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CP3-RP-1109 FRev. 2	TITLE: Radioactive Contamination Control And Monitoring	Page 1 of 27

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REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
FR0	Initial Release under FRNP.	All	10/18/17
FR1	General revision to change job responsibilities	All	8/9/18
FR2	Revise Section 6.5 Unrestricted Release of Equipment and Materials to meet new DOE requirements	All	11/05/2019

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE 3
1.1 Purpose 3
1.2 Scope 3
2.0 REFERENCES 3
2.1 Use References 3
2.2 Source References 3
3.0 COMMITMENTS 4
4.0 PRECAUTIONS AND LIMITATIONS 4
4.1 Precautions 4
4.2 Limitations 5
5.0 PREREQUISITES 5
6.0 INSTRUCTIONS 6
6.1 Contamination Control Area Requirements 6
6.2 Exit Control 7
6.3 Personnel Contamination Control 8
6.4 Release of Material and Equipment from Radiological Areas Inside the Posted Radiological Controlled Area 9
6.5 Unrestricted Release of Material/Equipment from the DOE Reservation 10
6.6 Documenting Contamination Surveys 15
6.7 Performing Routine Radiological Surveys 16
7.0 ACCEPTANCE CRITERIA 16
8.0 POST PERFORMANCE WORK ACTIVITIES 16
9.0 RECORDS 17
9.1 Records Generated 17
9.2 Records Disposition 17
APPENDIX A – ACRONYMS/DEFINITIONS 18
APPENDIX B – SURFACE CONTAMINATION VALUES[1] 21
APPENDIX D – AUTHORIZED LIMITS 23
APPENDIX E – MATERIAL/EQUIPMENT RELEASE PROCESS FLOWCHART 26

1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to define the process for compliance with the applicable regulatory requirements for radioactive contamination control and monitoring for the release of materials and equipment from radiological areas as specified in Title 10, *Code of Federal Regulations*, § 835 (10 Code of Federal Regulations [*CFR*] § 835), *Occupational Radiation Protection.* Title 10 incorporates guidance from the U.S. Department of Energy (DOE) guide, G 441.1-1C, *Radiation Protection Program Guide for Use with Title 10, Code of Federal Regulations,* § 835, *Occupational Radiation Protection*, and conformance with mandatory contractual and administrative requirements.

This procedure also defines the process for control of unrestricted release of materials and equipment as specified in DOE Order 458.1, *Radiation Protection of the Public and the Environment*.

1.2 Scope

This procedure applies to radioactive contamination control and monitoring conducted under the Radiological Protection Program (RPP) at the Paducah Gaseous Diffusion Plant (PGDP) by the Deactivation and Remediation (D&R) contractor. The approval authority for this document is the Radiation Protection Manager (RPM).

2.0 REFERENCES

2.1 Use References

- CP2-RP-1009, *Radiological Protection Instrumentation Operation Technical Basis Document*
- CP3-HS-2009, *Stop/Suspend Work*
- CP3-RP-1101, *Radiation Exposure Limits*
- CP3-RP-1104, *Radiological Area Entry Control*
- CP3-RP-1108, *Posting and Labeling*
- CP3-RP-1114, *ALARA Program*
- CP3-RP-1201, *Internal Dosimetry*
- CP3-RP-1202, *External Dosimetry*
- CP3-RP-1203, *Embryo/Fetus Protection*
- CP4-RP-1116, *Radiological Routines*

2.2 Source References

- 10 *CFR* 835, *Occupational Radiation Protection*
- CP2-WM-0011, *Waste Acceptance Criteria for the Treatment, Storage, and Disposal Facilities at the Paducah U.S. Department of Energy Site*
- DOE G 441.1-1C, *Radiation Protection Guide for Use with Title 10, Code of Federal Regulations, § 835, Occupational Radiation Protection*
- DOE Order 458.1, *Radiation Protection of the Public and the Environment*

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 Property control and clearance processes must be developed and implemented in accordance with the dose limits in CP3-RP-1101, *Radiation Exposure Limits*, under any plausible use of the property and the As Low As Reasonably Achievable (ALARA) process requirements according to CP3-RP-1114, *ALARA Program*, must be met before property is cleared from any radiologically controlled area.

4.1.2 Dose Constraints - Unless alternative dose constraints are approved by issuance of a directive or memorandum by the Chief Health, Safety and Security Officer or for National Nuclear Security Administration (NNSA), the Cognizant Secretarial Officer in consultation with the Chief Health, Safety and Security Officer, the following dose constraints for residual radioactive material must be applied to each specific clearance of property for any actual or likely future use of the property:

- Real property – a Total Effective Dose (TED) of 25 mrem (0.25 mSv) above background in any calendar year

  OR

- Personal property – a TED of 1 mrem (0.01 mSv) above background in any calendar year.

4.1.3 Surface contaminated radiological samples (includes air samples and swipes) shall **NOT** be left unattended in a Radioactive Material Area (RMA) unless properly packaged and labeled according to CP3-RP-1108, *Posting and Labeling*.

4.1.4 Logbook entries shall **NOT** be considered an acceptable equivalent to radiological survey forms.

4.1.5 **If** the field screening indicates contamination levels greater than 100 times the surface contamination values (highly contaminated) according to Appendix B, *Surface Contamination Values*, unless approved by the RPM or Radiation Protection Project Manager (RPPM), **then** radiological samples shall **NOT** be removed from Contamination Areas (CAs), High Contamination Areas (HCAs), or Airborne Radioactivity Areas (ARAs).

4.1.6 Highly contaminated radiological samples identified in Step **4.1.5** above must be handled with special precautions including double sealed packaging and a documented removable contamination survey of the package exterior.

4.1.7 Except as provided in Steps **6.4.3** and **6.4.4**, material and equipment shall **NOT** be released from CAs, HCAs, or ARAs to a Controlled Area **if** any of the following apply:

- Removable surface contamination levels on accessible surfaces exceed the removable surface contamination values specified in Appendix B, *Surface Contamination Values*, [§835.1101(a)(1)].
- Prior use of material or equipment suggests that the removable surface contamination levels on inaccessible surfaces are likely to exceed the removable surface contamination values specified in Appendix B [§835.1101(a)(2)].

4.1.8 Potentially contaminated property shall **NOT** be cleared from DOE control unless the property is demonstrated to **NOT** contain residual contamination based on process and historical knowledge, radiological monitoring or surveys, or a combination of these per the Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM) and Multi Agency Radiation Survey and Assessment of Materials and Equipment Manual (MARSAME).

