FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

SUMMARY PROTOCOL
IDENTIFICATION - CHARACTERIZATION -
DESIGNATION - REMEDIAL ACTION - CERTIFICATION

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U.S. DEPARTMENT OF ENERGY

OFFICE OF NUCLEAR ENERGY
DIVISION OF FACILITY AND SITE
DECOMMISSIONING PROJECTS

FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

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INTRODUCTION

This summary protocol describes those activities necessary for accomplishing the Formerly Utilized Sites Remedial Action Program objective, which is to ensure that sites formerly used by the Manhattan Engineer District and the Atomic Energy Commission are not contaminated with radioactive residues that may present a radiological hazard to the general public. This summary protocol is presented in four phases: Preliminary Analyses (identifying potentially contaminated sites), Radiological Evaluation and Designation (evaluating the radiological condition of the site and determining if remedial action is needed), Engineering and Remedial Action* (site characterization and planning, selecting, engineering, and implementing the action), and Certification of Site Conditions (verifying site conditions and archiving the records that document the results of remedial action). Additional guidance is provided on the first two phases and the fourth phase respectively in two supplements to this protocol entitled FUSRAP Designation/Elimination Protocol (Supplement No. 1) and the FUSRAP Verification and Certification Protocol (Supplement No. 2). Additional details regarding implementation of the third phase of the program are provided in the report Energy Systems Acquisition Project Plan-FUSRAP (Revision 1)" April 1985, and subsequent revisions.

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*Remedial action may involve decontamination or stabilization and restricted use through institutional control or physical modifications.

Appendix A is a flow diagram with decision points and assignment of responsibilities for specific program activities. All phases except the Engineering and Remedial Action Phase are outlined in some detail and covered in the enclosed flow charts. Only a brief discussion of the Engineering and Remedial Action Phase is contained in this protocol (see "Energy Systems Acquisition Project Plan--Formerly Utilized Sites Remedial Action Program, Revision 1," Steps 3 through 7, April 1985).

This protocol places the primary emphasis on contaminated sites or potentially contaminated sites for which there is existing authority that will permit DOE to perform remedial action at the site. However, the section on the first phase of this protocol also discusses the actions taken with regard to sites for which DOE is unable to establish remedial action authority. In the interest of efficiency and economy of operation, this protocol limits the amount of radiological survey data collected during the first two phases of the protocol to the minimum needed to determine if a site should be included in the program or eliminated from it. Any additional radiological data needed for project engineering will be accomplished during the engineering and remedial action phase of the operation. Similar guidance is provided for engineering of the remedial action to ensure that the magnitude and cost of the engineering, planning, and environmental reviews do not exceed the worth or the beneficial effect of the action. Throughout this process, the professional judgment of the radiological survey personnel and the engineering and project management personnel is utilized, with guidance from the DOE Division of Facility and Site Decommissioning Projects (DFSD) to determine the level of survey, engineering, and/or environmental work required to achieve the associated goals.

In order to ensure that any remedial action completed is preformed to comply with and meet appropriate standards and guidelines, the last phase, Certification Phase, includes a verification activity. The

goal of this phase is also to ensure through proper documentation that each remedial action is adequately documented and archived so that a permanent record of its final radiological condition will always be available.

SUMMARY PROTOCOL

The following narrative was prepared, along with Figure I--Preliminary Analyses, Figure II--Radiological Evaluation and Designation and Figure III--Engineering and Remedial Action and Certification of Site Condition (attached), to describe DOE protocols for determining if a site warrants consideration for remedial action. The narrative is subdivided to follow these figures. As can be noted in Figures I, II, and III, the decision point that is the transition from one phase to the next is repeated on these figures but is discussed in the narrative in the earlier of the two phases.

PRELIMINARY ANALYSES PHASE

During this phase of the program, sites are identified and evaluated to determine if they can be designated (included in) or eliminated from the remedial action program, or if a radiological survey of the site is required to more clearly define the radiological condition of the site to support this decision. This phase has five steps that include two decision points. This phase of the program is conducted by DOE-DFSD with assistance from a technical support contractor, a radiological survey contractor, and an aerial survey contractor as appropriate.

Step 1 - Data Collection and Site Identification

During this step, information sources are identified and investigated by the DOE-DFSD Technical Support Contractor. These sources include input from individuals or organizations and historical

FIGURE I

SUMMARY FLOW SHEET FOR PRELIMINARY ANALYSES PHASE OF FUSRAP REMEDIAL ACTION PROTOCOL

STEP 1 — DATA COLLECTION AND SITE IDENTIFICATION

IDENTIFY RECORDS SOURCES

USE INPUT FROM THE GENERAL PUBLIC AND OTHER SOURCES

CONDUCT RECORDS SEARCHES

- Assemble and Maintain a List of Sites
- Assemble Available Contracts
- Assemble Operating Records
- Assemble Radiological Data of Health and Safety Studies
- Assemble Ownership Data
- Identify Licenses
- Interview Knowledgeable Persons

STEP 2 — HISTORICAL DATA ANALYSIS

DETERMINE POTENTIAL FOR CONTAMINATION

CONTAMINATION POTENTIAL SIGNIFICANT IF

- Large Operation (Quantity and Time)
- History of Onsite Burial
- Radiological Data Suggest Contamination
- Input from Cognizant Individuals Suggest Contamination

CONTAMINATION POSSIBLE IF

- Historical Data Indicates AEC Operations Could Have Resulted in Contamination or that Onsite Residue may be Present
- Little or no Information is Available to Indicate Site Clean-Up Completed

CONTAMINATION POTENTIAL LOW IF

- Only Small Quantities of Material Were Handled
- Site Operated for a Short Time
- Previous Surveys Adequately Demonstrate Clean-up

DETERMINE DOE AUTHORITY FOR REMEDIAL ACTION

DOE HAS AUTHORITY IF

- Contractual Records Indicate It
- An Imminent Health Hazard May Exist (Must Be Confirmed By Site Visit and/or Survey)*
- Authority has been Provided by Legislation*

DOE AUTHORITY IS NEGATED IF

- Site is Currently Licensed to Conduct the Same Activities Conducted under the AEC/MED Contracts
- Site is Clearly under the Jurisdiction of Another Remedial Action Program (NRC Formerly Licensed Sites, Mill Tailings Act, Super Fund)

STEP 3 — DECISION POINT: DOE Division of Facility and Site Decommissioning Projects (DFSD) Determines Need for Additional Investigations

CATEGORIZE SITES

SCHEDULE SITE VISITS FOR SITES WHERE

- DOE has Authority for Remedial Action and Potential for Contamination is Significant
- DOE has Authority for Remedial Action and Contamination is Possible
- An Imminent Hazard May Exist

SCHEDULE WIDE-AREA SURVEYS (AERIAL OR SCANNING) IF

- Records or Survey Data Indicate Presence of Offsite Contamination and
- Contamination is such that it can be Identified by Wide-Area Surveys

HOLD SITES FOR FUTURE CONSIDERATION IF

- Contamination is Possible
- Insufficient Data Collected to Date to Establish Authority or
- Site is not Covered Under Another Program

(These Sites are Periodically Reviewed for Reclassification and/or Inclusion Through Legislation)

TERMINATE ACTIVITIES IF

- Potential for Contamination is Low
- DOE has no Authority for Remedial Action
- Site is Covered by Other Program or
- Site is Licensed

STEP 4 — INITIAL INVESTIGATIONS

COMPLETE REQUIRED SITE VISITS

- Determine Site Use
- Identify if Imminent Hazard Exists
- Conduct Screening Survey
- Prepare Preliminary Survey Report

Offsite Contamination

IMPLEMENT MOBILE GAMMA SCANS OR AERIAL SURVEYS

- Analyze Data
- Determine if Offsite Contamination is Present

No Contamination

Document Findings

STEP 5 — DECISION POINT: DOE Division of Facility and Site Decommissioning Projects (DFSD) Determines Need for Survey Data or Remedial Action and Priority

INCLUDE IN REMEDIAL ACTION PROGRAM IF

- Imminent Hazard Exists or
- Records Indicate Significant Potential for Contamination, Survey Data Indicates Radiation Clearly Above Guidelines, and DOE has Authority

INCLUDE IN RADIOLOGICAL SURVEY PROGRAM AND SCHEDULES

- First Priority if DOE has Authority and (1) Survey Data Indicates Contamination is Possible and Records Suggest Potential for Significant Contamination or (2) Survey Data Identifies Radiation Clearly Above Background and Records Indicate Contamination could be due to MED/AEC Work
- Second Priority if DOE has Authority and Survey Data Indicates Contamination may be Present and Records Indicate Contamination due to MED/AEC Work may be Possible
- Third Priority if Records have not Clearly Established DOE Authority but Survey Data Identifies Radiation Levels Clearly Above Background and Records Indicate Potential for Contamination is Significant and may be due to MED/AEC Work

TERMINATE ACTIVITIES IF SCREENING SURVEY IS SUFFICIENT TO CERTIFY CONDITION OF SITE IS SUITABLE FOR UNRESTRICTED USE, IS OTHERWISE LICENSED OR CONTROLLED BY APPROPRIATE RESTRICTIONS OR IF NO DOE AUTHORITY FOR REMEDIAL ACTION EXISTS

records. While input from individuals and organizations is actively sought and has provided much useful data, MED/AEC operating records provide, by far, the more usable data. Records associated with MED and AEC operations stored at various DOE and contractor records centers, the National and Regional Archives, and other agency records centers (such as NRC license records) located throughout the country, are scanned to determine if they are pertinent to the FUSRAP investigations. Records groups identified as possible sources of data are reviewed and available contracts, operating records, and records of previous radiological surveys are assembled. The level or detail of the reviews for specific groups of records depends on the importance of the records to the program. The more likely that new or additional data will be found in a specific set or group of records the more detailed the review of the records will be. Information from these sources is used to develop a list of potential FUSRAP sites that is updated as new data is collected. Ownership data are collected, wherever possible, especially for those sites determined to be highly probable candidates for FUSRAP.

