NRC FORM 189 (3-81)

U.S. NUCLEAR REGULATORY COMMISSION

PROJECT AND BUDGET PROPOSAL FOR NRC WORK

DATE OF PROPOSAL: July 1982

☐ NEW

☒ REVISION NO.

PROJECT TITLE: Edgemont Remedial Action Program

FIN NUMBER: B2217

NRC B&R NUMBER: 50-19-03-03

NRC OFFICE: Nuclear Materials Safety and Safeguards

DOE CONTRACTOR: PACIFIC NORTHWEST LABORATORY - BATTELLE MEMORIAL INSTITUTE

CONTRACTOR ACCOUNT NUMBER: TD 1323

SITE: RICHLAND, WASHINGTON

DOE B&R NUMBER: 40-10-01-05

COGNIZANT PERSONNEL	ORGANIZATION	FTS PHONE NUMBER
NRC PROJECT MANAGER: Harry J. Pettengill	NMSS/DWM/WMUR	427-4103
OTHER NRC TECHNICAL STAFF: Gregory Eadie	NMSS/DWM/WMUR	427-4541
DOE PROJECT MANAGER: Maynard J. Plahuta	RL-EPD	444-7034
CONTRACTOR-PROJECT MANAGER: N. A. Wogman	PNL	444-3003
PRINCIPAL INVESTIGATOR(S): P. O. Jackson	PNL	444-3780
J. A. Young	PNL	444-4448

PERIOD OF PERFORMANCE

STARTING DATE: 09/01/80

COMPLETION DATE: 03/31/85

STAFF YEARS OF EFFORT (Round to nearest tenth of a year)	FY 82	FY 83	FY 84	FY 85	FY
Direct Scientific/Technical	1.4	0.4	0.3	0.1	
Other Direct (Graded)	0.2	-	-	-	
TOTAL DIRECT STAFF YEARS	1.6	0.4	0.3	0.1	
COST PROPOSAL					
Direct Salaries	67	15	16	7	
Material and Services (Excluding ADP)	23	8	8	6	
ADP Support					
Subcontracts	251	18	16	0	
Travel Expenses — Foreign					
Travel Expenses — Domestic	17	7	7	2	
Indirect Labor Costs	22	5	5	2	
Other (Specify) Other direct cost/indirect services	35	7	7	3	
General and Administrative (%)	47	10	11	5	
TOTAL OPERATING COST	462K	70K	70K	25K	
CAPITAL EQUIPMENT FIN CHARGED					
TOTAL PROJECT COST	462K	70K	70K	25K	

FY	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
MONTHLY FORECAST EXPENSE	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER

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FIN NUMBER: B2217

DATE: July 1982

PROJECT TITLE

Edgemont Remedial Action Program

DOE PROPOSING ORGANIZATION

RICHLAND OPERATIONS OFFICE - ENERGY PROGRAMS DIVISION

FORECAST MILESTONE CHART: Scheduled to Start – △——▲ – Completed (Shown in Quarter Year)
PROVIDE ESTIMATED DOLLAR COST FOR EACH TASK FOR EACH FISCAL YEAR

TASK		FY PRIOR				FY 82				FY 83				FY 84				FY 85			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
A - Information Meeting and Public Relations	SCHEDULE	△				——▲															
	COST					0															
B - Prepare and Equip Mobile Laboratory Facility	SCHEDULE	△				——▲															
	COST					2															
C - Grade Working Level Measurements in Structures	SCHEDULE	△				——▲															
	COST					0															
D - Gamma Radiation Measurements	SCHEDULE	△				——▲															
	COST					0															
E - Measurement of ^{226}Ru in Soil	SCHEDULE	△				——▲															
	COST					50															
F - Measurement of U Decay Chain Radionuclides	SCHEDULE	△				——▲															
	COST					35															
G - Radon Daughter Measurements (.01WL - .033 WL)	SCHEDULE	△				——				——				▲——			▲				
	COST					100				60				55							
H - Engineering Assessment	SCHEDULE	△				——				——				▲——			▲				
	COST					246*				10				10							
I - Develop Acceptable Protocols	SCHEDULE	△				——▲															
	COST					10															
J - Mini-Engineering Assessment	SCHEDULE		△			——▲															
	COST					19*															
K - Final Report	SCHEDULE																△	——			▲
	COST																5				25
TOTAL ESTIMATED PROJECT COST		499 K				462 K				70 K				70 K				25 K			

APPROVAL AUTHORITY–SIGNATURE

A. J. Hanchett

DATE: 7/9/82

*These include $22K for the purchase of capital equipment items. reference SOEW 50-81-114, dated 8/23/81, and Attachment.