4.1.9 Property potentially containing residual radioactive material shall **NOT** be cleared from DOE control unless the property is evaluated and appropriately monitored or surveyed to determine the following:

- The types and quantities of residual radioactive material within the property.
- The quantities of removable and total residual radioactive material on property surfaces, including residual radioactive material present on and under any coating.
- That any residual radioactive material within or on the property is in compliance with applicable specific or pre-approved Authorized Limits according to Appendix D, *Authorized Limits*.

4.1.10 Property, with potentially contaminated surfaces that are difficult to access for radiological monitoring or surveys, shall **NOT** be cleared from DOE control unless an evaluation of residual radioactive material on such surfaces is performed which is:

- Based on process/historical knowledge, monitoring **and/or** surveys, to the extent feasible

  AND/OR

- Sufficient to demonstrate that applicable specific or pre-approved Authorized Limits (Appendix D) will **NOT** be exceeded.

4.2 Limitations

None

5.0 PREREQUISITES

None

6.0 INSTRUCTIONS

6.1 Contamination Control Area Requirements

Radiological Control Technician Supervisor/Radiological Control Technician (RCT)

NOTE:

Area Control is performed according to Steps **6.1.1** and **6.1.3.**

6.1.1 Maintain appropriate controls that prevent the inadvertent transfer of removable contamination to locations outside radiological areas under normal operating conditions [§835.1102(a)] **and** verify that controls are effective by performing routine documented surveys.

6.1.2 **If** contamination is found outside a radiological area, **then** refer to CP3-RP-1108, *Posting and Labeling*.

6.1.3 Prevent the spread of contamination across the boundary of CAs, HCAs, ARAs, and Radiological Buffer Areas (RBAs) by performing the following:

- **If** practicable, **then** erect barriers to enclose each CA, HCA, ARA, or RBA.
- Secure hoses and cords that cross the boundary to prevent removal from the area.
- **If** practicable, **then** control **and** direct air flow from areas of lesser removable contamination to areas of greater removable contamination.
- Label hoses and cords that cross the boundary to identify radiological boundary.
- Ensure engineering controls or containment devices, such as glove bags, glove boxes, tents are in place.

NOTE:

Contamination Area control is performed according to Steps **6.1.4** through **6.1.6.**

RCT

6.1.4 **If** the removable contamination values exceed the contamination limits in Appendix B, **then** identify the areas as Contamination Areas, or as appropriate.

6.1.5 Post **and/or** label Contamination Areas according to CP3-RP-1108, *Posting and Labeling.*

RPPM

6.1.6 Identify appropriate engineered controls, administrative controls, and personal protective equipment through the work planning process that is consistent with the physical and chemical characteristics of the contaminant, the radionuclides present, and the fixed and removable contamination levels specified in the radiological work permit (RWP). Controls should agree with other safety and health hazard mitigation controls specified in the Job Hazard Analysis (JHA).

NOTE:

FCA control is performed according to Steps **6.1.7** through **6.1.9**.

RCT

6.1.7 Identify **and** establish controls and postings for Fixed Contamination Areas (FCAs) according to CP3-RP-1104, *Radiological Area Entry Control,* and CP3-RP-1108, *Posting and Labeling*.

6.1.8 Routinely monitor the area at a determined frequency according to CP4-RP-1116, *Radiological Routines*, to ensure the removable surface contamination levels remains below the values specified in Appendix B [§835.1102(c)(1)].

6.1.9 Post the area to warn individuals of the contaminated status [§835.1102(c)(2)].

6.2 Exit Control

RCT

WARNING:

Slipping or tripping hazards may be present, **when** using a step-off-pad in wet areas or on uneven terrain. In such cases, the RCT Supervisor may waive the requirement for a step-off-pad.

6.2.1 Include the following at exit points from frequently accessed CAs and HCAs:

- A step-off-pad placed immediately outside the exit point, contiguous with the area boundary, and maintained free of radioactive contamination.
- Containers near the step-off-pad inside the area boundary for the collection of protective clothing, equipment, and radioactive waste.
- Contamination monitoring equipment placed close to the step-off-pad. **If** background radiation levels **and/or** environmental conditions prevent monitoring at the step-off-pad, **then** setup an exit pathway from the exit point to the area where monitoring can be accomplished.

NOTE:

Examples of CAs infrequently accessed (inactive) include abandoned, unoccupied, and deactivated facilities. No step-off-pad is required for CAs infrequently accessed (inactive).

6.2.2 Prior to entering any inactive CA, survey actual locations entered. RCT can be CA posting. Entrance and Exit area will be controlled by an RBA.

6.2.3 Use multiple step-off-pads, as appropriate, at the exits of HCAs to control and limit the spread of contamination.

6.2.4 **If** multiple step-off-pads are used, **then** apply controls according to Steps **6.2.5** through **6.2.7**.

6.2.5 Position an inner step-off-pad immediately outside the HCA, but still within the CA.

6.2.6 Ensure workers remove their outer clothing before stepping on the inner step-off-pad.

6.2.7 Position additional secondary step-off-pads, outside the CA but still within the RBA, to

restrict the spread of contamination out of the immediate area.

6.3 Personnel Contamination Control

RCT

6.3.1 Require protective clothing as specified in the RWP or other work control document (for example, JHA, IHWP, or safety permit) for entry into areas where removable contamination exists at levels exceeding those specified in Appendix B [§835.1102(e)].

All Personnel

6.3.2 Monitor upon exiting CAs, HCAs, and RBAs established for contamination control, as appropriate, for the presence of surface contamination [§835.1102(d)] in excess of the total surface contamination values in Appendix B.

RCT

6.3.3 **When** performing job coverage in radiological areas to determine whether it is conducted in a manner that minimizes the spread of contamination to adjacent surfaces, evaluate work, individuals in the area, and the workplace atmosphere. Implement stop work authority according to CP3-HS-2009, *Stop/Suspend Work*, as necessary, to prevent inadvertent spread of contamination.

6.3.4 Provide contamination control related process improvements and feedback to workers, workers' supervisor, RCT Supervisor, or other personnel as part of the continuous improvement process, as appropriate. Feedback is documented in job coverage logs, pre-job briefings, or post-job briefings.

6.3.5 Document deficiencies on RP-F-0050, *Radiological Work Permit Job Coverage Log,* **and** notify RCT Supervisor so that the deficiency may be screened for reporting.