In some cases, copies of pertinent materials are made and maintained for the record; in other cases, the location and a general description of the records are recorded. A data management system is utilized to keep track of records reviewed, identified, and collected.

Step 2 - Historical Data Analysis

During this step, site-specific data collected during records searches and investigations are reviewed and analyzed by the contractor to determine the potential for contamination and DOE authority to conduct remedial action at the site. Potential for contamination is considered significant if the records indicated that: (1) the MED/AEC onsite operations were large, that is conducted over many years and/or the contractor processed large quantities of material; (2) the site had a history of onsite burial of radioactive

material; or (3) radiological data suggests the site is contaminated and/or input from cognizant individuals suggests that the site is contaminated. Contamination is considered possible if the historical data indicates AEC operations could have resulted in the site being contaminated and there is little or no data to indicate the site was ever decontaminated. Potential for contamination is considered low or improbable if only small quantities of radioactive materials were handled, work on the site for MED/AEC for a very short period of time, and/or previous surveys adequately demonstrate decontamination was accomplished. Experience suggests that, for the most part, the potential for contamination is somewhat proportional to the quantities of data or records identified for a specific site, i.e. the more material processed at a site the more records were generated during shipping, billing, processing, etc. As a result, unless there is evidence to suggest otherwise, if only small amounts of information can be identified on a specific site, it is normally assumed that the site only operated for a short period of time or used small quantities of active material.

Generally, only sites in the first two categories will be considered for radiological survey or the remedial action program. Those sites having low potential for contamination will normally be eliminated from the program.

The contractor will also review and analyze the records and assemble materials that provide information regarding DOE authority for remedial action. The contractor will interface with DOE General Counsel to obtain guidance regarding pertinent material needed to determine if authority exists and will provide available records to the General Counsel's office to obtain preliminary findings to be used in the contractor's recommendation for inclusion. The recommendation report will include a brief description of the former activities conducted at the site and those data used as a basis for the recommendations provided in the report. Those recommendations or

findings of the contractor will indicate the potential for residual radioactive material being found at the site and if DOE has existing authority to conduct remedial action at the site. Sites for which there is potential for contamination but no DOE authority has been established are handled in several ways or categories. The first category of sites are those for which it is clear that DOE has no existing authority or that it is unlikely that additional records review will identify any information to provide such authority. The states and or other Federal agencies, as appropriate, are provided information on the sites in this category so that they can take appropriate actions. These sites are eliminated from FUSRAP. The other group includes those sites for which continuing records reviews may provide additional data on which to base an authority determination. Sites in this category are held until there is sufficient data to provide authority or until the likelihood of identifying additional pertinent records is sufficiently low that the site is placed in the first group. The contractor will also search records to determine if a needed action should be covered by programs other than FUSRAP.

Step 3 - Decision Point: DOE Division of Facility and Site Decommissioning Projects (DFSD) Determines Need for Additional Investigation

During this step, DOE-DFSD staff utilize the information assembled and developed by the Technical Support Contractor to determine if the site should be visited and a preliminary onsite survey and/or mobile gamma scan or aerial survey conducted, if activities regarding the site should be terminated, or if the site should be held for future consideration.

Site visits and preliminary surveys will be conducted at sites that could be contaminated with material from MED/AEC operations and for which DOE has authority to conduct remedial action if it is determined to be necessary and/or where an imminent hazard may exist.

Wide area surveys (aerial or mobile gamma scans) will be conducted at sites where records or survey data indicate offsite areas may have been affected and the potential contamination is such that wide area surveys will detect it. Sites are handled as discussed above if contamination is possible but DOE has no authority for remedial action.

DOE may terminate investigations and close files on a site if the potential for contamination is low or the site is clearly under the jurisdiction of a program other than FUSRAP. Similarly, if the site is currently licensed for the same activities conducted under MED/AEC and contamination resulting from licensed work is indistinguishable from that caused by MED/AEC, DOE activities relating to the site will be terminated.

If during this step DOE determines that initial radiological investigations are required, the Technical Support Contractor is tasked to identify the current site owner and a site contact if the information is not already available. DOE selects and assigns a survey contractor(s) to conduct the required onsite investigations, then notifies the owner and makes arrangements for site visits. For sites in the Hold for Future Consideration or Terminate Activity categories, no owner contact will be needed unless the owner was previously made aware of the investigations. Sites in the Hold for Future Considerations category will be assessed as more data are available and recategorized as appropriate.

Step 4 - Initial Radiological Investigations

This step involves site visits and wide area surveys at the sites identified in Step 3 that require additional investigation. These activities are necessary to assemble data required to include or eliminate the site from the program or to determine the need for a more comprehensive radiological evaluation of the site, and to

determine if there is offsite contamination. Site visits are conducted to determine current site use, to determine if an imminent hazard exists, to obtain a preliminary assessment of the radiological condition of the site, and collect data that will be used by DOE to determine if the site can be eliminated from or included in the program without implementing a more comprehensive survey.

The site visit is a multipurpose operation conducted by the assigned survey contractor and, in some cases, a DOE representative. During this visit, the owners or lessees are provided a brief description of the program and the purpose of the investigation. The survey team determines the current use of the site and any expected changes in use. A cursory walk over survey is performed to aid DOE in determining if further activity is needed at the site to ensure that the health and safety of the public is protected, and to ensure that there is no imminent hazard resulting from former MED/AEC operations. The cursory survey may involve gamma, alpha, and/or beta-gamma measurements and some air, water, or soil sampling if felt necessary by onsite survey personnel. The survey contractor should collect sufficient data to provide descriptions of the facility's physical and radiological condition to support a survey plan (if DOE determines that a radiological evaluation survey is needed) or a designation for remedial action (if it is appropriate). This effort should be limited to 1 day or less if possible. Following the visit, the survey contractor will be responsible for providing a draft preliminary survey report to DOE within 1 month (unless otherwise directed) after the visit. The report should contain the contractor's suggestions regarding need for additional surveys.

For those areas determined to need wide area surveying to determine if offsite surveys are needed, two types of surveys may be utilized, aerial and mobile gamma scanning. The aerial survey is conducted using a helicopter or fixed wing aircraft and covers very large areas and identifies the general area(s) of contamination. The

gamma scan is a mobile-based survey conducted along streets, alleys, and other accessible roadways throughout the area. Individual properties having radiological anomalies can be identified using mobile gamma scanning techniques. Following completion of wide area surveys, the survey contractor will prepare a report providing the results of the survey and recommendations concerning the potential for offsite contamination. If there is no indication of offsite contamination, the aerial and/or mobile gamma survey reports may suffice to document the findings and offsite survey efforts will be terminated. If the wide area surveys provide positive indications of the presence of offsite contamination potentially due to DOE predecessor activities, DOE will determine if further radiological characterization is required, or if the area can be designated on the basis of wide area survey data alone. Where additional offsite investigations are required the survey contractor or technical assistance contractor, as appropriate, will be tasked by DOE to identify owners of the properties involved. DOE will notify the owner of the findings and proposed actions if necessary.

Step 5 - Decision Point: DOE Division of Facility and Site Decommissioning (DFSD) Projects Determines Need for Survey Data or Remedial Action

Upon receipt of the site visit and preliminary survey report, DOE reviews the report and recommendations, and, giving due consideration to those data provided by the records searches, will categorize each site either for inclusion in the radiological survey program, or direct inclusion in the remedial action program, or elimination from the program.

Sites will be included for remedial action if DOE has authority for remedial action and data indicate that the potential for contamination is significant and the preliminary survey demonstrates that the contamination is clearly above guidelines. In this case, any additional survey work will be performed during the engineering phase of the task.

If DOE-DFSD determines the site visit and preliminary survey results, along with the historical data are sufficient to verify that the radiological condition of the site is within appropriate guidelines or that the site conditions are controlled by license or appropriate restrictions, the site is eliminated from the program. Sites in this category are processed for elimination and the findings that the radiological condition of the site is acceptable for unrestricted use or, as necessary, for controlled use, are documented and archived.

Sites that can neither be included or eliminated from the remedial action program are scheduled for preinclusion site radiological evaluation surveys to better characterize their radiological condition. When DOE-DFSD assigns a radiological survey contractor to complete the survey, DOE-DFSD will provide the contractor a survey priority for the subject site. Three categories are proposed for assigning survey priorities to sites. First priority sites (those to be scheduled for survey first) are sites for which DOE has authority (through the Atomic Energy Act or Congressional mandate) for remedial action and:

- Preliminary survey data indicate that the site may be contaminated and records suggest the potential for contamination from MED/AEC operations is significant; or
- Survey data identify radiation clearly above background and records indicate it resulted from MED/AEC operations.

Second priority is assigned to sites for which DOE has authority and preliminary survey data indicate contamination is related to MED/AEC work and may be present in quantities that can exceed guidelines.

Third priority is assigned to those sites where that the preliminary data indicate radiation levels are clearly above background; but it is not clear from the data collected that the

radioactivity is from former MED/AEC operations; that is, DOE authority to conduct remedial action is not clear cut. Surveys at third priority sites will be conducted to confirm authority as well as to determine the need for remedial action. If authority is confirmed, the site will be forwarded to the next appropriate step. If the site is contaminated and authority is not confirmed, DOE activities will be terminated, and the appropriate State or Federal agency having jurisdiction will be notified.

