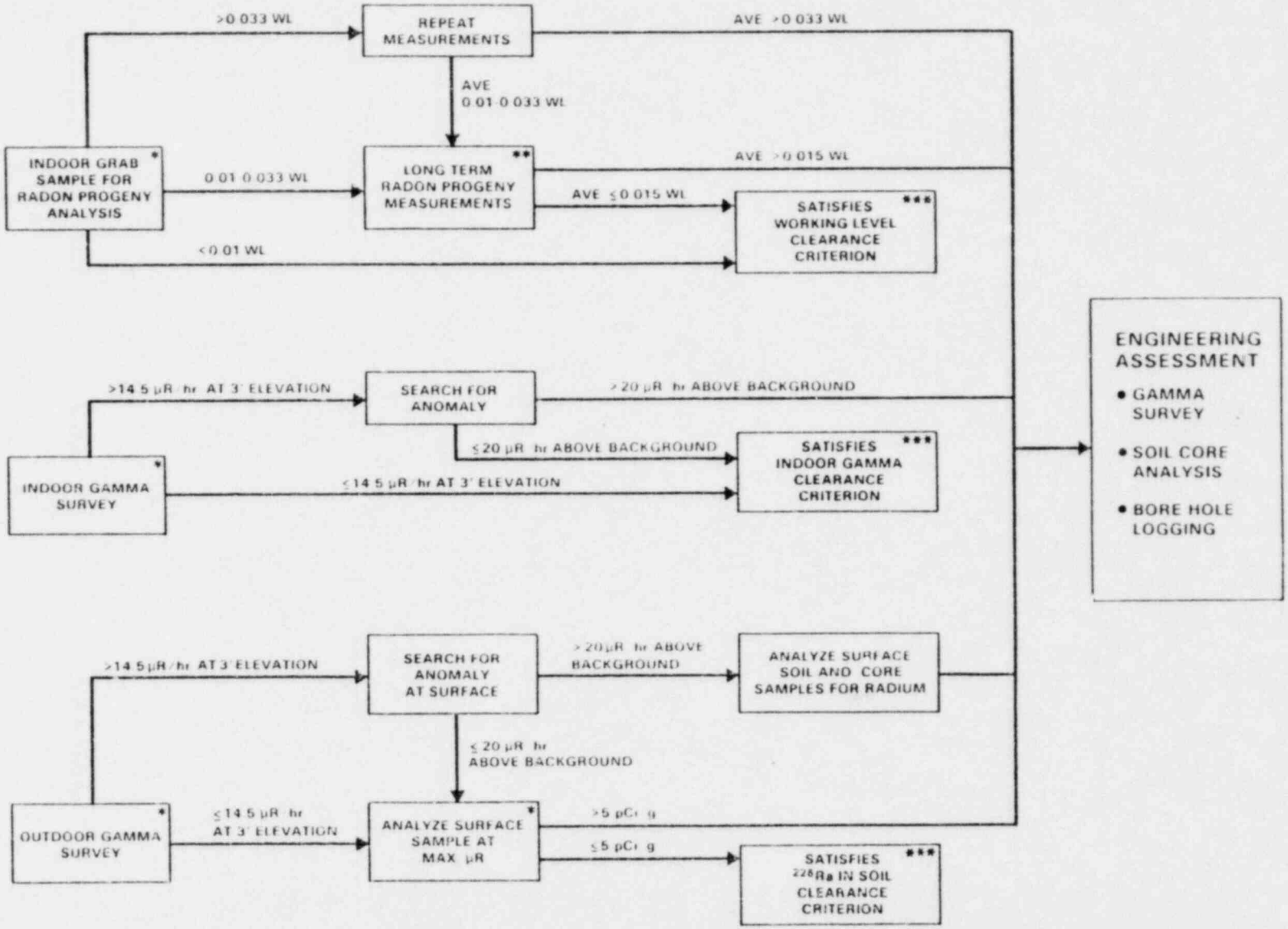
6 HUD criterion for Vacant Land is that the average gamma radiation dose rate level must be less than 14.5 μR/hr.

7 Total was revised starting on May 31, 1981 to reflect changes in the status of properties caused by rerun analyses. It is based on data taken from the master log and no longer agrees with the sum of the originally reported monthly status.