6.3.6 Provide oversight of workers to ensure they are implementing RWP requirements to minimize the spread of contamination according to Steps **6.3.7** through **6.3.20,** as appropriate.

6.3.7 Work with the project team to minimize the number of individuals and materials entering areas controlled for removable contamination.

6.3.8 Use proven work techniques (for example, fixatives, ventilation, coverings, damp mopping) to minimize contamination spread.

6.3.9 Use stop-work authority to correct radiological problems before they escalate.

6.3.10 Perform work area surveys to detect the presence of contamination, followed by decontamination to reduce potential spread of contamination.

6.3.11 **Before** removing radiological samples (swipes or air samples) from a CA, HCA, ARA, or RBA, place samples in a sealed package.

6.3.12 Field-screen all radiological samples from a CA, HCA, or ARA for gross contamination.

6.3.13 **If** radiological samples **CANNOT** be field-screened for gross contamination due to interfering radiation, **then** contact the RCT Supervisor for direction.

6.3.14 Place highly contaminated radiological samples in a double-sealed package. In addition, prior to the removal of the samples from the area, a documented removable contamination survey of the package exterior must be performed.

6.3.15 **If** there are special circumstances that require highly contaminated radiological samples to be removed (for example, swipes with levels greater than 100 times the contamination values in Appendix B) from a CA, HCA, ARA, or RBA, **then** do so **only** with the permission of the RPM or RPPM. Document in the RWP log. **If** a highly contaminated radiological sample is found during the field screening **and** has already been removed from a radiological area, **then** notify the RPM or RPPM.

6.3.16 Use a RWP according to CP3-RP-1104, *Radiological Area Entry Control,* for counting swipes **and/or** air samples at field counting stations or laboratory counting areas.

6.3.17 **If** using a field counting station (for example, Ludlum 2929, 3030) in accordance with CP2-RP-1009, *Radiological Protection Instrumentation Operation Technical Basis Document*, **then** collect **and** count a minimum of one swipe of the sample preparation counter top area upon completion of counting activities.

6.3.18 Document this swipe result with the survey for which the swipes were collected.

6.3.19 **If** using a fixed counting laboratory (for example, C-743), **then** perform a survey of the counter tops and document for each shift of operation.

6.3.20 At a minimum, dispose of all radiological samples above the limits in Appendix B counted at a field counting station or laboratory counting area as radioactive waste.

6.4 Release of Material and Equipment from Radiological Areas Inside the Posted RCA

RPPM/Radiological Engineer

6.4.1 Identify the radionuclides that may be present in order to define the appropriate surface contamination release limits using Appendix B.

RCT

6.4.2 **When** performing surveys, **then** include a sufficient number of survey points to characterize the radiological condition of the surface of the item.

6.4.3 **If** material **and/or** equipment exceeds the removable surface contamination values specified in Appendix B, **then if** necessary, transport items from one radiological area **and** immediately place in another equally posted radiological area [835.1101 (b)] after the following conditions are met:

- Items are properly labeled or tagged according to CP3-RP-1108, *Posting and Labeling*.
- Items are properly packaged to prevent the spread of contamination.
- Items are monitored and controlled by a trained radiological worker to ensure no spread of contamination and no unmonitored individual is likely to exceed a dose equivalent that would require monitoring according to CP3-RP-1201, *Internal Dosimetry*; CP3-RP-1202, *External Dosimetry;* or CP3-RP-1203, *Embryo/Fetus Protection.*

6.4.4 Release material and equipment with fixed contamination levels that exceed the total contamination values specified in Appendix B [§835.1101(c)] for use in controlled areas outside radiological areas provided:

- Removable contamination levels are below the values specified in Appendix B; [§835.1101(c)(1)].
- Materials are routinely monitored, clearly labeled or tagged to alert personnel of the contaminated status (§835.1101[c][2]) in accordance with CP3-RP-1108, *Posting and Labeling.*
- Controls are established to ensure that no unmonitored individual is likely to exceed a dose equivalent that would require monitoring in accordance with: CP3-RP-1201, *Internal Dosimetry*, CP3-RP-1202, *External Dosimetry,* **or** CP3-RP-1203, *Embryo/Fetus Protection.*

6.5 Unrestricted Release of Material/Equipment from the DOE Reservation

NOTE:

Appendix E, *Material/Equipment Release Process Flowchart,* details the material or equipment release process.

Waste material slated for disposal at the C-746-U site landfill is characterized according to the landfill waste acceptance criteria and DOE approved radiological authorized limits (Appendix D). Waste destined for the C-746-U landfill falls outside the scope of this procedure.

<u>Material Custodian</u>

6.5.1 Prior to submitting an off-site request for a piece of material or equipment, ensure that the material or equipment is done being used, labeled or easily identifiable, staged in a manner that supports proper off-site survey techniques or requirements (**NOT** piled or stacked on each other), and soil, debris, and trash removed.

6.5.2 Complete RP-F-0123, *Request for Unconditional Release of Material/Equipment,* by completing the “General Information” and “Use History” sections.

6.5.3 Include a description of the material or equipment, model number (if available), serial number (if available), use history, radiological area (if applicable), any special access or handling requirements, location of the material or equipment (must remain in the location given on the request form), and charge code.

6.5.4 Print name, provide badge number, **and** provide phone number, then sign **and** date RP-F-0123.

6.5.5 Forward the completed RP-F-0123 to the designated Radiation Protection Off-site Survey Coordinator.

Off-site Survey Coordinator

6.5.6 Upon receipt of RP-F-0123, fill-in the date received, next sequential request number from the log, **and** sign at the bottom.

6.5.7 Forward RP-F-0123 to the appropriate Radiation Protection designated Survey/Sample Designer.

Survey/Sample Designer

6.5.8 Initiate RP-F-0160, *Unconditional Release Survey/Design Evaluation*, by filling in the request number (taken from the bottom of RP-F-0123) in the upper right-hand corner **and** evaluate the information provided to determine how the graded approach to release of material or equipment, provided in the MARSAME Manual (NUREG-1575 Supplement 1), will be applied (Part 1 of RP-F-0123).

6.5.9 Evaluate the process to include both equipment and materials to be released off-site as a part of recycling or reuse efforts and equipment and materials destined for disposal in off-site, non-radioactive, industrial and sanitary landfills.

NOTE:

The collection of sentinel measurements or a scoping survey may be necessary to assist in performing the Initial Assessment process, categorization, and MARSAME classification. Sentinel measurements should focus on areas of likely contamination based on surveyor's professional judgement.