RADIOLOGICAL EVALUATION AND DESIGNATION PHASE

The purpose of this phase is to further evaluate the radiological conditions of the site by more comprehensive surveys, to compare the conditions to applicable guidelines and standards, to determine the potential for exposure and, ultimately, to determine if there is a need for remedial action.

During this phase, the radiological surveys are conducted at sites where those data collected during the Preliminary Analysis Phase are not sufficient to include or eliminate sites from the program. As with previous activities, every effort is made to conduct only as much survey work as is necessary to obtain sufficient data to make a designation determination. Determining the extent of survey activity is the responsibility of the radiological survey team leader. In addition, an engineering contractor representative(s) may work with the survey contractor(s) both before and during the survey(s) to ensure the data collected will be of use for engineering work that may be needed. In some cases, where agreed upon between DOE-DFSD and the DOE Oak Ridge Operations Office Technical Services Division (OR-TSD), the comprehensive survey will be thorough enough to provide the basis for the engineering bid request for remedial action.

The radiological evaluation and designation phase of the program contains two steps: the Radiological Evaluation Survey for

Designation and the Decision Point (see Figure II, Step 1 and Step 2). However, the radiological evaluation survey is further divided into two subelements.

Step 1 - Radiological Evaluation Survey for Designation

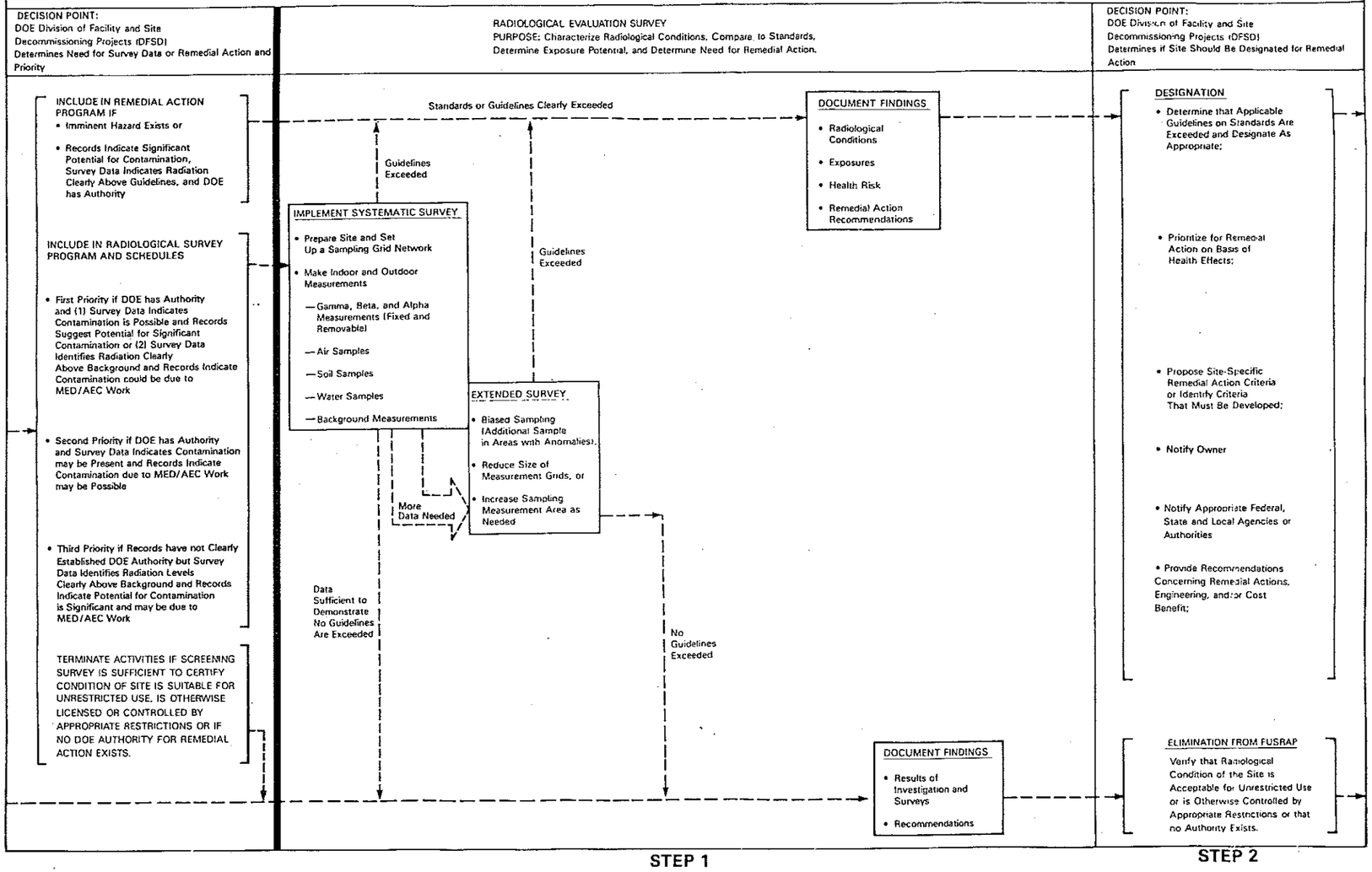
The radiological evaluation survey is subdivided into (1) Systematic and Extended Survey, the onsite survey effort; and (2) Document Findings, the report preparation effort. The onsite survey effort is organized in stages that increase in complexity as they proceed from left to right on the flow chart (Figure II). Each stage represents a part of the survey program and, if conducted, are conducted as part of the same onsite survey. The radiological survey team leader is responsible for the decision to implement more comprehensive stages of the survey activity. This responsibility includes the decision to conduct the extended survey (i.e., biased measurements) in selected areas of the site or to remove minor contamination as part of the survey.

Systematic and Extended Survey. The systematic stage of the survey is, as its name implies, a radiological survey involving systematic and preplanned sampling and direct radiation measurements over a predesigned grid network. These surveys may be of structures or outside areas. The measurements taken can include:

- Gamma, beta, and alpha scans and grid point measurements (fixed and removable); (grounds, buildings, and/or equipment)
- Air samples and analyses (Grab samples);
- Soil samples and analyses; (surface and subsurface)
- Water samples and analyses; (surface and ground water)and
- Background measurements.

FIGURE II

SUMMARY FLOW SHEET FOR RADIOLOGICAL EVALUATION AND DESIGNATION PHASE OF THE FUSRAP REMEDIAL ACTION PROTOCOL



While the survey may include all or any combination of these measurements, it will primarily be the judgment of the radiological survey team leader to determine which and how many measurements are needed. The survey team leader will interact with the engineering contractor representative* as required in planning the survey and will provide a survey plan to DOE-DFSD prior to the survey. This plan will document the measurements to be performed during the systematic survey and briefly indicate under what conditions the extended effort (biased sampling) will be completed. Whenever possible, survey results will be forwarded for final analysis and recommendations as to inclusion or elimination based on the results of the systematic stage of the survey. This decision will be based on or guided by pre-established criteria approved by DOE-DFSD (Appendix B). For isotopes other than radium-226 and thorium isotopes, the soil concentration limits must be calculated (Appendix B). This calculation is done by the radiological support contractor with the assistance of the criteria development contractor (ANL). At some future time, EPA is expected to issue guidelines or standards for residual radioactive materials in the environment. These guidelines will be applied as appropriate.

Where systematic surveys do not provide sufficient data to support this decision, based on indicated action levels, the survey will be extended. The decision whether or not to subject the property to more comprehensive data collection (biased sampling) is made in the field by the radiological survey team leader. These judgments by the radiological survey team leader are important to the success of this approach to the survey process and require the presence of a well-qualified survey team leader.

*Engineering contractor is the Formerly Utilized Sites Remedial Action Program Management Contractor (PMC).

As indicated, the survey is extended to include more detailed measurement techniques only when the systematic effort cannot provide sufficient data to determine if the site exceeds applicable guidelines. The extended survey may include:

- Additional gamma and beta-gamma measurements over a smaller grid to more clearly identify the extent of the contamination;
- Alpha measurements (fixed and removable) of floors and walls and, in some cases, ceilings to define contamination in or on building materials to provide information regarding surface contamination;
- Sampling of building material to assist in defining the source of the contamination and in determining if it is derived from MED/AEC activities;
- Radon and radon daughter monitoring or sampling for other radionuclides in the air over several days to determine if action levels are exceeded;
- Additional soil sampling and subsurface sampling in areas where anomalies may exist;
- Surface and ground water sampling on and/or off the site; and
- Air sampling on and off the site.

It is essential that the extended survey be detailed enough to determine if the condition of the site can be certified to meet guidelines or if the site must be included in the remedial action program.

Document Findings. If, after the evaluation survey the survey contractor believes the site radiological conditions meet established criteria for the site, the contractor should document its findings, including the results of the survey and the description of any material removed from the site. The report should include the survey contractor's recommendations regarding additional DOE or government involvement at the site. The survey contractor will similarly document the results of the surveys for the sites that contain

radioactive residues that exceed appropriate guidelines or standards. In addition to documenting the sites radiological condition and remedial action recommendations, these reports should briefly assess the potential for human exposure and associated health effects or risks.

Step 2 - Decision Point: DOE-Division of Facility and Site Decommissioning (DFSD) Projects Determines if Site Should Be Designated for Remedial Action

During this step, DOE-DFSD staff will review all the data collected on each site and determine whether the site should be included or eliminated from the remedial action program.