1. Objective of Proposed Work

The objectives of this program are to survey structures and properties within the city limits of Edgemont, South Dakota, using radiological analysis equipment to provide necessary data to identify those properties which require engineering assessments to define remedial action required to meet the interim standards promulgated by the U. S. EPA (40 CFR 192 - "Proposed Cleanup Standards for Inactive Uranium Processing Sites") which became effective June 21, 1980. In addition, the U. S. Department of Housing and Urban Development (HUD) has required that grab working level sampling be conducted in any structure and gamma surveys of vacant lots be performed in Edgemont before federal financial assistance will be approved. At the request of HUD and the State, the NRC has instructed PNL to conduct these surveys. Upon completion of the environmental surveys, complete engineering assessments, as warranted, will be performed to propose the extent of needed remedial action to clean up residual radioactive materials.

2. Summary of Prior Efforts

The program began late in FY 1980 under urgent scheduling requirements. During the interval between August and mid-September, plans and protocol details were developed, and the necessary staff and equipment were assembled and a mobile laboratory was equipped. Necessary questionnaires and legal releases were also prepared. The mobile laboratory was taken to Edgemont to initiate sampling and measurements during the week of September 15, 1980. PNL suggested some protocol modifications (cleared by the NRC technical monitor) which were necessary to meet the proposed EPA standards of 40 CFR 192.

During FY 1981, a communications strategy for notifying property owners of the nature and need for the survey program was developed and implemented. Files were set up and a map was prepared showing the ownership and boundaries of all properties in Edgemont and its vicinity. Screening surveys were completed on 474 properties containing habitable buildings on 97 empty lots and on 31 blocks.

A symposium on Edgemont protocols and measurements was hosted, and the protocols were modified on the basis of recommendations made at the symposium and experiences at Edgemont. Year-long surveys of radon progeny exposure rates were initiated in 101 buildings using radon progeny integrating sampling units (RPISU). Comparisons were made in 54 buildings between radon concentrations measured using Terradex Track Etch® and radon daughter exposure rates measured by five-minute air filter and 100-hour RPISU samples. A mini-engineering assessment protocol was tested at eight properties as a substitute for long-term radon daughter measurements. (Forty-two subsequent mini-engineering assessments done in FY 1982 indicated that more research outside the scope of this effort was required to assure a statistically valid interpretation of the results, and at the request

of NRC, mini-engineering assessments were discontinued.) Radon concentrations were monitored continually at two locations in Edgemont, and five-minute radon progeny measurements were conducted simultaneously outside and inside at 38 properties. A protocol for conducting engineering assessment measurements was established and was performed at 71 properties. A NaI(Tl) well-logging probe was constructed for use in engineering assessments. A subcontract for architect-engineering services was prepared and put out for bid.

3. Work to be Performed and Expected Results

Task A. Information Meetings and Public Relations

Before any surveys or remedial actions are initiated in the town of Edgemont, we plan to work with the NRC in holding information meetings to inform the public of the type of measurements and possible remedial action practices that will be carried out. A meeting will be held with state officials of South Dakota to inform them of our plans and coordinate activities. Then an open meeting will be held in the town of Edgemont. This will be followed by requesting that all of the residents and owners of commercial establishments sign agreements allowing the necessary surveys to be carried out. It is anticipated that these consent documents will be drawn up by PNL Legal staff and submitted to NRC Legal so that they can develop an official consent agreement. Battelle will carry out all work required for their distribution and the answering of questions regarding them. We anticipate full cooperation from the home owners and owners of commercial properties; but if there are refusals, we will document them.