6.5.10 Use NUREG-1575, Supplement 1, MARSAME, to determine classification and survey design requirements.

6.5.11 Print name, provide badge number, then sign **and** date Part 2 of RP-F-0160.

6.5.12 **If** an unrestricted release survey is required, **then** specify survey data and measurement quality objectives necessary to demonstrate compliance.

6.5.13 Define unique measurement quality objectives (MQOs) **NOT** already specified in Radiological Control (RADCON) technical basis documents and standard operating procedures, where appropriate; considering the following criteria:

- Isotopes of concern **NOT** commonly encountered (for example, tritium)
- Background radioactivity
- Distribution of contamination
- Physical properties of the material and equipment
- Detection capability and sensitivity
- Temperature or environment influences
- Other performance characteristics that may affect measurability

6.5.14 Document survey requirements using **one** of the following methods:

- Prepare a Survey and Release (SRP) Plan approved by DOE for release of large quantities of land and buildings per MARSSIM.
- Utilize a Survey Instruction Sheet (SIS) approved by DOE, supplemented by requirements found on RP-F-0160, for large volume **and/or** routine releases of materials and equipment.
- Perform small volume, unique releases per design on RP-F-0160.

6.5.15 Identify the appropriate release limits (Appendix B) based on the identification of plant derived radionuclides that are likely to be present on the item. Specify appropriate release limits on RP-F-0160.

6.5.16 Evaluate wood, concrete, and other porous materials for release on a case-by-case basis. Porous items which exhibit levels of radioactivity above background (for example, greater than critical level [L_c]) should be considered to possess contamination in depth or volume. Refer to note below.

NOTE:

For material or equipment contaminated in depth or volume (such as liquids, bulk soils, vegetation, **and/or** dispersible materials whether impacted or non-impacted) require DOE's authorized release or an appropriate Authorized Limit is required. Requirements for establishing authorized limits follow the criteria described in DOE Order 458.1, *Radiation Protection of the Public and the Environment*. The Authorized Limit process is outlined in Appendix D.

6.5.17 Evaluate whether material release complies with current DOE restrictions on release of scrap metals, if applicable.

RCT Supervisor

6.5.18 Schedule unrestricted release surveys of material and equipment (except for hand-carried items) in advance of release.

Off-Site Survey Coordinator

6.5.19 **Prior** to conducting unrestricted release of radiologically impacted material and equipment (M&E), make required notification at least one business day following the categorization of M&E as radiologically impacted to the DOE Portsmouth/Paducah Project Office (PPPO) Health Physicist (HP) and the PPPO Site Facility Representative with a description of the M&E being released. A radiological evaluation, survey documentation, and release package of M&E being released must be submitted electronically to DOE.

6.5.20 **Prior** to conducting unrestricted release of radiologically non-impacted M&E, make required notification at least three business days prior to the anticipated release with a description and assessment (for example, process knowledge, sampling results, etc.) of M&E being released to the DOE PPPO HP and the PPPO Site Facility Representative.

6.5.21 **If** special circumstances arise in which the timeframe for notification cannot be met, **then** notify DOE to request a variance from the approved notification requirements.

RCT

6.5.22 **Before** release, survey material and equipment that are potentially contaminated with radioactive material to determine whether surface contamination values are less than those specified on RP-F-0160.

6.5.23 Collect survey measurements per instructions provided by the RP-F-0160, SRP, or SIS.

6.5.24 **If** field conditions differ from assumptions specified on RP-F-0160, SRP, or SIS (as appropriate), **then** consult with RCT Supervisor and RPPM.

6.5.25 Record survey measurements on radiological survey forms.

6.5.26 Forward completed survey to RCT Supervisor for review.

6.5.27 **Before** release of material for unrestricted use, remove radiological labels or tags.

RCT Supervisor

6.5.28 Review **and** approve surveys, then forward to the Survey or Sample Designer.

Survey Sample Designer, Radiological Engineer, or RPPM

NOTE:

The Survey or Sample Reviewer signing Section 4 of RP-F-0160 can be different from the person who signed as Survey or Sample Designer in Section 2 of RP-F-0160.

6.5.29 Review **and** approve all survey and sample data submitted by RCT Supervisors, for unrestricted off-site releases.

6.5.30 Fill-in the upper right-hand corner on page 2 of RP-F-0160 with the request number (from page 1 of RP-F-0160) **and** complete Sections 3 and 4.

6.5.31 **If** survey measurements exceed 80% of the specified release limit, **then** independent verification is required. Revise RP-F-0160 **and** notify RCT Supervisor that independent verification is required. Skip to Section **6.5.32.**

6.5.32 **If** the material or equipment is **NOT** approved for unrestricted release (for example, MQOs and Data Quality Objectives [DQOs] are **NOT** met), **then** return to the Survey or Sample Designer with appropriate comments stated in Section **3.i**. of RP-F-0160.

6.5.33 **If** the material or equipment is approved for unrestricted release (for example, MQOs and DQOs are met), **then** notify the Off-site Survey Coordinator. Skip to Section **6.5.39**.

RCT Supervisor

6.5.34 **When** required by RPM, RPPM, or Radiological Engineer, **then** ensure material or equipment has an independent verification radiological survey performed by a RCT using radiological instruments that are different than those used during the initial survey and percentage of survey determined by RPM, RPPM or Radiological Engineer.

6.5.35 **When** required, submit independent verification survey to RPPM for review **and** approval.

RPM/RPPM/Radiological Engineer

6.5.36 **When** required, review independent verification survey to ensure requirements specified on RP-F-0160 have been met.

6.5.37 **If** the material or equipment is **NOT** approved for unrestricted release, **then** return to the Survey or Sample Designer with appropriate comments stated in Section **3.i**. of RP-F-0160.

6.5.38 **If** the material or equipment is approved for unrestricted release, **then** notify the Off-site Survey Coordinator.

Off-site Survey Coordinator

NOTE:

DOE concurrence is not required for radiologically non-impacted M&E, unless review by DOE determines the M&E has been incorrectly categorized as non-impacted.

6.5.39 Submit material or equipment unrestricted off-site release radiological survey documentation upon completion electronically, including survey maps, to PPPO HP/Site Facility Representative. PPPO HP/Site Facility Representative will provide concurrence or comments within three (3) business days for radiologically impacted M&E. **If** additional time is needed to complete the DOE review process, **then** DOE will provide FRNP an expected review completion date.