If DOE-DFSD determines that radiation levels at the site exceed applicable guidelines or standards, the site will be designated for remedial action by notification from the Director of the Office of Remedial Action and Waste Technology to the Manager of Oak Ridge Operations Office. This designation provides the FUSRAP office in Oak Ridge (OR-TSD) the authority to proceed with the remedial action process. Remedial measures to be considered for a designated site will include restricted use and stabilization on site as well as decontamination of the site. As part of the designation provided to OR-TSD, DOE-DFSD will assign a remedial action priority to the site.* Other guidance will be provided by DOE-DFSD to OR-TSD with the site

*Headquarters will assign each designated site a high, medium, or low priority for remedial action. (see Appendix C) These priorities are assigned considering the potential for public exposure to radiation (dose), the potential for migration of the contaminants, and property use. The final remedial action scheduling priorities determined by OR-TSD with approval from DOE-DFSD take into account the designation priorities as well as other factors including but not limited to: Congressional mandates, availability of a disposal site, coincidence (proximity of projects), available funding and so forth.

designation as may be appropriate; e.g., criteria for remedial action, remedial action options to be considered, and cost/benefit considerations. Simultaneous with designation of the site, DOE-DFSD will notify the owner of the site and appropriate state, local, and Federal agencies and authorities of the findings and plans. In all cases the Department will notify the Environmental Protection Agency of designation actions.

If DOE-DFSD determines from review of the survey data that the site meets the applicable guidelines the findings will be documented and archived according to this protocol. If the site does not meet the DOE criteria but for one of the reasons stated above cannot be included in FUSRAP, the appropriate Federal or state agency will be notified to insure that proper consideration will be given to the site under other assessment efforts.

ENGINEERING AND REMEDIAL ACTION PHASE

The Engineering and Remedial Action Phase of this protocol encompasses conceptual and preliminary engineering activities as well as other activities necessary for the completion of the remedial action and establishment of the disposal site. The activities are to:

- Define and evaluate options for remedial action;
- Obtain required site-specific environmental and radiological characterization data;
- Select the preferred and alternative remedial actions to be assessed during the National Environmental Policy Act (NEPA) analysis;
- Identify environmental impacts and mitigating measures to be assessed during the NEPA analysis;
- Select the preferred remedial action option;
- Prepare the final engineering design (Title II) of the options;

- o Implement the selected remedial action and waste disposal action; and

- o Prepare the final report and assemble material for the certification docket (see Appendix D).

Implementation of this phase (Figure III) is the responsibility of the OR-TSD, the FUSRAP Project Management Contractor (PMC), and the FUSRAP NEPA Process Contractor. More detail is presented in the OR report, "Energy Acquisition Project Plan - Formerly Utilized Sites Remedial Action Program." The general flow chart of activities associated with this phase are shown in Appendix E (steps 3 through 7). The need for and level of preremedial action analyses and preliminary engineering is dependent on many factors including institutional and other nontechnical factors that may dictate the final selection of remedial action options. In such cases, the preparation of certain documents and/or such things as geological investigations may not be required. Decisions regarding the level and need for site-specific studies will be made by OR-TSD with input as needed from DFSD. OR-TSD will provide DOE-DFSD a site-specific project completion report for each remedial action project and prepare a certification docket* for the site.

OR-TSD will interface with DOE-DFSD on all key decisions such as remedial action selection and will supply periodic program status reports. Accomplishment of site decontamination to meet unrestricted use criteria or the achievement of site restrictions and adequate institutional control of residual contamination is the responsibility of OR-TSD.

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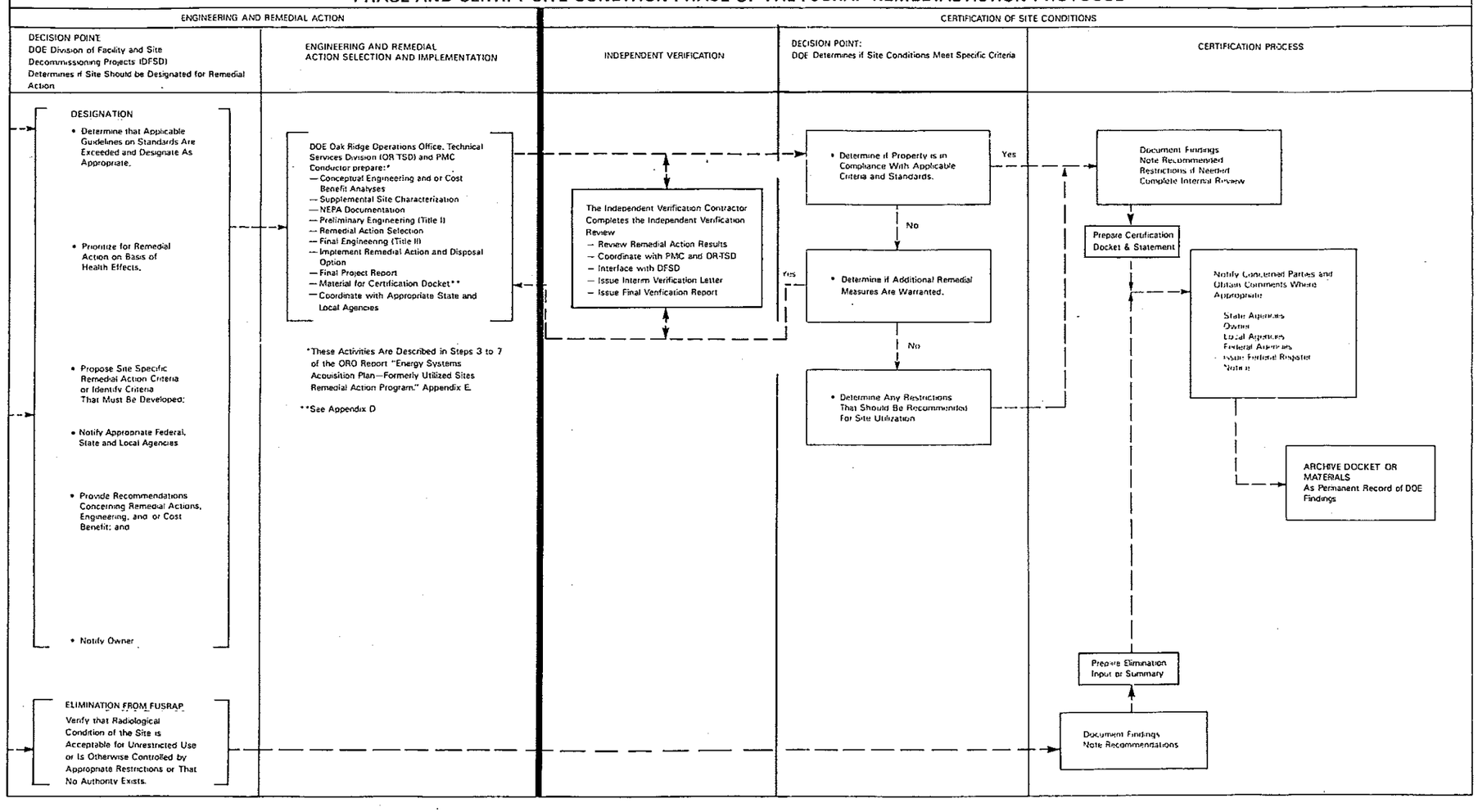
*The contents of the certification docket are discussed in Appendix D and in the FUSRAP Certification/Verification Supplemented Protocol.

FIGURE III

SUMMARY FLOW SHEET FOR THE ENGINEERING AND REMEDIAL ACTION PHASE AND CERTIFY SITE CONDITION PHASE OF THE FUSRAP REMEDIAL ACTION PROTOCOL



CERTIFICATION OF SITE CONDITION PHASE

The Certification Phase is the responsibility of DOE-DFSD and OR-TSD. It utilizes data from the Remedial Action Phase as well as the other phases of the protocol especially the post-remedial action report or project completion report and involves three interrelated steps:

- o Independent verification of the remedial action
- o Decision on the adequacy of the remedial action
- o Certification process
  - Notification of concerned parties and the issuing of a Federal Register Notice and
  - Completion of the Certification Docket and archiving of the docket

These activities are described in detail in the Verification and Certification Protocol (Supplement 2 to this Protocol).

Step 1 - Independent Verification

An Independent Verification Contractor (IVC) contracted by DFSD, reviews the remedial action activities and conducts verification surveys as necessary to confirm the adequacy of the remedial action and/or the procedures used by the PMC to certify the site's condition. The IVC coordinates with the PMC and OR-TSD during the verification activity, but, is managed and contracted by DFSD to maintain independence and insure no conflict of interest. An interim verification letter is provided by the contractor to OR-TSD and DFSD upon completion of the initial analysis of the remedial action at a specific site within four weeks after completion of the remedial action. The final verification report is submitted sometime thereafter.

Step 2 - Decision Point: DOE Determines If Site Conditions Meet Specific Criteria for the Remedial Action

On the basis of the data provided during and after the remedial action by the PMC including the Post-Remedial Action Report and the information provided by the IVC, OR-TSD, with approval from DFSD, determines if the site was adequately decontaminated and meets DOE guidelines. This decision point is actually a continuous process that is conducted in conjunction with the verification activity and the certification process steps. DOE interacts regularly with the PMC and the IVC during the conduct of the remedial action and the post-remedial action and verification reviews and surveys. This interaction is necessary to insure that any conflicts or discrepencies that are identified are expeditiously resolved. The preparation of the certification docket, certification statement and associated draft Federal Register notice is conducted during the decision process. Any changes required in these documents as a result of the decision are implemented as part of the certification process step.

