PROGRESS ON THE UMTRA PROJECT: THE ROLE OF THE INCLUSION SURVEY CONTRACTOR*

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ABSTRACT

Oak Ridge National Laboratory serves as the Inclusion Survey Contractor (ISC) for the Department of Energy's Uranium Mill Tailings Remedial Action Project (UMTRAP). The role of the ISC is to assess whether or not each of the estimated 10,000-plus vicinity properties associated with UMTRAP is contaminated in excess of applicable standards. To date, the ISC has made recommendations on more than 8500 properties. This paper describes the flow of information through the inclusion process, the role of the ISC, and the inclusion progress to date.

INTRODUCTION

The Environmental Assessments Group at Oak Ridge National Laboratory (ORNL) serves as the Inclusion Survey Contractor (ISC) for the Department of Energy's (DOE) Uranium Mill Tailings Remedial Action Project (UMTRAP). The UMTRA Project is authorized by the Uranium Mill Tailings Radiation Control Act of 1978 (1). The purpose of the project is to perform remedial action in cooperation with affected states and tribes at inactive uranium processing sites designated by the Act and at properties in the vicinity of the designated processing sites where residual radioactive contamination above established criteria (2) is found. The UMTRA Project is funded through a cost sharing arrangement (90% DOE, 10% state) and is to be completed within seven years from initiation (originally to be March 1990).

The UMTRA Project is devoted to remedying the inactive piles (sites) and associated public and private properties (vicinity properties) that were contaminated with residual radioactive material from mill operation either by environmental or willful causes. The most common constituent of residual radioactive material is ^{226}Ra which was in secular equilibrium with the uranium in the milled ore. Radon gas from the radioactive decay of the ^{226}Ra is the principal pathway of exposure and subsequent health risk to humans.

Vicinity properties are identified for clean up near 25 inactive processing sites (Table I, leftmost column). Approximately 8700 vicinity properties were originally identified as being candidates for remedial action. The number of designated properties varies by site from none for Ambrosia Lake and Maybell to 6905 for the Grand Junction site (Table I).

The role of the ISC is to investigate vicinity properties to determine whether or not they qualify for remedial action. Based on comparisons to relevant EPA standards, the ISC recommends to the DOE whether the given property should be remedied (included in the project) or not (excluded from the UMTRA). The DOE decides whether or not to accept the ISC recommendations.

This paper briefly describes the organization of the UMTRA Project, the various roles of the ISC in the UMTRA Project, the standards applied, and ISC progress to date.

FUNCTIONAL ORGANIZATION OF THE INCLUSION PROCESS

The UMTRA Project Office of the DOE, located in Albuquerque, NM, is responsible for implementation of the remedial action program. A Technical Assistance Contractor (TAC, a team of Jacobs Engineering Group and Roy F. Weston, Inc.) provides support to the project office. Two remedial action contractors or RACs (MK-Ferguson and UNC Geotech) are responsible for management and supervision of engineering, radiological surveillance and construction activities required for remedial activities at the

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processing sites and vicinity properties. Project organization is detailed in the UMTRA "Project Vicinity Properties Management and Implementation Manual" (3).

The UMTRA project is concerned with clean up of both inactive mill sites and vicinity properties. The flow of information throughout the inclusion process for vicinity properties alone is shown in Fig. 1. Responsibility for the listed activity is indicated parenthetically.

Historical radiological information on vicinity properties came from aerial surveys, the ORNL mobile gamma scanning van (4), and walk-on surveys conducted by various agencies and contractors, including the Colorado Department of Health, ORNL and others. These historical data were evaluated by the DOE and candidate properties containing potentially excessive amounts of 226Ra-bearing materials were specified for further investigation by publication of the Designated Properties List (DPL; 1,5).

The ISC may utilize historical information to make inclusion recommendations. If historical data indicate that an includable deposit once existed on the location in question, and if the ORNL mobile gamma scanning van indicates that the deposit is still in existence, then the property is recommended to DOE for inclusion.