6.5.40 **If** PPPO HP/Site Facility Representative concurrence is given for a release of material/equipment for a routine process (such as, SRPs or SISs, **then** notification and concurrence from the PPPO HP/Site Facility Representative for each shipment is **NOT** required. Go to Step **6.5.41.**

6.5.41 **If** a more rapid review cycle is required to meet project needs, **then** notify PPPO HP/Site Facility Representative via telephone.

RPM/RPPM/Radiological Engineer/Off-site Survey Coordinator

6.5.42 Notify Material Custodian to release material or equipment once PPPO HP/Site Facility Representative concurrence has been obtained for impacted material and equipment.

Material Custodian

6.5.43 **When** approved by RPM or RPPM or Off-site Survey Coordinator, **then** remove materials or equipment from DOE property.

6.6 Documenting Contamination Surveys

NOTE:

Other methods of survey documentation are acceptable only when approved by the RPM.

RCT

6.6.1 Document contamination surveys on the appropriate following contamination survey forms:

- RP-F-0002, *Radiological Survey Cover Form*
- RP-F-0007, *Radiological Survey Map Form*
- RP-F-0008, *Radiological Survey Contamination Form*
- RP-F-0144, *Radiological Survey Contamination Form without LAWs*

6.6.2 Document contamination surveys as soon as reasonable after the survey is completed, but no later than the end of the next regular shift worked, unless awaiting laboratory results.

NOTE:

Job conditions of ongoing work should be available for turnover on subsequent shifts.

6.6.3 Document job conditions on survey forms as appropriate.

6.6.4 At a minimum, include the following information on contamination survey documentation, as applicable:

- Name and badge number of RCT(s) performing survey
- Date on which the survey was performed
- Completed survey time
- RWP number
- Location of survey
- Description of item surveyed (including unique identification number)
- Survey instrument, model, and identification number
- Instrument calibration due dates
- Instrument correction factors, detection levels
- Survey number
- Results of the survey
- Signature of RPPM, Radiological Engineer, RCT Supervisor reviewing the results

6.6.5 Document the following additional information for unrestricted release surveys:

- Scanning minimum detectable concentrations
- Classification (Class 1, 2, 3, or non-impacted)
- Scanning or survey percentage;
- Location of scan survey (if less than 100%)
- Unrestricted Release Request tracking number

6.6.6 Include on the contamination survey forms sufficient graphical information (for example, location identifiers or maps) as appropriate to identify survey points.

NOTE:

When surveys are returned to the RCT because they are incomplete, inaccurate, or illegible, **then** the RCT has one working day to make the corrections and return to the RCT Supervisor. **When** on a normal 4-10 schedule, working days are Monday through Thursday.

RCT Supervisor

6.6.7 Review **and** approve the survey record no later than five (5) working days from the date the survey was completed to ensure it is complete, accurate, and legible.

6.7 Performing Routine Radiological Surveys

RCT

6.7.1 Conduct routine radiological surveys according to CP4-RP-1116, *Radiological Routines*.

6.7.2 **If** changes need to be made to the routine survey program, **then** complete RP-F-0143, *Radiological Routine Survey Program Change,* **and** forward it to the Project Support RPPM for approval and filing.

6.7.3 Perform survey as guided by RP-F-0163, *Routine Survey Control Sheet.*

6.7.4 Attach RP-F-0163 to the back of the survey packet.

7.0 ACCEPTANCE CRITERIA

DQOs and MQOs met.

8.0 POST PERFORMANCE WORK ACTIVITIES

None

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

- RP-F-0002, *Radiological Survey Cover Form*
- RP-F-0007, *Radiological Survey Map Form*
- RP-F-0008, *Radiological Survey Contamination Form*
- RP-F-0123, *Request for Unconditional Release of Material/Equipment*
- RP-F-0143, *Radiological Routine Survey Program Change*
- RP-F-0144, *Radiological Survey Contamination Form without LAWs*
- RP-F-0160, *Unconditional Release Survey/Design Evaluation*
- RP-F-0163, *Routine Survey Control Sheet*

Forms are to be completed in accordance with CP3-OP-0024, *Forms Control*.

9.2 Records Disposition

The records are to be maintained in accordance with CP3-RP-1401, *Radiation Protection Program Records,* and CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

ALARA – As Low as Reasonably Achievable

ARA – Airborne Radioactivity Area

CA – Contamination Area

CFR – Code of Federal Regulations

D&R – Deactivation and Remediation

DOE – United States Department of Energy

DQO – Data Quality Objective

FCA – Fixed Contamination Area

HCA – High Contamination Area

HP – Health Physicist

JHA – Job Hazard Analysis

MARSAME – Multi Agency Radiation Survey and Assessment of Materials and Equipment Manual

MARSSIM – Multi Agency Radiation Survey and Site Investigation Manual

MQO – Measurement Quality Objective

NNSA – National Nuclear Security Administration

PGDP – Paducah Gaseous Diffusion Plant (PGDP)

PPPO – Portsmouth/Paducah Project Office

RADCON – Radiological Control

RBA – Radiological Buffer Area

RCT – Radiological Control Technician

RMA – Radioactive Material Area

RPM – Radiation Protection Manager

RPP – Radiation Protection Program

RPPM – Radiation Protection Project Manager

RWP – Radiological Work Permit

Appendix A – Acronyms/Definitions (Continued)

SIS – Survey Instruction Sheet

SRP – Survey Release Plan

TED – Total Effective Dose

DEFINITIONS

Contamination Area – Any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed the removable surface contamination values specified in Appendix D of 10 CFR§ 835, but do not exceed 100 times those values [§835.2].

Controlled Area – Any area to which access is managed by or for DOE to protect individuals from exposure to radiation **and/or** radioactive material [§835.2].

Data Quality Objectives (DQOs) – Qualitative and quantitative statements derived from the DQO process that clarify [the survey] technical and quality objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

Fixed Contamination Area – Areas that are accessible to individuals where the measured total surface contamination levels exceed, but the removable surface contamination levels are less than the corresponding surface contamination values in Appendix B [§835.1102(c)].

High Contamination Area – An area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed 100 times the removable surface contamination values specified in appendix D of 10 CFR § 835 [§835.2].

Initial Assessment – An investigation to collect existing information describing materials and equipment and is similar to the historical site assessment described in MARSSIM.

Material Custodian – Person responsible for the material or equipment being surveyed**.**

Measurement Quality Objectives (MQOs) – a statement of a performance objective or requirement for a particular method of performance characteristic. The part of the project DQOs that apply to the measured result and its associated uncertainty, statements of measurement performance objectives or requirements for a particular measurement method performance characteristic (for example, measurement method uncertainty and detection capability), used initially for the selection and evaluation of measurement methods, and used subsequently for the ongoing and final evaluation of the measurement data.