Most of Task A has been completed. NRC has also requested that if no written response has been given to our last letter (dated December 28, 1981) to Edgemont property owners each owner should be contacted individually by telephone; and, as a last resort, every attempt be made to make a personal contact to obtain a written document in each instance of an owner's refusal. Also, for those properties where the owner has refused the free radiological survey, PNL staff have been requested to make a personal contact to convince the owner that the surveys are beneficial and should be completed. For the most part, these contacts have been made; however, some few out-of-state property owners have not yet been located. We expect that this request will be completed during FY 1982.

Task B. Prepare and Equip Mobile Field Laboratory Facility

A mobile field laboratory is essential for carrying out the measurements at Edgemont. PNL has a mobile laboratory which was originally equipped for conducting NRC studies at uranium mining and milling sites. The following equipment will either be housed in the mobile laboratory or in a local facility when portability is not essential. In addition, the measurement of uranium and its daughters in soil samples will be performed at the PNL laboratory.

a. Six to eight alpha scintillation counters for measuring radon daughters (working levels) in structures.

b. Air pumps, filter papers, and filter heads for collecting radon daughters from large volumes of air within the structures.

c. Portable micro-R-meters for the radiological surveys in and around structures and a pressurized ionization chamber for calibration of the micro-R-meters.

d. A large NaI(Tl) well crystal and associated electronics for measurement of the radium content of soil samples.

e. Soil coring equipment to permit either borehole logging or soil core analyses.

f. Continuous radon daughter measuring instruments, RPISU, or MOU will be assembled later for use when necessary.

A new borehole logging capability will be installed this summer (FY 1982). Rather than returning the mobile laboratory to Richland, Washington, for maintenance and refurbishing, these activities have been and will be performed in Edgemont, South Dakota.

Task C. Working Level Measurements in Structures Based on Grab Sampling

The intent of this task is to determine as accurately as possible from a grab sample the numbers of working levels in air within residential and commercial structures. To assure that a reasonably representative sample is obtained, owners of the structures will be requested to close up the buildings (i.e., all doors and windows shut and no air conditioning or heating systems operating) for at least three, and preferably eight, hours prior to sample collection. A staff member will then enter the structure and collect a radon daughter sample in the main first story living area and in habitable basement areas (or main working area of a commercial building). Up to five structures can be sampled simultaneously. These samples will then be taken directly to the portable laboratory station and counted in scintillation counters according to the method of Thomas for establishing working levels within the structure. It is anticipated that the team should be able to measure working levels in three to six structures per day. The average number will depend on the number of reruns necessitated because of excessive working levels, detected excessive air leakage or radon daughter plateout, and by inactive days necessitated because of excessive outdoor wind speeds (high wind speeds were found to correlate with abnormally low results). Where the working levels exceed 0.033, a second measurement will be made on another day. When the average measured result exceeds 0.033, the property will be scheduled for an engineering assessment. Where

the initial measurement(s) average less than 0.01 WL, the property will require no further working level measurements, and it will be assumed that the air concentrations do not exceed the standards. Homes where levels from 0.01 WL through 0.033 WL are measured must have a backup measurement to determine if the annual average air concentration exceeds 0.015 WL.

Task C will continue through August 1982 to complete the screening surveys of those residences which recently requested such surveys as authorized by the NRC project manager in April 1982.

Task D. Gamma Radiation Measurements

At all properties in Edgemont and vicinity, a gamma dose rate survey will be made. The measurements will be taken at grid indices both inside and outside of structures and on vacant lots. Surveys will be made with portable gamma survey meters which will be cross-calibrated periodically with a pressurized ion chamber to ensure that the dose rates are accurate. The grid surveys will be entered on maps of the interior of structures and of the surrounding lot. When gamma dose rates above 14.5 μR/hr are observed (the upper 95% limit of background dose rate measurements at Edgement), the surveyor will make a surface survey of nearby walls and floors or the ground to search for the source of elevated readings. If a source is located, it will be indicated on the survey map. When any indoor or outdoor gamma dose rate measurement exceeds 20 μR/hr above background, the property will be scheduled for an engineering assessment.