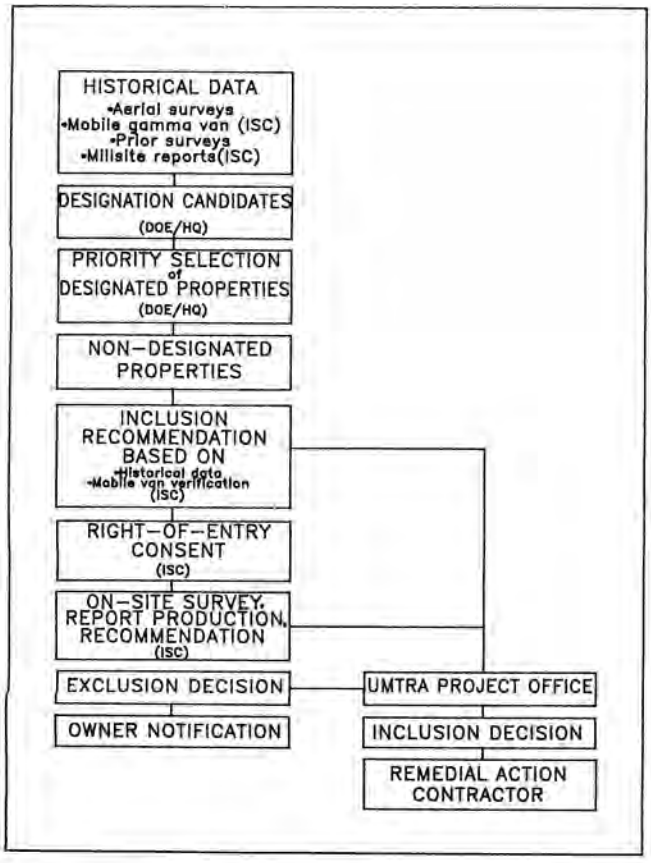

Fig. 1. Recommendation Flow Through the UMTRAP Inclusion Process.

If historical information is not adequately detailed or clear to make a decision, then the location requires further study. A consent-for-access form, which grants written permission to visit the property, is obtained from the owner by the ISC. The property is visited by graphics team which prepares a field map of the property. Radiological survey teams then visit the property to take radiological measurements or samples using approved methods (6).

A recommendation report that describes the radiological condition of the property is sent to DOE, which decides whether or not the property is to be cleaned up. Exclusion decisions result in notification of the property owner. Inclusion into the program results in notification of the appropriate RAC to proceed with clean up of the property.

STANDARDS APPLIED TO INCLUSION RECOMMENDATIONS

Inclusion recommendations are based upon standards issued by the US Environmental Protection Agency (EPA, 2). The standards state that a deposit should be removed if gamma exposure rates exceed 20μR/hr indoors or if the interior annual average radon daughter concentrations are in excess of 0.02 WL. Remediation is also indicated if concentrations of ^{226}Ra exceed 5 pCi/g in the top 15 cm of soil or 15 pCi/g in any subsequent 15 cm layer of soil, averaged over 100 sq.m.

In practice, the standards have been augmented by procedures and guidelines which allow for an orderly and efficient progression towards either an inclusion or exclusion recommendation. The decision process is shown in Fig. 2.

If the gamma exposure rate in any room of the lowest habitable level of the structure averages more than 20 μR/hr, then the property is recommended for inclusion with no additional effort. Likewise, an immediate inclusion recommendation is made if an outdoor survey detects a gamma exposure rate of 25μR/hr above background averaged over any 100 sq.m. area.

If both outdoor and indoor gamma exposure rates are not adequate to include the property and are within the expected range of background (less than 20% above average), then the property is recommended for exclusion. If outdoor contamination on the property is in excess of the background range, but not sufficiently high to include the property, then soil samples are collected and analyzed for ^{226}Ra. If the sampled deposit is in excess of the published EPA standards, then the property is recommended for inclusion.