Off-Site Survey Coordinator – RADCON professional designated to coordinate off-site surveys of material with the custodian and DOE**.**

Radioactive Material Area – any area within a controlled area, accessible to individuals, in which items or containers of radioactive material exist and the total activity of radioactive material exceeds the applicable values provided in Appendix E of 10 CFR §835[§835.2].

Appendix A – Acronyms/Definitions (Continued)

Radiological Area – For the purposes of this procedure, a radiological area is defined as any area controlled for removable contamination, such as Contamination Areas, High Contamination Areas, and Radiological Buffer Areas.

Radiological Buffer Area – An intermediate area established to prevent the spread of radioactive contamination and to protect personnel from radiation exposure.

Sentinel Measurement – A biased measurement performed at a key location to provide information specific to the objective of the initial assessment.

Surface Contamination Area – Any surface on which contamination levels exceed the values specified in Appendix B, *Surface Contamination Values*, is considered contaminated, according to [§835.1102(b)].

Survey/Sample Designer – A professional level Radiation Protection individual, which includes RPM, RPPM and RAD Engineer, who determines DQOs, MQOs, survey classification for release surveys using NUREG-1575, Supplement 1, MARSAME.

Appendix B – Surface Contamination Values[1]

Radionuclide	Removable [1,2,4]	Total (Fixed + Removable)[1,2,3]
U-nat, U-235, U-238, and associated decay products	[7]1,000	[7]5,000
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	100[8]/500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above[5]	1,000	5,000
Tritium and STCs [6]	10,000	See 6
Modified Transuranics (Paducah on-site and off-site limit for alpha)[9]	200	1,000

1. The values in this Appendix, with the exception noted in footnote 6, apply to radioactive contamination deposited to, but not incorporated into the interior or matrix of, the contaminated item. Where surface contamination by both alpha- and beta-gamma-emitting nuclides exist, the limits established for alpha- and beta-gamma-emitting nuclides apply independently.
2. 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 observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
3. The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 cm^2 is less than three times the value specified. For purposes of averaging, any square meter of surface shall be considered to be above the surface contamination value if: (1) From measurements of a representative number of sections it is determined that the average contamination level exceeds the applicable value; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm^2 exceeds the applicable value; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100cm^2 area exceeds three times the applicable value.
4. The amount of removable radioactive material per 100 cm^2 of surface area should be determined by swiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note – The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area shall be based on the actual area and the entire surface shall be wiped. It is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicated that the total residual surface contamination levels are within the limits for removable contamination.
5. This category of radionuclides includes mixed fission products, including Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where Sr-90 has been enriched.
6. Tritium contamination may diffuse into the volume or matrix of materials. Evaluation of surface contamination shall consider the extent to which such contamination may migrate to the surface in order to ensure the surface contamination value provided in this appendix is not exceeded. Once this contamination migrates to the surface, it may be removable, not fixed; therefore, a "Total" value does not apply. In certain cases, a "Total" value of 10,000 dpm/100 cm^2 may be applicable either to metals of the types from which insoluble special tritium compounds are formed, that have been exposed to tritium, or to bulk materials to which insoluble special tritium compound particles are fixed to a surface.
7. These limits apply only to the alpha emitters within the respective decay series and for soils located outside the process buildings within the Limited Area unless Contaminated Areas with transuranic (TRU) limits exists.
8. This value (100) shall be used when releasing materials for unrestricted use per DOE Order 458.1.
9. Modified transuranic limit is a Paducah administrative limit based on site historical radiological isotopic data using 8% TRU and 92% Uranium mixture for alpha surface contamination. This limit is not for soils located outside process buildings within the Limited Area.

Appendix C – Posting Criteria

AREA	CRITERIA [4]	REQUIRED POSTING	SUPPLEMENTAL POSTING [2,3]
Contamination Area	Removable contamination levels [1] (dpm/100 cm^2) > But ≤ 100 x Attachment B of CP3-RP-1109	"CAUTION, CONTAMINATION AREA"	"RWP REQUIRED FOR ENTRY"
High Contamination Area	Removable contamination levels (dpm/100 cm^2) > 100 x Attachment B of CP3-RP-1109	"CAUTION" or "DANGER," "HIGH CONTAMINATION AREA"	"RWP REQUIRED FOR ENTRY" [2]
Airborne Radioactivity Area	Airborne Concentrations (µCi/ml) are > 25% of derived air concentration	"CAUTION," OR "DANGER, AIRBORNE RADIOACTIVITY AREA"	"RWP REQUIRED FOR ENTRY"

[1]Levels exceed or are likely to exceed the listed values.
[2]The use of these words, or their equivalent, is acceptable.
[3]Whenever an area is posted as a CA or a HCA based upon removable surface contamination limits less than 1000 dpm/100cm^2, an insert should be placed on the posting indicating the proper guideline to apply [e.g., if transuranic (TRU) contamination is present at a ratio of U to TRU of < 50 to 1, include an insert stating "Use TRU Limits" or equivalent; or if Th-232 is present in excess of 10% and TRU negligible, include an insert stating "Use Th-232 Limits" or equivalent; or if Sr-90 is present in excess of these percentages, include an insert stating "Use Sr-90 Limits" or equivalent].
[4]For soils located outside of process buildings within the Limited Area, use uranium limits for alpha surface contamination in Appendix B of CP3-RP-1109 unless Contaminated Areas with TRU limits exist where U:TRU ratio is less than 50:1 (> 2% TRU).

Appendix D – Authorized Limits

1. Authorized Limits for the clearance of any property with residual radioactive material must provide reasonable assurance that the dose requirements of CP3-RP-1101, *Radiation Exposure Limits*, are met. Authorized Limits may be applied to property for which process knowledge cannot establish the absence of residual radioactive material but in which no residual radioactive material can be detected.