Task D will continue through August 1982 to complete the screening surveys of those residences which recently requested such surveys as authorized by the NRC project manager in April 1982.

Task E. Measurement of ^{226}Ra in Soil

For all lots with permanent habitable structures, at least two surface soil samples will be collected and the ^{226}Ra content measured. The soil will be collected at two grid locations where maximum dose rates are measured unless surface soil is blocked by pavement or valuable shrubs. Then the next highest location will be sampled. If dose rates exceeding 20 μR/hr above background are located, one or more additional samples will be collected, including an 18-inch core sample. When any soil radium concentration exceeds 5 pCi/g, the property will be scheduled for an engineering assessment.

Task E will continue through August 1982 to complete the screening surveys of those residences which recently requested such surveys as authorized by the NRC project manager in April 1982. Depending on the number of soil samples required for analysis, it may be delayed into September of 1982.

Task F. Measurement of Uranium Decay Chain Radionuclides

Those soil samples which exceed 5 pCi/g of ^{226}Ra will be analyzed as required for the content of ^{238}U (^{234}Th), ^{230}Th, and ^{210}Pb using photon spectrometry with an intrinsic germanium detector. The ratios of daughter radionuclides to ^{238}U will assist in determining whether the sampled soil contains residual radioactivity.

Task F should be completed by the end of September 1982.

Task G. Long-term Radon Daughter Measurements

For those structures where the airborne radon daughter concentrations result in working levels from 0.01 through 0.033 but which are not scheduled for an engineering assessment based on the gamma radiation or soil radium content, a long-term measurement of the radon daughter concentration will be conducted. Long-term measurements will include either the use of RPISU's or MOD's which will be operated on the main floor living area. The units will accumulate radon daughter exposures for a period of at least 100 hours and then be sent to the EPA Las Vegas for reading. The measurements will be repeated every other month for a year. In the event a detector head plugs it will be replaced with fresh ones until the total of 100 hours is accumulated. Any structure where the annual average working level exceeds 0.015 will be scheduled for an engineering assessment. Since only a limited number of RPISU detection systems are available from the EPA, this program could take up to three years to complete.

Task G is in process, and about 100 samples were finished as of April 30, 1982. Approximately 250 long-term radon progeny measurements remain to be completed. With the 20 existing radon progeny integrating sampling units (RPISU's), we would estimate completion of 100 of these measurements by July of 1983, another 100 by July of 1984, and the final 50 by July of 1985. Efforts will be expended to acquire additional RPISU's to allow completion of the measurements in FY 1984. Projections in this proposal reflect this early completion.

Task H. Engineering Assessments

Engineering assessments will be required for those properties where the average grab working level exceeds 0.033 WL or the annual average working level exceeds 0.015 WL or the gamma exposure rate exceeds 20 μR/hr above background or the ^{226}Ra in soil exceeds 5 pCi/g. The engineering assessment will consist of collecting soil samples around the structure, both on the surface and by drilling to determine the extent of the area where radium concentrations exceed 5 pCi/g. These areas will be carefully mapped both horizontally and vertically and serve as a basis for obtaining bids for removal of contaminated material. Contaminated structural materials will be noted and cost estimates for remedial action will be prepared. During the course of the measure-

ment of uranium decay chain radionuclides (Task F) and/or the engineering assessment, it will be determined whether the high radium concentrations are residual radioactivity or whether they are due to natural occurrences in the ambient soil. If they are due to naturally occurring radioactivity in the soil, the NRC and the state of South Dakota will be notified.

Engineering assessments, will be completed this fiscal year for all properties except those required by ongoing RPISU measurements which result in an annual average working level of 0.015. This task is anticipated to terminate in FY 1984 unless additional RPISU units are not available.