If the remedial action was accomplished adequately, the site certification process is completed. If the remedial action did not bring the site in compliance with criteria, DOE will determine whether further remedial action is needed or warranted and will provide appropriate direction to the PMC.

Step 3 - Certification Process

As soon as possible after the determination is made that the site will be certified (the remedial action is complete), OR-TSD provides the owner of the site with interim notification that the remedial action is complete and that a certification package is being prepared. In general, the notification of the concerned parties is the responsibility of OR-TSD as is the preparation of the certification statement (required to officially approve the remedial

action) and the draft Federal Register notice. Once approved by the DOE Oak Ridge Chief Counsel's Office and DOE Headquarters (the Office of Management and Administration (MA) and DFSD) the Federal Register notice is issued through DFSD in Washington.

The Certification Docket (Appendix D) is prepared by OR-TSD and the certification statement is signed at the Oak Ridge Field Office. Final approval is required through DFSD. DFSD will arrange to archive the Certification Docket and supporting data as a permanent record of the DOE findings and radiological condition of the site. DFSD will also have the information placed in the DOE Public Reading Room in Washington, D.C., for general availability to the public. Distribution of the dockets to other agencies (Federal, state, or local) as necessary, is made by OR-TSD. The Verification and Certification Protocol (Supplement No. 2 to this protocol) and Appendix F (Public Availability and Archiving of FUSRAP Records) provide additional information.

BIBLIOGRAPHY OF DOE SUPPORTING GUIDANCE DOCUMENTS

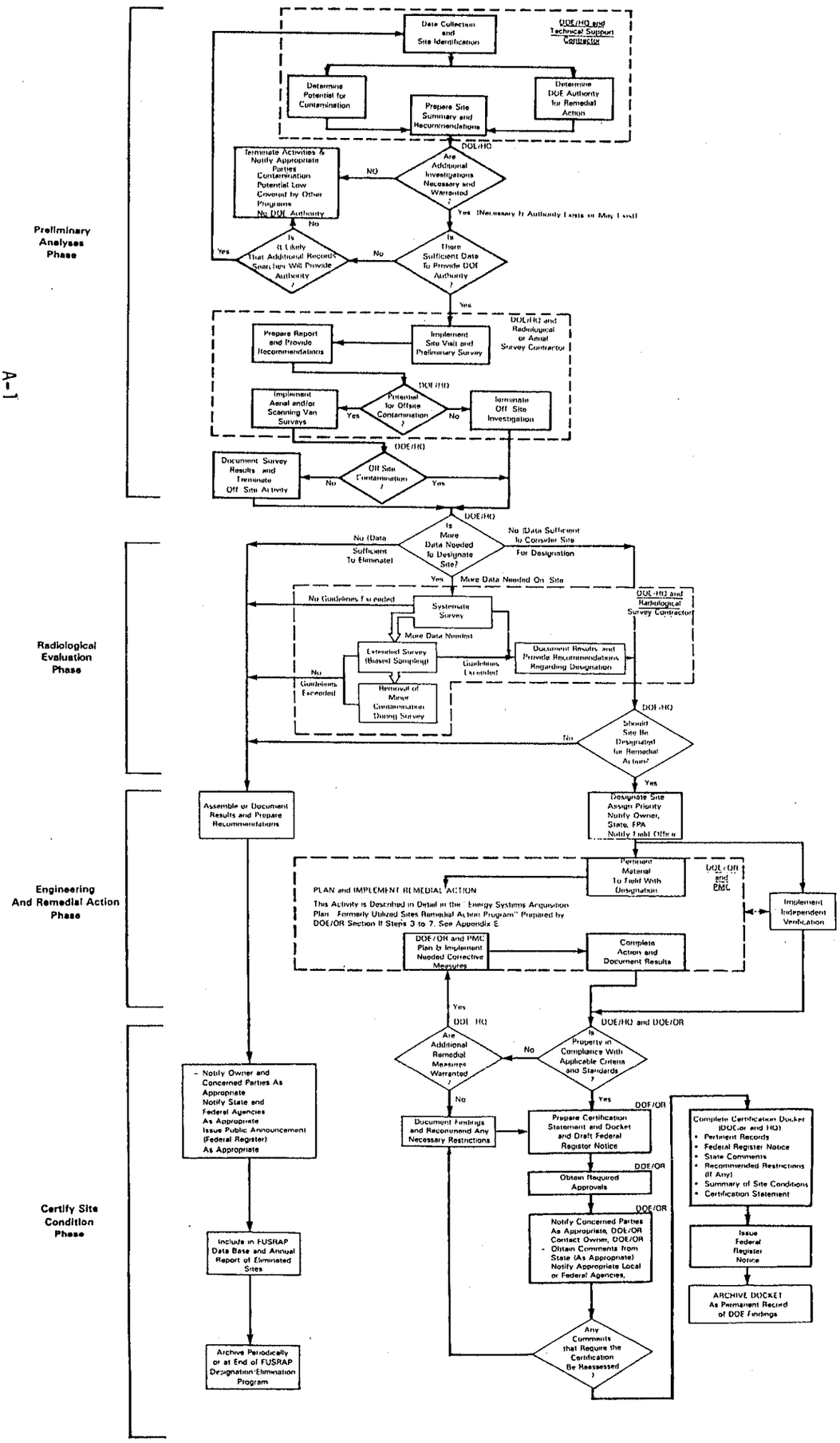
Formerly Utilized Sites Remedial Action Program, Designation/Elimination Protocol--Supplement No. 1 to the FUSRAP Summary Protocol, November 1985.

Formerly Utilized Sites Remedial Action Program, Verification and Certification Protocol--Supplement No. 2 to the FUSRAP Summary Protocol, January 1986.

U.S. DOE Energy Acquisition Project Plan (ESAPP), Formerly Utilize MED/AEC Sites Remedial Action Program (FUSRAP) (Revision 1), April 1985, and subsequent revisions.

APPENDIX A

APPENDIX A
FLOWCHART FOR FUSRAP PROTOCOL



APPENDIX B.

U.S. DEPARTMENT OF ENERGY GUIDELINES FOR RESIDUAL RADIOACTIVITY AT FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM AND REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

(Rev. 1, July 1985)

A. INTRODUCTION

This document presents U.S. Department of Energy (DOE) radiological protection guidelines for cleanup of residual radioactive materials and management of the resulting wastes and residues. It is applicable to sites identified by the Formerly Utilized Sites Remedial Action Program (FUSRAP) and remote sites identified by the Surplus Facilities Management Program (SFMP).* The topics covered are basic dose limits, guidelines and authorized limits for allowable levels of residual radioactivity, and requirements for control of the radioactive wastes and residues.

Protocols for identification, characterization, and designation of FUSRAP sites for remedial action; for implementation of the remedial action; and for certification of a FUSRAP site for release for unrestricted use are given in a separate document (U.S. Dept. Energy 1984). More detailed information on applications of the guidelines presented herein, including procedures for deriving site-specific guidelines for allowable levels of residual radioactivity from basic dose limits, is contained in a supplementary document--referred to herein as the "supplement" (U.S. Dept. Energy 1985).

"Residual radioactivity" includes: (1) residual concentrations of radionuclides in soil material,** (2) concentrations of airborne radon decay products, (3) external gamma radiation level, and (4) surface contamination. A "basic dose limit" is a prescribed standard from which limits for quantities that can be monitored and controlled are derived; it is specified in terms of the effective dose equivalent as defined by the International Commission on Radiological Protection (ICRP 1977, 1978). Basic dose limits are used explicitly for deriving guidelines for residual concentrations of radionuclides in soil material, except for thorium and radium. Guidelines for

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*A remote SFMP site is one that is excess to DOE programmatic needs and is located outside a major operating DOE research and development or production area.

**The term "soil material" refers to all material below grade level after remedial action is completed.

residual concentrations of thorium and radium and for the other three quantities (airborne radon decay products, external gamma radiation level, and surface contamination) are based on existing radiological protection standards (U.S. Environ. Prot. Agency 1983; U.S. Nucl. Reg. Comm. 1982). These standards are assumed to be consistent with basic dose limits within the uncertainty of derivations of levels of residual radioactivity from basic limits.

A "guideline" for residual radioactivity is a level of residual radioactivity that is acceptable if the use of the site is to be unrestricted. Guidelines for residual radioactivity presented herein are of two kinds: (1) generic, site-independent guidelines taken from existing radiation protection standards, and (2) site-specific guidelines derived from basic dose limits using site-specific models and data. Generic guideline values are presented in this document. Procedures and data for deriving site-specific guideline values are given in the supplement.

An "authorized limit" is a level of residual radioactivity that must not be exceeded if the remedial action is to be considered completed. Under normal circumstances, expected to occur at most sites, authorized limits for residual radioactivity are set equal to guideline values. Exceptional conditions for which authorized limits might differ from guideline values are specified in Sections D and F. A site may be released for unrestricted use only if the residual radioactivity does not exceed guideline values at the time remedial action is completed. Restrictions and controls on use of the site must be established and enforced if the residual radioactivity exceeds guideline values. The applicable controls and restrictions are specified in Section E.

DOE policy requires that all exposures to radiation be limited to levels that are as low as reasonably achievable (ALARA). Implementation of ALARA policy is specified as procedures to be applied after authorized limits have been set. For sites to be released for unrestricted use, the intent is to reduce residual radioactivity to levels that are as far below authorized limits as reasonable considering technical, economic, and social factors. At sites where the residual radioactivity is not reduced to levels that permit release for unrestricted use, ALARA policy is implemented by establishing controls to reduce exposure to levels that are as low as is reasonably achievable. Procedures for implementing ALARA policy are described in the supplement. ALARA policies, procedures, and actions must be documented and filed as a permanent record upon completion of remedial action at a site.

B. BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 500 mrem/yr for a period of exposure not to exceed 5 years and an average of 100 mrem/yr over a lifetime. The committed effective dose equivalent, as defined in ICRP Publication 26 (ICRP 1977) and calculated by dosimetry models described in ICRP Publication 30 (ICRP 1978), shall be used for determining the dose.

C. GUIDELINES FOR RESIDUAL RADIOACTIVITY

C.1 Residual Radionuclides in Soil Material

Residual concentrations of radionuclides in soil material shall be specified as above-background concentrations averaged over an area of 100 m^2. If the concentration in any area is found to exceed the average by a factor greater than 3, guidelines for local concentrations shall also be applicable. These "hot spot" guidelines depend on the extent of the elevated local concentrations and are given in the supplement.

The generic guidelines for residual concentrations of Th-232, Th-230, Ra-228, and Ra-226 are:

- 5 pCi/g, averaged over the first 15 cm of soil below the surface
- 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface

These guidelines take into account ingrowth of Ra-226 from Th-230 and of Ra-228 from Th-232, and assume secular equilibrium. If either Th-230 and Ra-226 or Th-232 and Ra-228 are both present, not in secular equilibrium, the guidelines apply to the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that the dose for the mixtures will not exceed the basic dose limit. Explicit formulas for calculating residual concentration guidelines for mixtures are given in the supplement.

The guidelines for residual concentrations in soil material of all other radionuclides shall be derived from basic dose limits by means of an environmental pathway analysis using site-specific data. Procedures for deriving these guidelines are given in the supplement.

C.2 Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that are intended for unrestricted use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR 192) is: In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL.* In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive materials are not the cause.

C.3 External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site to be released for unrestricted use shall not exceed the background level by more than 20 μR/h.

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*A working level (WL) is any combination of short-lived radon decay products in one liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy.

C.4 Surface Contamination

The following generic guidelines, adapted from standards of the U.S. Nuclear Regulatory Commission (1982), are applicable only to existing structures and equipment that will not be demolished and buried. They apply to both interior and exterior surfaces. If a building is demolished and buried, the guidelines in Section C.1 are applicable to the resulting contamination in the ground.

Radionuclides†[2]	Allowable Total Residual Surface Contamination (dpm/100 cm^2)†[1]		
	Average†[3],†[4]	Maximum†[4],†[5]	Removable†[4],†[6]
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products	5,000α	15,000α	1,000α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000β-γ	15,000β-γ	1,000β-γ

†[1] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

†[2] Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

†[3] Measurements of average contamination should not be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.

†[4] The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

†[5] The maximum contamination level applies to an area of not more than 100 cm^2.

†[6] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

D. AUTHORIZED LIMITS FOR RESIDUAL RADIOACTIVITY

The remedial action shall not be considered complete unless the residual radioactivity is below authorized limits. Authorized limits shall be set equal to guidelines for residual radioactivity unless: (1) exceptions specified in Section F of this document are applicable, in which case an authorized limit may be set above the guideline value for the specific location or condition to which the exception is applicable; or (2) on the basis of site-specific data not used in establishing the guidelines, it can be clearly established that limits below the guidelines are reasonable and can be achieved without appreciable increase in cost of the remedial action. Authorized limits that differ from guidelines must be justified and established on a site-specific basis, with documentation that must be filed as a permanent record upon completion of remedial action at a site. Authorized limits differing from the guidelines must be approved by the Director, Oak Ridge Technical Services Division, for FUSRAP and by the Director, Richland Surplus Facilities Management Program Office, for remote SFMP--with concurrence by the Director of Remedial Action Projects for both programs.

E. CONTROL OF RESIDUAL RADIOACTIVITY AT FUSRAP AND REMOTE SFMP SITES

Residual radioactivity above the guidelines at FUSRAP and remote SFMP sites must be managed in accordance with applicable DOE Orders. The DOE Order 5480.1A requires compliance with applicable federal, state, and local environmental protection standards.

The operational and control requirements specified in the following DOE Orders shall apply to interim storage, interim management, and long-term management.

a. 5440.1B, Implementation of the National Environmental Policy Act
b. 5480.1A, Environmental Protection, Safety, and Health Protection Program for DOE Operations
c. 5480.2, Hazardous and Radioactive Mixed Waste Management
d. 5480.4, Environmental Protection, Safety, and Health Protection Standards
e. 5482.1A, Environmental, Safety, and Health Appraisal Program
f. 5483.1, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities
g. 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements
h. 5484.2, Unusual Occurrence Reporting System
i. 5820.2, Radioactive Waste Management

E.1 Interim Storage

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years.

b. Above-background Rn-222 concentrations in the atmosphere above facility surfaces or openings shall not exceed: (1) 100 pCi/L at any given point, (2) an annual average concentration of 30 pCi/L over the facility site, and (3) an annual average concentration of 3 pCi/L at or above any location outside the facility site (DOE Order 5480.1A, Attachment XI-1).

c. Concentrations of radionuclides in the groundwater or quantities of residual radioactive materials shall not exceed existing federal, state, or local standards.

d. Access to a site shall be controlled and misuse of onsite material contaminated by residual radioactivity shall be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These control features should be designed to ensure, to the extent reasonable, an effective life of at least 25 years. The federal government shall have title to the property.

E.2 Interim Management

a. A site may be released under interim management when the residual radioactivity exceeds guideline values if the residual radioactivity is in inaccessible locations and would be unreasonably costly to remove, provided that administrative controls are established to ensure that no member of the public shall receive a radiation dose exceeding the basic dose limit.

b. The administrative controls, as approved by DOE, shall include but not be limited to periodic monitoring, appropriate shielding, physical barriers to prevent access, and appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactivity or cause it to migrate.

c. The owner of the site or appropriate federal, state, or local authorities shall be responsible for enforcing the administrative controls.

E.3 Long-Term Management

Uranium, Thorium, and Their Decay Products

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years.

b. Control and stabilization features shall be designed to ensure that Rn-222 emanation to the atmosphere from the waste shall not: (1) exceed an annual average release rate of 20 $pCi/m^2/s$, and (2) increase the annual average Rn-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L. Field verification of emanation rates is not required.

c. Prior to placement of any potentially biodegradable contaminated wastes in a long-term management facility, such wastes shall be properly conditioned to ensure that (1) the generation and escape of biogenic gases will not cause the requirement in paragraph b of this section (E.3) to be exceeded, and (2) biodegradation within the facility will not result in premature structural failure in violation of the requirements in paragraph a of this section (E.3).

d. Groundwater shall be protected in accordance with 40 CFR 192.20(a)(2) and 192.20(a)(3), as applicable to FUSRAP and remote SFMP sites.

e. Access to a site should be controlled and misuse of onsite material contaminated by residual radioactivity should be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These controls should be designed to be effective to the extent reasonable for at least 200 years. The federal government shall have title to the property.

Other Radionuclides

f. Long-term management of other radionuclides shall be in accordance with Chapters 2, 3, and 5 of DOE Order 5820.2, as applicable.

F. EXCEPTIONS

Exceptions to the requirement that authorized limits be set equal to the guidelines may be made on the basis of an analysis of site-specific aspects of a designated site that were not taken into account in deriving the guidelines. Exceptions require approvals as stated in Section D. Specific situations that warrant exceptions are:

a. Where remedial actions would pose a clear and present risk of injury to workers or members of the general public, notwithstanding reasonable measures to avoid or reduce risk.

b. Where remedial actions--even after all reasonable mitigative measures have been taken--would produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near affected sites, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

c. Where the cost of remedial actions for contaminated soil is unreasonably high relative to long-term benefits and where the residual radioactive materials do not pose a clear present or future risk after taking necessary control measures. The likelihood that buildings will be erected or that people will spend long periods of time at such a site should be considered in evaluating this risk. Remedial actions will generally not

be necessary where only minor quantities of residual radioactive materials are involved or where residual radioactive materials occur in an inaccessible location at which site-specific factors limit their hazard and from which they are costly or difficult to remove. Examples are residual radioactive materials under hard-surface public roads and sidewalks, around public sewer lines, or in fence-post foundations. In order to invoke this exception, a site-specific analysis must be provided to establish that it would not cause an individual to receive a radiation dose in excess of the basic dose limits stated in Section B, and a statement specifying the residual radioactivity must be included in the appropriate state and local records.

d. Where the cost of cleanup of a contaminated building is clearly unreasonably high relative to the benefits. Factors that shall be included in this judgment are the anticipated period of occupancy, the incremental radiation level that would be effected by remedial action, the residual useful lifetime of the building, the potential for future construction at the site, and the applicability of remedial actions that would be less costly than removal of the residual radioactive materials. A statement specifying the residual radioactivity must be included in the appropriate state and local records.

e. Where there is no feasible remedial action.

G. SOURCES

Limit or Guideline	Source
Basic Dose Limits	
Dosimetry Model and Dose Limits	International Commission on Radiological Protection (1977, 1978)
Generic Guidelines for Residual Radioactivity	
Residual Concentrations of Radium and Thorium in Soil Material	40 CFR 192
Airborne Radon Decay Products	40 CFR 192
External Gamma Radiation	40 CFR 192
Surface Contamination	Adapted from U.S. Nuclear Regulatory Commission (1982)
Control of Radioactive Wastes and Residues	
Interim Storage	DOE Order 5480.1A
Long-Term Management	DOE Order 5480.1A; 40 CFR 192

H. REFERENCES

International Commission on Radiological Protection. 1977. Recommendations of the International Commission on Radiological Protection (Adopted January 17, 1977). ICRP Publication 26. Pergamon Press, Oxford. [As modified by "Statement from the 1978 Stockholm Meeting of the ICRP." Annals of the ICRP, Vol. 2, No. 1, 1978.]