As a last resort, if a property has a deposit (or deposits) associated with a habitable structure which does not

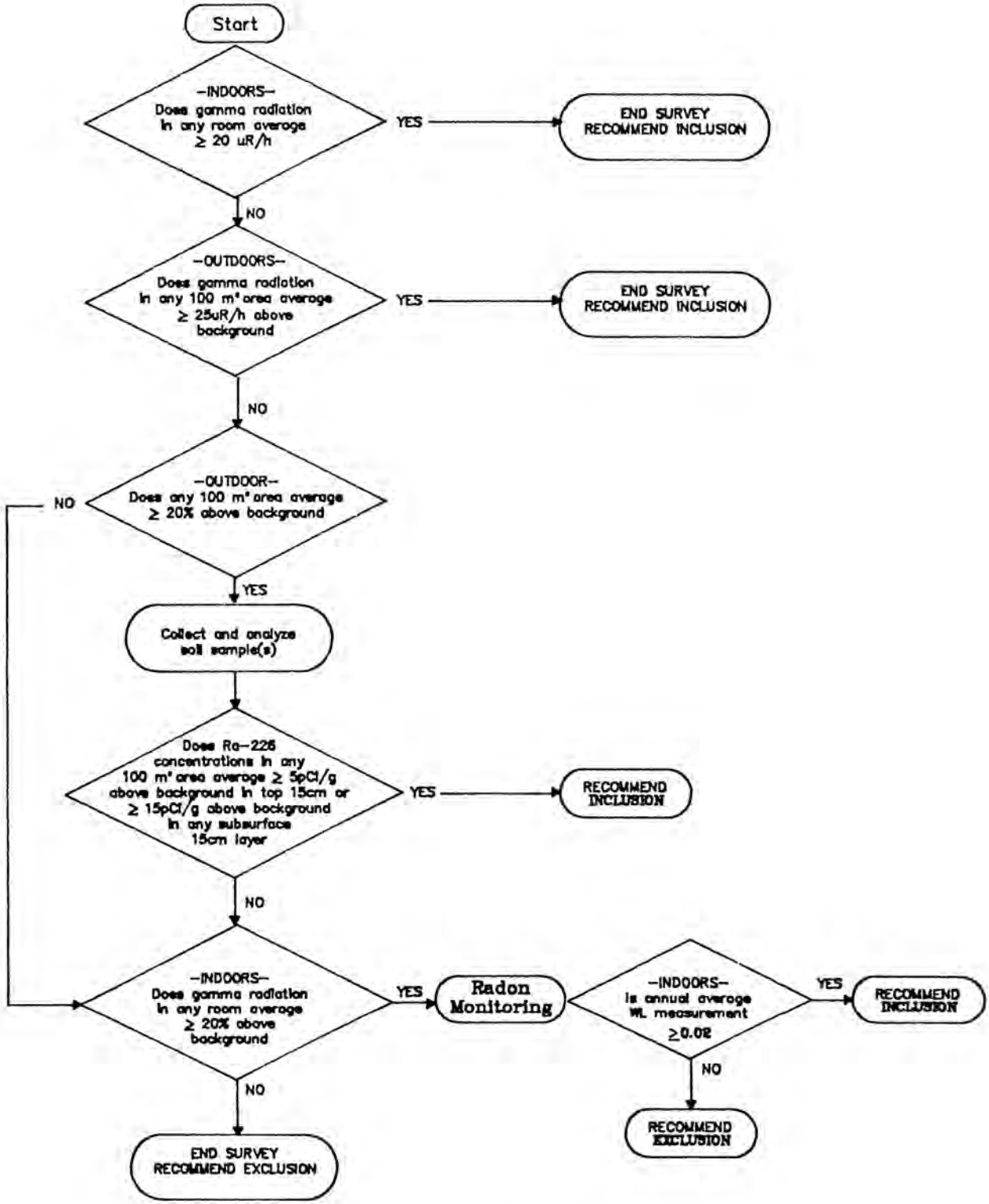

Fig. 2. The Inclusion Survey Contractor Inclusion/Exclusion Decision Process.