2. Authorized Limits must:

   - Be developed in accordance with the ALARA requirements of CP3-RP-1114, *ALARA Program*
   - Be based on the applicable dose constraint, supported by a complete exposure pathway analysis using appropriate methodologies, techniques, parameters, and models (such as the RESRAD family of codes) that meet the quality assurance requirements;
   - Be expressed in terms of concentration of radioactivity per unit surface area (for example, dpm per 100 cm^2), radioactivity per unit mass (for example, pCi per gram) or volume (for example, pCi per ml), total radioactivity, or DOE controls and restrictions, if applicable;
   - Explicitly state any restrictions or conditions on future use of the property necessary to ensure the basic dose limit and applicable dose constraint are not exceeded;
   - In addition to the paragraphs above for clearance of personal property only:
     - Be based on expected annual quantity of property to be cleared;
     - Be based on expected total amount of property cleared over the life of the project for specific remedial action or decontamination and decommissioning projects;
     - Prior to clearance of metals, the contractor must provide the necessary information to support a determination by the Field Element Manager that there is no practical internal DOE opportunity for reuse or recycle of the material or equipment; and
   - Authorized limits must be submitted to the Field Element Manager to obtain DOE approval.

3. Applications for DOE approval of Authorized Limits must contain the following:

   - A description of the property;
   - Specific limits proposed for each radionuclide or group of radionuclides **and/or** external radiation exposure, surrogate metrics, or conditions used to limit radionuclides;
   - Potential collective dose to the exposed population and the potential dose to a member of the public most likely to receive the highest dose for both: actual or likely future use, and plausible future use of the property;
   - ALARA assessments, conducted in accordance with the ALARA requirements of CP3-RP-1114, *ALARA Program* for the proposed clearance action to include, at a minimum, the effects of:
     - Implementing the proposed Authorized Limits;
     - Implementing alternative levels of residual radioactive material instead of the proposed Authorized Limits; and
     - Not implementing the proposed Authorized Limits, i.e., not proceeding with the proposed clearance action;
   - A description of the procedures and radiological monitoring or surveys to be used to demonstrate compliance with proposed limits;

Appendix D – Authorized Limits (Continued)

- Identification of any restrictions or conditions on the future use of the property upon which the proposed limits are based, and the means by which the restrictions or conditions will be implemented and maintained; and
- An estimated date for when the property will be cleared and an estimate of when the property will be released from the PGDP [This information is needed to support the DOE expectation stated at 72 FR 31904, 31906 (10 CFR § 835, June 8, 2007), that the material, equipment, or real property to which the 10 CFR § 835.1(b)(6) exclusion is applied will be released from DOE control according to a specified time interval].

4. Property covered by Authorized Limits is subject to the requirements of this procedure, unless the criteria above has been met and the Authorized Limits have been approved by a Cognizant Secretarial Officer in consultation with the Chief Health, Safety and Security Officer as required by the 10 CFR § 835 exclusion.

5. If established Authorized Limits are found to be not protective, appropriate or practical to apply for a specific type or portion of property, further clearance for that specific type or portion of property must not proceed without revised Authorized Limits.

   a) An application for revised Authorized Limits must be submitted in accordance with the requirements of step 3 above.
   b) In addition to the requirements of step 3 above, requests for approval of revised Authorized Limits must include a justification for the need for the revised Authorized Limits. Justifications for revised Authorized Limits must be based upon one of the following:
      - Complying with existing Authorized Limits would pose a clear and present risk of injury to general employees or members of the public;
      - Complying with existing Authorized Limits would produce environmental harm (for example, destruction of artifacts, ecological damage, loss of cultural assets) that is clearly excessive compared to the potential health benefits to persons exposed to affected properties;
      - Complying with existing Authorized Limits is unreasonably costly relative to long-term benefits and where the residual radioactive material does not pose a clear present or future potential of exceeding the public dose limit of CP3-RP-1101, *Radiation Exposure Limits*;
      - Portions of the project or activity for which the scenarios or assumptions used to establish the existing Authorized Limits are overly conservative, or where more appropriate scenarios or assumptions indicate that other limits are applicable or appropriate for protection of the public and the environment; or
      - New information which indicates the existing Authorized Limits are not sufficient to meet the protective requirements established by DOE.

6. Pre-Approved Authorized Limit Guidelines

   a) The following values have been pre-approved by DOE for use as Authorized Limits and may be used as specified below instead of developing specific Authorized Limits:
      - For radium-226 and radium-228 in soil - 5 pCi/gram (0.2 Bq/gram) in excess of background levels, averaged over 100 m^2, in the first 15 cm depth of the surface layer of soil; and 15 pCi/gram (0.56 Bq/gram) in excess of background levels, averaged over any subsequent 15 cm subsurface layer of soil plus an ALARA assessment. If both thorium-230 and radium-226 or both thorium-232 and radium-228 are present and not in secular equilibrium, the appropriate pre-approved limit must be applied to the radionuclide with the higher concentration; **and/or**