International Commission on Radiological Protection. 1978. Limits for Intakes of Radionuclides by Workers. A Report of Committee 2 of the International Commission on Radiological Protection. Adopted by the Commission in July 1978. ICRP Publication 30. Part 1 (and Supplement), Part 2 (and Supplement), Part 3 (and Supplements A and B), and Index. Pergamon Press, Oxford.

U.S. Environmental Protection Agency. 1983. Standards for Remedial Actions at Inactive Uranium Processing Sites; Final Rule (40 CFR Part 192). Fed. Regist. 48(3):590-604 (January 5, 1983).

U.S. Department of Energy. 1984. Formerly Utilized Sites Remedial Action Program. Summary Protocol: Identification - Characterization - Designation - Remedial Action - Certification. Office of Nuclear Energy, Office of Terminal Waste Disposal and Remedial Action, Division of Remedial Action Projects. April 1984.

U.S. Department of Energy. 1985. Supplement to U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites. A Manual for Implementing Residual Radioactivity Guidelines. Prepared by Argonne National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest Laboratory for the U.S. Department of Energy. September 30, 1985 (comment draft) and subsequent revisions.

U.S. Nuclear Regulatory Commission. 1982. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material. Division of Fuel Cycle and Material Safety, Washington, DC. July 1982.

APPENDIX C. DOE FUSRAP PROCEDURE FOR ASSIGNING SITE PRIORITIES

The assessment of potential health effects and the ranking of contaminated sites are complex and must take into account many influencing factors. The major hazard due to radiological contaminants is their potential to increase either the long or short term risk of cancer. The nature of these contaminants must be clearly defined. Furthermore, the risk from all pathways to an exposed individual or population group, as well as such exposure parameters as occupancy factors associated with the contaminated living or working areas and the population density around a contaminated site must be evaluated. Potential for migration of contaminants to the surrounding environs either through the air, water, soil, and the ecosystem and ultimately to man is of major importance.

Analyses to date have identified no site under current use conditions where there is an immediate health hazard; however, over the long term, the potential for accumulated exposure and unacceptable increases in risk do exist.[a] It should be noted, however, that dose and risk estimates completed as part of the assigning of priorities procedure are not absolute estimates. These estimates are

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(a) An unacceptable increase has been tentatively defined as an annual increased risk of getting a fatal cancer in excess of 5 chances in 100,000 per year of exposure. The values represent the approximate increase in risk of contracting a fatal cancer as a result of continuous exposure to the recommended guidelines (500 mrem/y) value for short term exposure (DOE-85) using a dose risk conversion factor of 10^{-7} effects/mrem of dose (ICRP-26). Because this procedure assumes risk to be proportional to dose, the equivalent whole body dose calculated as the sum of weighted internal and external doses (recommendation ICRP-26) can be directly compared to the 500 mrem limit to determine a priority. The short term guideline is appropriate rather than the long term guideline of 100 mrem/year because the implementation of remedial actions to remove material causing the potential exposures are expected to begin in a short period (about 5 years or less following designation).

relative comparisons of the potential for exposure at the specific sites and are intended to be compared to estimates at other designated sites for the purpose of assigning a remedial action priority. The health effects or dose estimates are not intended or necessarily applicable for other uses.

The Department is using a three-category system for ranking contaminated sites based on health effects (see Figure C-1). The categories are:

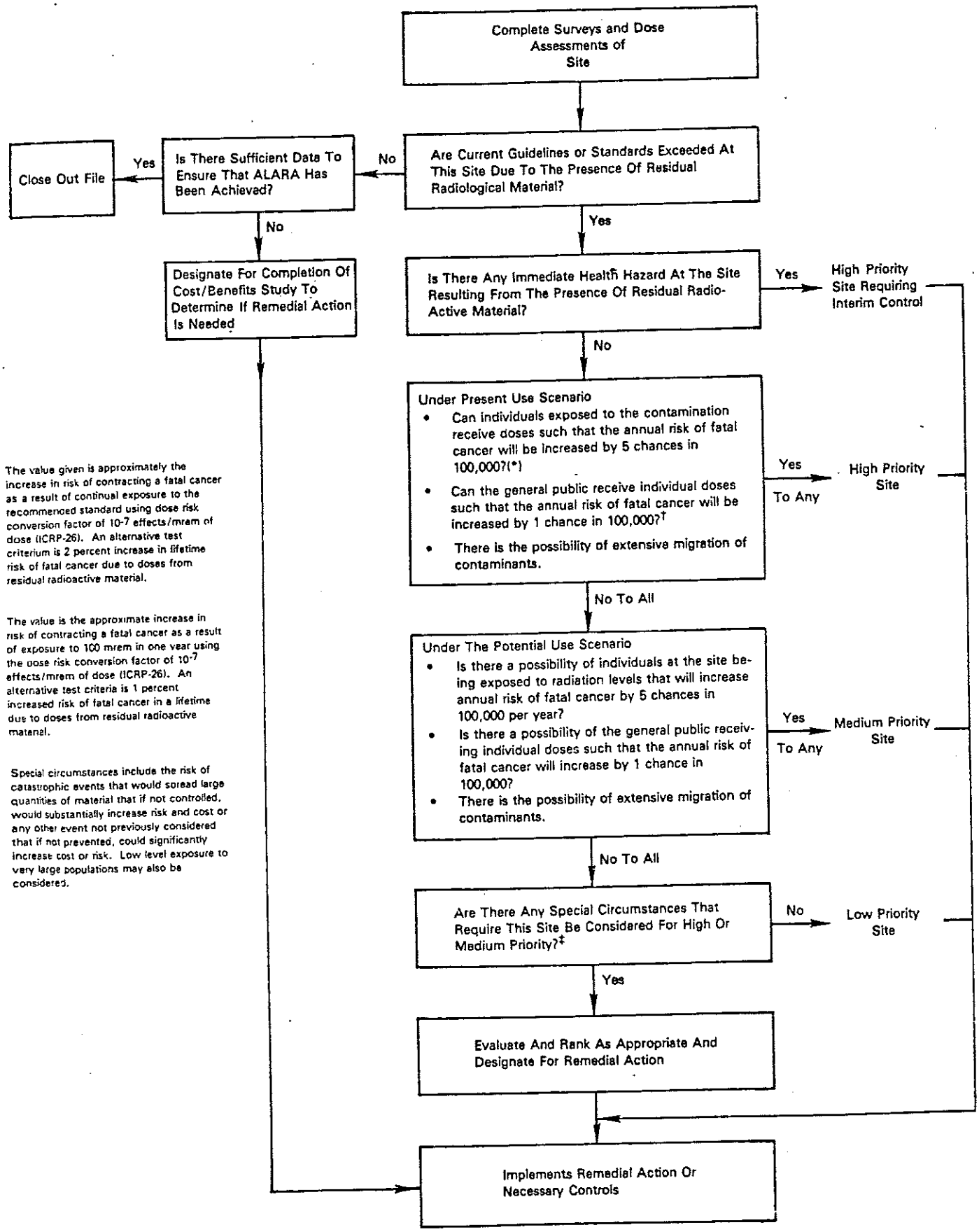
High

- Ranking a site as a high priority indicates that the site is contaminated above guidelines, and
  - there is potential for individuals at a site under present use conditions to receive an unacceptable increase in cancer risk,[a] or
  - there is significant potential for a larger group of individuals not directly associated with a site to be exposed to levels of radiation that could increase the number of expected cancers to an unacceptable level,[b] or

(a) See Note (a) on previous page

(b) An unacceptable increase to a group of individuals has been tentatively defined as an annual increased risk of getting a fatal cancer in excess of 1 in 100,000. This value, as the similar one defined for individual risk, is preliminary; it is based on the increased risk that would occur if a group of persons were exposed to the standard for large groups (100 mrem/y, FRC* 1960) over their entire lives. This is the approximate annual risk estimated using the 100 mrem/y standard and a dose risk conversion factor of 10^{-7} effects/mrem of dose from ICRP-26. Because the procedure assumes risk to be proportional to dose, the equivalent whole body dose calculated as recommended in ICRP-26 (the sum of weight internal and external doses) can be directly compared to the 170 mrem dose limit to determine priorities.

*Recommendations of the Federal Radiation Counsel.



The value given is approximately the increase in risk of contracting a fatal cancer as a result of continual exposure to the recommended standard using dose risk conversion factor of 10-7 effects/mrem of dose (ICRP-26). An alternative test criterium is 2 percent increase in lifetime risk of fatal cancer due to doses from residual radioactive material.

The value is the approximate increase in risk of contracting a fatal cancer as a result of exposure to 100 mrem in one year using the dose risk conversion factor of 10^{-7} effects/mrem of dose (ICRP-26). An alternative test criteria is 1 percent increased risk of fatal cancer in a lifetime due to doses from residual radioactive material.

Special circumstances include the risk of catastrophic events that would spread large quantities of material that if not controlled, would substantially increase risk and cost or any other event not previously considered that if not prevented, could significantly increase cost or risk. Low level exposure to very large populations may also be considered.

Figure C-1. DOE Prioritization Procedure

- there is extensive migration or there is significant potential for extensive migration of the contamination into the surrounding environs.