Task I. Develop Protocols Acceptable to Regulatory Agencies

A generally approved protocol will be necessary for this program so that its results are acceptable to regulatory agencies. A starting version submitted by the NRC program monitor formed the basis for the original scope of this program. Because of the need to assure that Edgemont activities conform with the intent of proposed standards in 40 CFR 192, subpart B, it is necessary to obtain a consensus of scientific opinion that measurements and methodologies are satisfactory. To this end, correct protocols must be developed and approved by NRC prior to application in the field. However, it is apparent that modifications may be necessary after the initiation of the program if field experience indicates that the original protocol is in some way unacceptable.

To establish an acceptable protocol, PNL will review the proposed versions and comment on them. Meetings will be held with scientists and officials of NRC, HUD, EPA, the State of South Dakota, and the City of Edgemont to discuss the proposed protocols. From time to time the protocol will be adjusted after consultation with NRC if evidence of a needed change occurs.

Task I has resulted in the issuance to NRC of the protocol for radiological testing, the protocol for mini-engineering assessments, and the protocol for full engineering assessments.

Task J. Mini-engineering Assessments

To expedite surveys, starting in July 1981, a mini-engineering assessment will be substituted for the long-term radon daughter measurements. The mini-engineering assessment will consist of borehole logging to a depth of six feet or to the base of the foundation to determine the ^{226}Ra concentration pattern. One hole will be made on each of four sides of the structure at the point of highest measured surface gamma dose rate within two meters of the structure. If no ^{226}Ra measurement exceeds 5 pCi/g, it will be assumed that no residual radioactive material is present. If any measurement exceeds 5 pCi/g, the property will be scheduled for a full engineering assessment.

The measurements in Task J were initiated in July of 1981 as a possible substitute for long-term radon daughter measurements by RPISU. However, based on the preliminary information gathered from the conduct of mini-engineering assessments in Edgemont, it was determined that a more extensive research program would have to be completed to assure a statistically valid interpretation of the sampling results; and, therefore, the mini-engineering assessment task was discontinued, as per instruction from the NRC project manager in April of 1982.

Task K. Final Report

The final report draft will be prepared at the conclusion of this program, detailing all work performed in this program and the current status of properties in Edgemont, S.D. This draft will be submitted to the appropriate NRC distribution for approval and recommendations. The draft will be returned within 60 days and a revised formal report will be prepared which contains appropriate recommendations of the NRC staff project manager. We expect the final report to be completed by mid-year FY 1985.

Detailed subtasks and milestones are shown beginning on page 10.

4. Description of any Follow-on Efforts

No work past FY 1985 is anticipated at present.

5. Relationship to Other Projects

This program is directly related to the NRC funded study entitled "Environmental Cleanup Standards for Low Level Radioactive Waste Materials." This program proposes to review and assess the existing methodologies and capabilities for evaluating the effectiveness of decontamination efforts for structures in open land areas and to provide the Nuclear Regulatory Commission (NRC) with a technical manual of standardized methods best suited for this purpose. This program is needed because Public Law 95-604 requires that NRC concur in remedial actions taken for the cleanup of open land and buildings contaminated with residual low level radioactive materials from inactive uranium processing sites.

6. Reporting Schedule

The reporting requirements for this project are the following:

1. A monthly letter status report.
2. Informal monthly progress reports.
3. Interim reports summarizing work performed each calendar year.

4. A final report.

5. Requested reports -- Several informal topical, progress, and summary reports have been requested from time to time by the NRC project manager. We will continue to supply requested reports as needed.

Formal Reports Issued

"Workshop on Radiological Surveys in Support of the Edgemont Cleanup Action Program," R. W. Perkins (Workshop Chairman), J. A. Young, P. O. Jackson, V. W. Thomas, and L. C. Schwendiman. Proceedings of Conference held at Denver, Colorado, January 21-22, 1981, NUREG/CP-0021, October 1981.