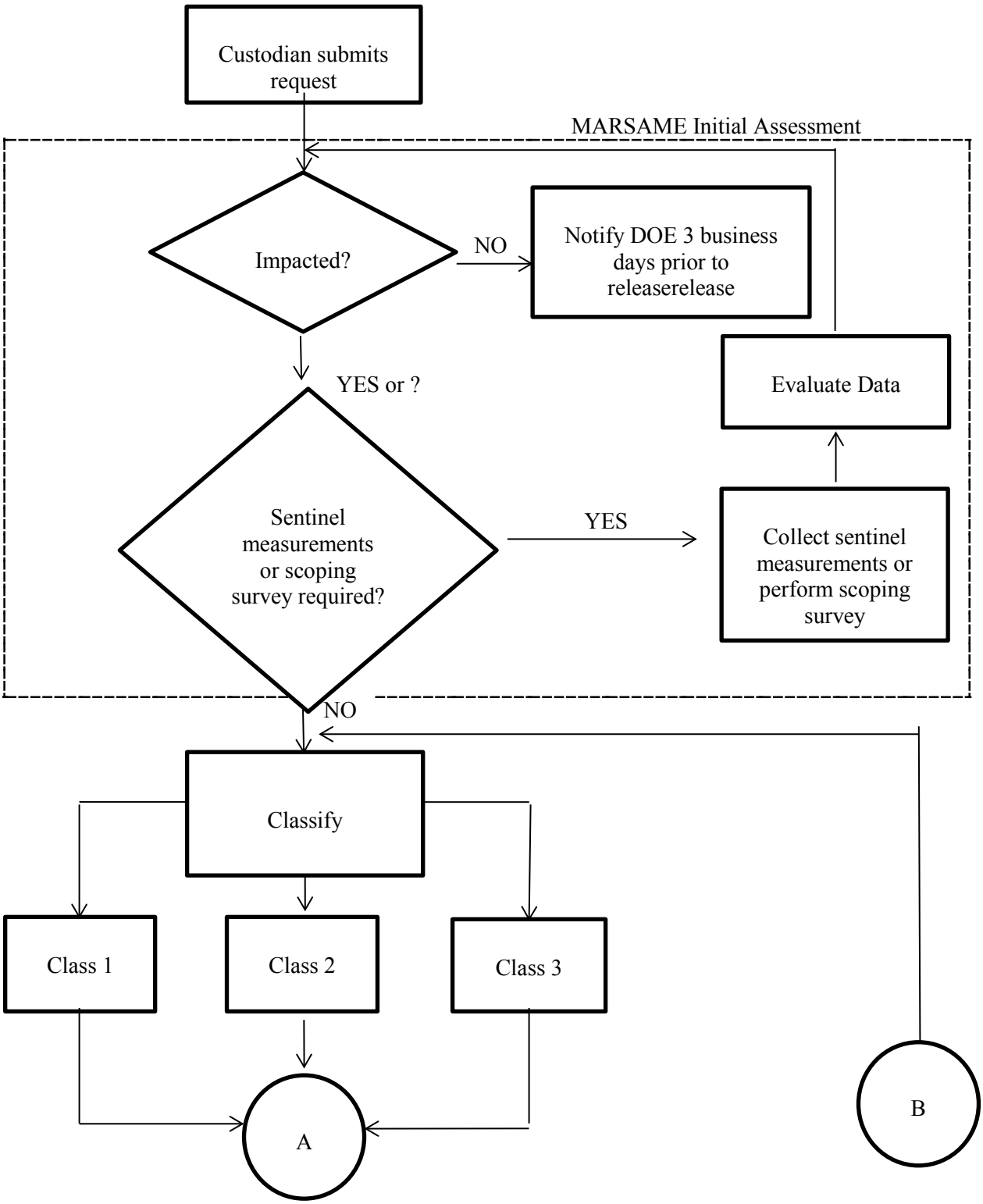
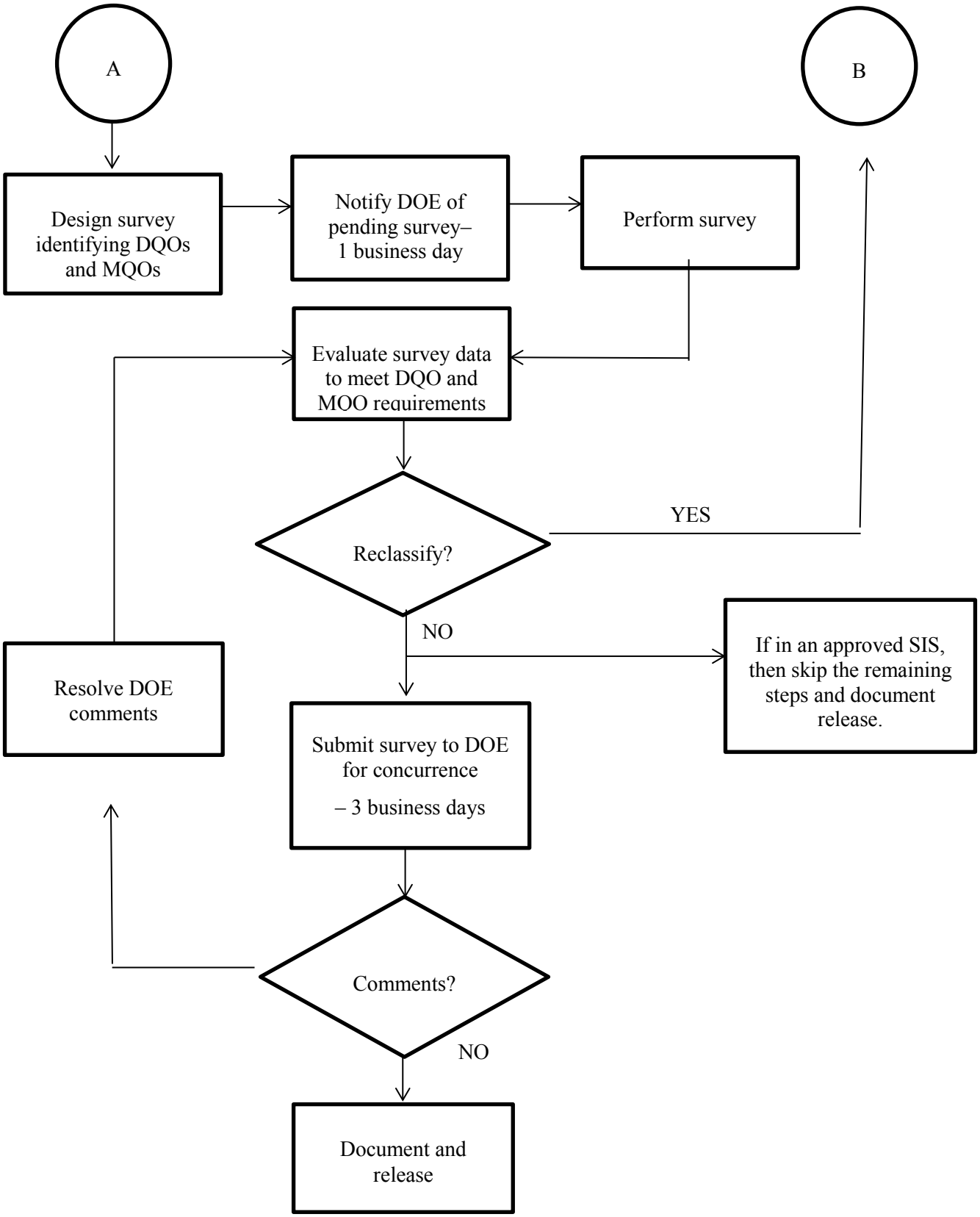
Appendix D – Authorized Limits (Continued)

- Guidelines and limits previously derived from DOE Order 5400.5 and associated guidance (such as the surface activity guidelines) may continue to be applied and used as Pre-Approved Authorized Limits until they are replaced or revised by Pre-Approved Authorized Limits issued by the Department.

b) Pre-Approved Authorized Limits may be used for any radiological activity instead of developing specific Authorized Limits, if their use is documented in the environmental radiological protection program and the specific application of the Authorized Limits is approved by the responsible Field Element Manager

7. Documentation of Approved Authorized Limits - Approved Authorized Limits and approved revised Authorized Limits and supporting documentation must be made available to the public.

Appendix E – Material/Equipment Release Process Flowchart



Appendix E – Material/Equipment Release Process Flowchart (Continued)