TABLE I

Number of UMTRA Vicinity Properties Associated with Each Millsite

Site	Designated	Other*	Total
Ambrosia Lake, NM	0	2	2
Belfield, ND	11	9	20
Bowman, ND	3	0	3
Canonsburg, PA	111	238	349
Durango, CO	137	334	471
Edgemont, SD	216	42	258
Falls City, TX	20	1	21
Grand Junction, CO	6905	2462	9367
Green River, UT	29	6	35
Gunnison, CO	14	12	26
Lakeview, OR	4	8	12
Lowman, ID	17	15	32
Maybell, CO	0	3	3
Mexican Hat, UT	21	3	24
Monument Valley, AZ	17	0	17
Naturita, CO	60	3	63
Rifle, CO (2 mills)	384	57	441
Riverton, WY	50	18	68
Shiprock, NM	17	3	20
Slick Rock, CO	4	1	5
Salt Lake City, UT	127	64	191
Spook, WY	1	0	1
Tuba City, AZ	8	0	8
Total	8156	3281	11437

*Estimated responses to advertising, spillovers, and owner requests.

exceed the Ra-in-soil standard or the interior gamma exposure standard, then it will be sampled for radon daughters. Although project criteria allow for grab sampling of RDCs, it has been the practice of the ISC to measure annual averages of radon using passive film detectors and then infer the annual average RDC from the measured ^{222}Rn concentrations. By using long-term measurements, the inherent variability in making short-term measurements has been avoided.

The annual average radon concentration is converted to annual average RDC in units of working level (WL) by assuming an equilibrium coefficient of 50%. If the calculated WL is in excess of 0.02, then the property is recommended for inclusion. If concentrations are below 0.02 WL, then the property is recommended for exclusion.

To keep the cost per inclusion/exclusion survey to a minimum, the number of various types of measurements performed during a survey is kept low. Although surveys are purposely superficial they have been designed to provide detail necessary to make a justifiable and accurate decision. The relatively scant amount of data collected requires that all information collected be of high quality and has necessitated a strong commitment to quality assurance (7).

INCLUSION PROGRESS TO DATE

The original designated property list had a total of 8605 location numbers listed (Table I). Based on current information, a total of over 11,000 properties will be surveyed by the ISC. The number of recommendations in excess of the original DPL results from non-designated properties which comprise owner requests, responses to advertising, and properties which "spillover" from adjacent properties.

Progress estimates of the inclusion survey process vary depending how the total number of recommendations is estimated. If the total number of recommendations is taken to equal the original DPL, then the inclusion process is 95% complete. However, if a realistic estimate of owner requests, responses to advertisements, and spillovers is used for the total number of recommendations, then the inclusion process is approximately 80% complete.

The final total number of recommendations to be made is difficult to estimate because of the public involvement in the program. Heightened publicity and published deadlines regarding remedial action of the mill site, and health risk concerns may prompt property owners to request a survey of their property. Current project policy allows public participation at the owner's request so long as the ultimate schedule of mill site remediation is not impacted.

More critical to project deadlines than the number of recommendations to be made is the number of included properties that enter into the project. While there is no identified or defined difference between the cost for exclusion and inclusion recommendations, inclusions ultimately cost more because only included properties are remedied. The inclusion ratio (number of inclusions divided by total decisions) has varied throughout the life of the project.

Average inclusion ratios through December, 1987, are listed by site in Table II. Discarding extreme values which result from sites with only a few properties (e.g., Ambrosia Lake and Slick Rock), the inclusion ratio for designated properties varies from low values of 6% and 17% for Monument Valley and Rifle, respectively, to high values of about 80% for Lowman, Shiprock and Tuba City. Most sites, however, exhibit about a 50% inclusion ratio.

Undesignated properties tend to have a lower probability of being included. The fact that properties were designated because of a suspicion of contamination makes it understandable that undesignated properties are less likely to be included.

Using the figures listed in Table I along with the characteristic inclusion ratios for designated and undesignated properties taken from Table II, the calculated number of

remedial actions to be performed is 4950. The overall inclusion ratio for the project to date is estimated to be 43%.