7. Subcontractor Information

Temporary field technician positions are being and will be staffed by graduate scientists obtained by a contract with Manpower, Inc., of Sioux Falls, S.C. A consultant, Don Kurvink, has been used under subcontract for the program. A subcontract has been let to ARIX, Inc. for the performance of architect-engineering services necessary for the completion of engineering assessments. Estimates of the cost of these contracts for FY 1982, FY 1983, and FY 1984 are shown below:

	FY 1982	FY 1983	FY 1984
Manpower, Inc.	$142K	$15K	$15K
Donald Kurvink	$ 24K	0	0
ARIX, Inc.	$ 60K	$ 2K	0

8. New Capital Equipment Requirements

None

9. Special Facilities Required

Primary NRC facilities to be used are mobile vehicles purchased under past NRC capital money. This facility will house instrumentation operating in the city of Edgemont, S.D. Laboratory based facilities will be housed in the 329 Bldg. of the Hanford project, Richland, WA. A local laboratory has been provided in the Edgemont Hospital building. Office space and limited laboratory space will be provided in a rented apartment in Edgemont, S.D. There are no proposed modifications to any existing or planned facilities or test installations.

10. Conflict of Interest

This proposed project has been reviewed by Battelle's corporate scope coordinator, who indicates that it does not duplicate work being performed for others.

SUBTASKS AND MILESTONES	FY 1982	FY 1983	FY 1984
Preprogram review with NRC in Washington D.C. (8/80)			
Task A. Information meetings and public relations	4 ▽ 5 ▽		
1. Town meeting and initial contacts with property owners (9/80)			
2. Newspaper ad published (9/80)			
3. Letters from South Dakota Department of Health and City of Edgemont to property owners (mid-1981)			
4. Battelle letter to property owners			
5. Personal contacts with nonresponding or reticent home owners			
Task B. Prepare and equip mobile laboratory facility	3 ▽		
1. Initial setup (9/80)			
2. Restore and modify as necessary (2/81)			
3. Install new borehole logging capability			
Task C. Working level measurements in structures based on grab sampling	3 ▽ 4 ▽		
1. Initiate field sampling (9/80)			
2. Complete preliminary surveys of radon progeny at approximately 500 residences in the Edgemont area (12/81)			
3. Status report to NRC			
4. Complete remainder of grab working level measurements and resamplings of sites with greater than 0.033 WL			

SUBTASKS AND MILESTONES	FY 1982	FY 1983	FY 1984
Task D. Gamma radiation measurements	1 ▽		
1. Indoor and outdoor gamma surveys and maps			
Task E. Measurement of ^{226}Ra in soil	1 ▽		
1. Collect soil samples and measure ^{226}Ra			
Task F. Measurement of uranium decay chain radionuclides	1 ▽		
1. Measure uranium decay chain radionuclides			
Task G. Radon daughter measurements (0.01 WL -0.033 WL)			1 ▽
1. Long-term radon daughter monitoring			
Task H. Engineering assessment	1 2 3 4 ▽▽▽		5 ▽
1. Borehole logging and core sampling and ^{226}Ra analysis			
2. Complete analyses of core samples for ^{238}U and ^{232}Th decay chain members			
3. Prepare survey maps for all sites			
4. Prepare an engineering assessment giving details of remedial action costs and schedules for each site			
5. Complete engineering assessments for those properties required by annual average working level greater than 0.015 as measured by RIPSU method			
Task I. Develop protocols acceptable to regulatory agencies	2 3 ▽		
1. Develop protocols for radiological testing (4/81)			

SUBTASKS AND MILESTONES	FY 1982	FY 1983	FY 1984
2. Develop protocols for mini-engineering assessments			
3. Develop protocols for engineering assessments			
Task J. Mini-engineering assessments	[1] ▽		
1. Complete borehole logging at points of highest measured surface gamma dose rate within 2 meters of a structure			
Task K. Final report			
1. Initial draft submitted (early FY 1985)			
2. Final draft submitted (mid-FY 1985)			

MONTHLY FORECAST EXPENSE

	FY82	FY83	FY84	FY85
October	4*	5	5	4
November	22*	6	6	4
December	23*	6	6	4
January	17*	6	6	4
February	14*	5	5	4
March	14*	6	6	5
April	24*	6	6	
May	61*	6	6	
June	70	6	6	
July	71	6	6	
August	71	6	6	
September	71	6	6	
	462	70	70	25

*Actual costs