8 Residual radioactive material with radium concentrations greater than 5 pCi/g.

9 Entries in this column are also included in columns 1 or 2.

FIGURE 1: FLOW DIAGRAM OF PROCEDURES FOR DETERMINATION OF PROPERTIES REQUIRING REMEDIAL ACTION



(*) PERFORMED AT EACH PROPERTY SURVEYED

(**) NOT PERFORMED UNLESS ALL OTHER CLEARANCES CRITERIA ARE SATISFIED

(***) ENGINEERING ASSESSMENT IS PERFORMED UNLESS ALL THREE CLEARANCE CRITERIA ARE SATISFIED

Comments on the Final Standard
for Remedial Actions at Inactive Uranium Processing Sites

P. O. Jackson
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General Comments

The use of "reasonable" in defining approaches to be implemented by DOE and NRC to assure compliance with these standards opens the door to unending criticisms. A formal and conclusive arbitration process should be established so that one scientist does not second guess all of the activities of another. Protocols approved in advance should be required as well as compliance with those protocols. They may be site specific, and exceptions may be needed, but the process for this should be completely defined in the standards. The use of ranges of standards may lead to litigation again based on disagreement as to what is "reasonable" or "cost effective".

Related Comments

P.5 -
It appears that the effort to get away from a "nondegradation" policy was primarily focused on the control systems for tailings piles.

P.6, 1st footnote
A working level is not exactly a concentration unit. The term intensity could be substituted in the last sentence to give the intended meaning without being misleading.

P.7, last paragraph
Although these standards will not apply to new housing or non-contaminated dwellings, HUD is already using the more restrictive proposed standards to decide if homes are sufficiently habitable to receive federal mortgage guarantees under the FHA programs. The EPA itself (Region 8 offices) cooperated in this effort. Although the original intent was probably to prevent federal financing of houses contaminated with residual radioactive materials, the effect in Edgemont, S.D. has been to prevent financing of buildings which exceeded the current limit of 0.02 WL even when the source of radon progeny in most homes appears to be the natural radium content of the soil. This policy also blocks financing on vacant lands where the average gamma dose rate exceeds the upper 95% confidence limits for background soils, even when there is no other evidence for the presence of residual radioactive materials. These policies place the property owner in an adversary position relative to the efforts to discover deposits of residual radioactive material, which increases the difficulty of locating those deposits in routine radiological screening surveys.

P. 12, 2nd paragraph
Based on evidence in Edgemont, S.D. of all homes that contain radon progeny concentrations that exceed the new limit, relatively few will involve

the presence of residual radioactive material. Thus, although the measurement of WL gives a good indication of the exposure to residents, it gives essentially no information about the possible presence of residual radioactive materials, except possibly when concentrations reach levels of the order of 0.1 WL. In the Edgemont survey, roughly 5% to 10% of the structures exceeded the new maximum limit. Thus, it should be clear in the standards that unless there is another indication of the presence of residual radioactive material, the working level measurement in a property cannot be used to define the need for remedial action, although it might be used as a criterion to perform a more intense search. In regions where there are numerous properties, working level measurements in all of them would be an unacceptable screening technique. Even when residual radioactive material has been found at a property, its complete removal may not reduce the working levels below the limit, thus the remedial action will be forced to remedy the natural background at some sites even considering the 0.03 WL limit. This problem stems from the setting of WL limits which are too close to the scatter of normal WL intensities produced by specific site characteristics and by life style variations of the occupants.

P. 7, paragraph 4
Meteorological dispersal models can give relatively good exposure estimates at large distances from source terms where exposure rates are extremely small and large numbers of populations are exposed. For the population which resides or works close to the source term, large variation of acute exposures can be expected, which can be very much more difficult to model precisely. For these cases, direct measurements over an extended period may be necessary to establish the exposures reliably.

P. 43, Definitions
The definition of "lands" to cover only sites where there is no "occupiable" building can have the effect of changing the status of land that has temporary structures or mobile structures on it. Some sort of permanence and habitability should be included.

P. 44, Standard 192.12(b)
Same comments apply as for Page 43, Definitions.

Consistency of Standards
Based on measurements taken at open pit mines (NUREG/CR-2407), there is an average specific flux of about 4200 pCi $^{222}Ra/m^2sec$-$\%U_3O_8$ on various land surfaces containing natural uranium. In the case of the 15 pCi $^{226}Ra/g$ standard, if ^{226}Ra is assumed to be in equilibrium with natural uranium, 15 pCi ^{226}Ra is equivalent to 53 ug of U_3O_8 which would have an emission rate of 22 pCi $^{222}Rn/m^2$-sec. Given the wide range in specific flux as reported in the above reference, this shows excellent agreement between the new standards.

The agreement between radon progeny limits, indoor dose rate limits, and radon emission rates or radium in soil standards is impossible to assess based on PNL's experience in Edgemont, S.D. There was essentially no correlation between radon progeny concentrations measured in structures and the maximum ^{226}Ra concentrations in soil samples collected on the property or the average indoor gamma dose rate. In addition, there was

evidence that the range of annual average radon progeny concentrations measured in homes was at least partly influenced by local environmental factors such as the life style of the occupants and the tightness of the structure, rather than being primarily dependent on the amount of ^{226}Ra in the soil.