The vast majority of the inclusion survey process is to be completed by the end of fiscal year 1988. However, minor efforts will continue until near the deadline for completion of the project (1992). Interest in the project by property owners is highly variable but may be higher near the end of the project for each site. As the inclusion process begins to conclude, there may or may not be unforeseen, large numbers of undesignated properties which need to be surveyed. However, if such properties do appear, the lower inclusion ratio of undesignated properties would tend to have a greater impact on the Inclusion Survey Contractor than on the project as a whole. Site-specific cut-off dates, which prevent initiation of the inclusion process for properties following a certain time, will prevent impacts on the project schedule by latecomers to the project.

SUMMARY

The Inclusion Survey Contractor is charged with identifying vicinity properties that are candidates for remedial action by the UMTRA project. Specific roles include review of historical data, requesting consent-for-access to visit vicinity properties, conducting radiological surveys, and preparation of inclusion/exclusion recommendation reports for the DOE.

To date, the ISC has completed inclusion/exclusion recommendations on over 8500 properties. Under current conditions, a total of approximately 5000 remedial actions would result during the project.

REFERENCES

1. Public Law 95-604, "Uranium Mill Tailings Radiation Control Act of 1978," November 8, 1978.

2. Federal Register, Part II, Environmental Protection Agency, "Standards for Remedial Actions at Inactive Uranium Processing Site, Final Rule," (40 CFR Part 192), January 5, 1983.

3. Uranium Mill Tailings Remedial Action Project, "Vicinity Properties Management and Implementation Manual," UMTRA-DOE-AL-050601, Revision D, December, 1987.

4. T.E. Myrick, M.S. Blair, R.W. Doane, W.A. Goldsmith, "A Mobile Gamma-Ray Scanning System for Detecting Radiation Anomalies with 226Ra-Bearing Materials," ORNL/TM-8475, November, 1982.

5. C.D. Young and L.C. Brazley, "Inclusion of Vicinity Properties in the Uranium Mill Tailings Remedial Action Project," An Invited Paper for the 31st Annual Meeting , American Nuclear Society, Boston, Massachusetts, June 9-13, 1985.

6. C.A. Little, B.A. Berven, T.E. Carter, M.L. Espegren, F.R. O'Donnell, S.J. Ramos, C.D. Retolaza, A.S. Rood, F.A. Santos, D.A. Witt, and K.M. Woynowskie, "Radiological Survey Activities Uranium Mill Tailings Remedial Action Project Procedures Manual," ORNL/TM-9902, July, 1986.

7. S.J. Ramos, B.A. Berven, and C.A. Little, "Quality Assurance Program Plan for the Radiological Survey Activities Program Uranium Mill Tailings Remedial Action Project," ORNL/TM-9684/R1, August, 1986.

TABLE II

Inclusion Ratio (a) and Estimated Number of Remedial Actions for Each Millsite.

Site	Designated	Other(b)	Total	Estimated Remedial Actions
Ambrosia Lake, NM	0.00	1.00	1.00	2
Belfield, ND	0.45	0.33	0.40	8
Bowman, SD	0.00	0.00	0.00	0
Canonsburg, PA	0.25	0.23	0.23	82
Durango, CO	0.41	0.19	0.26	120
Edgemont, SD	0.41	0.36	0.48	104
Falls City, TX	0.32	0.00	0.30	6
Grand Junction, CO	0.51	0.31	0.47	4285
Green River, UT	0.38	0.20	0.34	12
Gunnison, CO	0.29	0.42	0.35	9
Lakeview, OR	0.50	0.63	0.58	7
Lowman, ID	0.88	0.83	0.86	27
Maybell, CO	0.00	0.00	0.00	0
Mexican Hat, UT	0.47	0.33	0.45	11
Monument Valley, AZ	0.06	0.00	0.06	1
Naturita, CO	0.40	0.67	0.41	26
Rifle, CO (2 mills)	0.18	0.15	0.17	78
Riverton, WY	0.38	0.53	0.42	29
Shiprock, NM	0.76	0.67	0.75	15
Slick Rock, CO	1.00	1.00	1.00	5
Salt Lake City, UT	0.63	0.57	0.65	116
Spook, WY	1.00	0.00	1.00	1
Tuba City, AZ	0.75	0.00	0.75	6
Total			0.43	4950

(a) Current for the life of the project.
(b) Advertising responses, owner requests, and spillovers.