Medium o Ranking a site as medium priority indicates the site is contaminated above guidelines, and

- there is no immediate hazard to individuals at a site under current use conditions, but there is potential (due to possible change in use or occupancy) for individuals to be exposed to levels of radiation that may increase the risk of cancer above an acceptable level,[(a)] or

- there is potential for a site to be exposed to levels of radiation that could increase the number of cancers to an unacceptable level[(b)] if the present use conditions of the site were to change, or

- there is a moderate possibility that contamination may migrate offsite and result in exposure to individuals around the site.

Low o Ranking a site as low priority indicates that the site is contaminated above guidelines; however,

- the exposure level is very close to the level where no discernible increase in cancer risk to individuals under current or near term (10 year period) future use of the site is expected, or

- there is no foreseeable chance of the surrounding population being exposed to levels of radiation that would increase their risk of cancer, or

- there is little or no chance of, or little significance in, migration of contamination from the site.

Dose/Health effects based priorities are only one factor in determining a sites remedial action priority. Other factors (discussed in the text of the protocol) will be assessed by the OR/TSD and DFSD after designation and are used along with health effects priorities to provide the overall remedial action priorities. It is also important to note that the dose/health effects calculations are used in determining priorities but designations are base on comparison of the site to DOE guidelines.

REFERENCES

DOE-85, U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites, Rev. 1, July 1985.

ICRP-26, Annuals of the ICRP Report, November 26, January 7, 1977.

APPENDIX D. CERTIFICATION DOCKET

The purpose of the Certification Docket is to provide a consolidated and permanent record of DOE activities at the specific site and of this site's radiological condition at the time of certification. This record will be placed in the DOE Public Reading Room in Washington, D.C., and subsequently will be microfilmed for Federal Archives. The certification package will contain a summary of DOE (and predecessor agencies) activities at the site, the supporting documentation, and a bibliography of relevant documents that are not included in the docket. The outline for the final docket is:

(A) Introduction to the Docket

  (1) Purpose and Contents of the Docket

  (2) Property Identification (general description and drawings of property being certified)

(B) Exhibit I - Summary of Activities at the Specific Site

  (1) Site History (MED/AEC use; ownership history and use; and FUSRAP activities at site)

  (2) Site Description (past and current)

  (3) Radiological History and Status (survey and monitoring information, and criteria for determining need for remedial action)

  (4) Selection of Remedial Action (option selected; criteria for the remedial action; cost-benefit analysis; and health effects evaluation)

  (5) Summary of Remedial Action (what was done; waste volume and waste types; costs; and occupational and public exposures)

(C) Exhibit II - Documents Supporting the Certification of the Site

These include but are not limited to:

(1) Decontamination or Stabilization Criteria

(2) NEPA Documents

(3) Agreements (with owner, state, and so forth)

(4) Post Remedial Action Survey and Monitoring Data

(5) State, County, and Local Comments On Adequacy of Remedial Action (and others as appropriate)

(6) Recommended Restrictions and Actions Taken to Implement

(7) Federal Register Notice

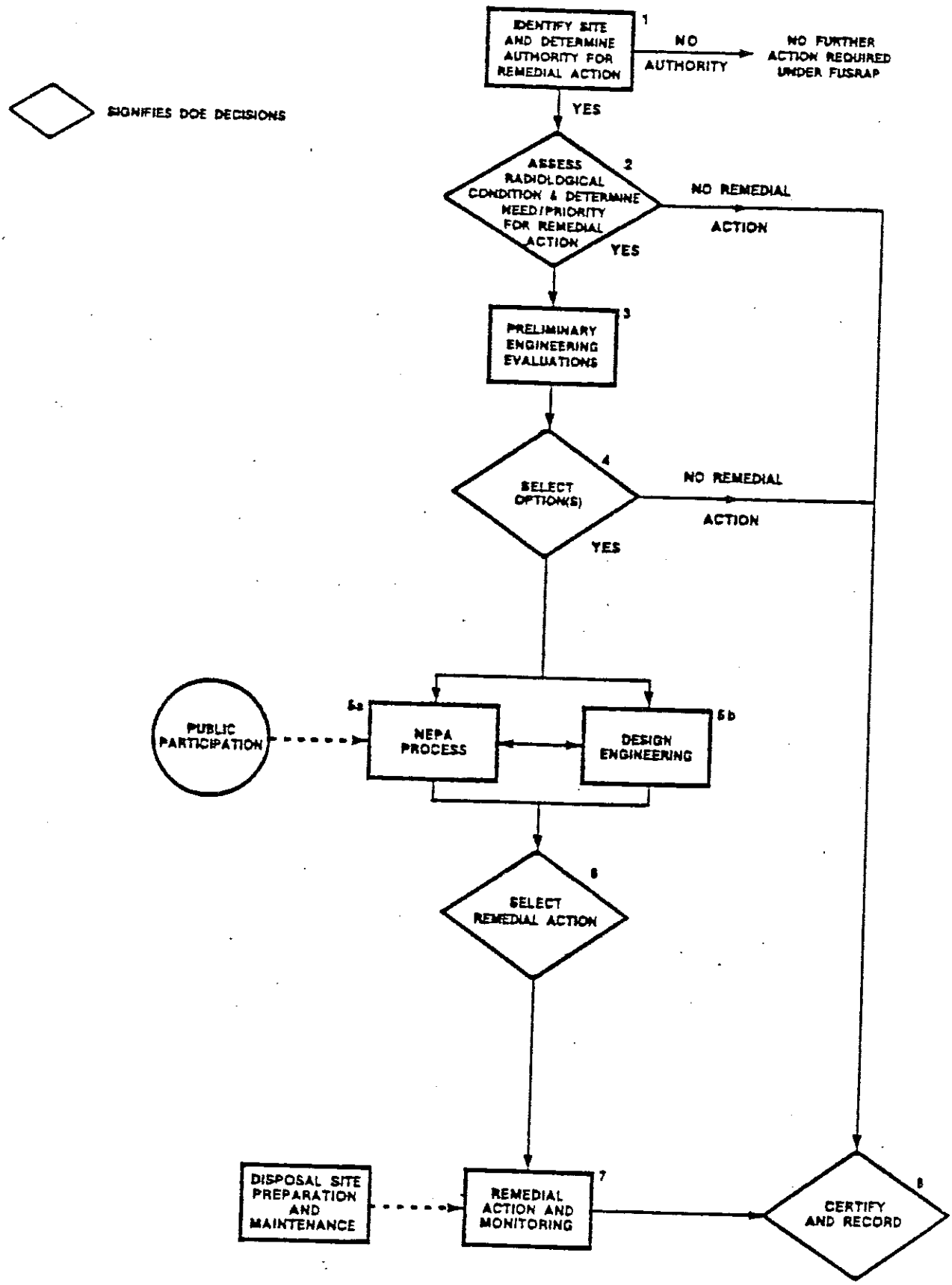
(8) Approved Certification Statement

(D) Exhibit III - Diagrams and/or Figures or Tables Supporting the Certification

(E) List of Relevant Documents

The Certification Docket shall be prepared by OR-TSD for each completed remedial action and will include state, county, and local comments (as appropriate), Federal Register notice, and Approved Certification Statement. The certification statement is signed at DOE Oak Ridge Operations and is approved at Headquarters. OR-TSD drafts and obtains the required concurrences for the Federal Register notice which is issued by Headquarters.

APPENDIX E. BASIC STEPS INVOLVED IN THE REMEDIAL ACTION PROGRAM (FUSRAP ESAPP, APRIL 1985)



APPENDIX F. PUBLIC AVAILABILITY AND ARCHIVING OF FUSRAP RECORDS

Introduction

Documentation on all FUSRAP site investigations and activities (for eliminated as well as certified sites) will be prepared and archived by the Department of Energy as permanent records of the program. This activity is required by this protocol for the purpose of ensuring that investigations completed under FUSRAP do not have to be repeated at some future date. It is DFSD's responsibility to ensure that actions are taken to permanently preserve these records.

Throughout the FUSRAP project DFSD, with its technical assistance contractors and the FUSRAP project office (OR-TSD), will maintain records that document program activities including site identification, characterization, designation or elimination, and site remedial action planning, implementation, and certification. DFSD and the Technical Assistance Contractor will maintain these records documenting site identification, characterization, and designation or elimination activities. DFSD and the FUSRAP Project Office (OR-TSD) will maintain those records documenting remedial action planning, implementation, and certification activities at each site. The certification dockets assembled by OR-TSD as described in Appendix D will be the primary record for those sites designated for remedial action. Elimination reports, including authority reviews and supporting documentation, assembled by the DFSD Technical Support Contractor will be the primary record for sites identified but not included in the remedial action program. In addition, the primary record file will include general information regarding program policy, decisions, and other pertinent information required to reflect as complete as possible history or chronology of activities associated with each FUSRAP site.

Temporary Public Access

The Certification Dockets, major FUSRAP announcements, press releases and, where appropriate, elimination reports will be made available at the Department of Energy Public Reading Room in Washington, D.C. Upon receipt of the primary records assembled by OR-TSD and/or the Technical Assistance Contractor, DFSD will transfer copies of the subject documents to the reading room through a memorandum to the Department's Public Information Office (MA-232.1). The official record copies will be maintained by DFSD or the program office until they are archived. The memorandum will request that MA-232.1 make the copies of the documents available to the public at the reading room for a period from 3 to 5 years, after which time they will be destroyed.

Permanent Archiving of FUSRAP Records

At the termination of FUSRAP, or at an appropriate interval to be determined, DFSD will assemble and prepare these records in accordance with pertinent records management procedures for transfer to the National Archives for permanent retention. The Office of Nuclear Energy Records Liaison Office (NE-73), at the request of DFSD, will coordinate with the Department Records Officer (MA-232.3) to have the records identified for permanent retention by the National Archives. The records will then be available to interested parties through the National Archives.