

# **Facility Hazard Categorization and Change Management Process**

**MSC-PRO-8366**

**Revision 4**

**Effective Date: December 12, 2013**

**Topic: Nuclear and System Safety**

Approved for Public Release;  
Further Dissemination Unlimited

# Facility Hazard Categorization and Change Management Process

## 1.0 PURPOSE

Title 10, Code of Federal Regulations, Part 830 (10 CFR 830), *Nuclear Safety Management*, Subpart B, *Safety Basis Requirements*, establishes safety basis requirements for hazard category 1, 2, and 3 Department of Energy (DOE) nuclear facilities. This procedure is used to prepare a hazard categorization, to determine the applicability of 10 CFR 830, Subpart B to Mission Support Alliance (MSA) facilities, and to produce a documented basis for that determination. In addition, this procedure is used to identify how less than Hazard Category (HC) 3 (< HC 3) facilities are managed.

This document partially implements the ISMS Guiding Principles – #1 Line Management Responsibility for Safety and Environmental Requirements, #2 Clear Roles and Responsibilities, #5 Identification of Safety and Environmental Standards and Requirements; as well as Core Function #2 Identify & Analyze the Hazards.

## 2.0 SCOPE

This procedure applies to all Hanford nuclear facilities, including less than Hazard Category 3 facilities, operated by MSA. The scope does *not* include accelerators and their operations and does *not* include activities involving only incidental use and generation of radioactive materials or radiation sources, use of radioactive sources in research and experimental and analytical laboratory activities, electron microscopes, and X-ray machines.

This procedure does *not* apply to onsite transportation activities. This procedure does *not* determine the applicability of other sections of 10 CFR 830, such as the Quality Assurance Requirements, to any facility or activity.

MSA does not currently own or manage any HC 1, 2, or 3 Nuclear Facilities but presently does manage several facilities that are designated less than Hazard Category 3 facilities requiring that MSA establish a Change Management process to ensure that that proposed changes to < HC 3 facilities, or work in areas contiguous to the facility, cannot increase the radioactive inventory or alter its form and distribution in a manner that would cause the HC 3 threshold to be exceeded as approved in the Final Hazard Categorization (FHC).

If, at some in the future, MSA acquires a HC 2 or 3 facility or determines that a current project/facility possesses enough radiological inventory to graduate from a < HC 3 facility to a HC 3 or 2 facility, MSA will provide the necessary evaluation/safety basis documentation at that time for DOE-RL approval.

## 3.0 IMPLEMENTATION

This procedure is effective upon publication and will become part of the mandatory required reading for facility managers who manage less than HC3 facilities.

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### 4.0 REQUIREMENTS

**NOTE:** For the requirement “type” column, “V” means verbatim and “I” means interpreted.

#	Requirement	Type V or I	Source
1.	...the contractor responsible for the facility must: ... (3) Categorize the facility consistent with DOE-STD-1027-92 (“Hazard Categorization and Accident Analysis Techniques for compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports,” Change Notice 1, September 1997);	V	10 CFR 830.202 (b)(3)
2.	A contractor must maintain complete and accurate records as necessary to substantiate compliance with the requirements of this part (sic 10 CFR 830).	V	10 CFR 830.6
3.	For nuclear facilities with inventories above the hazard category 3 threshold quantity in DOE-STD-1027-92, Table A.1, but for which the proposed final hazard categorization is less than hazard category 3; <ul style="list-style-type: none"> <li>• DOE approval of the final hazard categorization is required.</li> <li>• The assumptions and controls (e.g., inventory control), as defined in the approved final hazard categorization, are to be maintained.</li> </ul>	I	RL Letter 02-ABD-0109, Attachment 2, Item 2.2
4.	10 CFR 830.202(c)(1) requires that the safety basis be kept current to reflect changes in the facility, work, and hazards. Final hazard categorizations for below hazard category 3 nuclear facilities shall be revisited for any changes that may affect the approved final hazard categorization controls or assumptions (e.g., introduction of a new energy source).	I	RL Letter 02-ABD-0109, Attachment 2, Item 2.3
5.	Facilities whose hazard categorization is not final or DOE approval of the final hazard categorization downgrade is pending shall comply with 10 CFR 830, Subpart B, in accordance with the preliminary hazard categorization or the current approved final hazard categorization.	I	RL Letter 02-ABD-0109, Attachment 2, Item 2.4

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### 5.0 PROCESS

The processes addressed in the section are listed below. Navigation links are provided.

Section 5.1	Pre-Screening and Initial Hazard Categorization
Section 5.2	Final Hazard Categorization
Section 5.3	Categorization for Intrusive Activities within < HC 3 Inactive Waste Sites
Section 5.4	Nuclear Safety Management and Change Management process for < HC 3 Facilities

This process results in documentation for all MSA facilities regarding applicability of 10 CFR 830, Subpart B. Subpart B applies only to nuclear facilities. 10 CFR 830 defines nuclear facilities as: “those facilities, activities, or operations that involve, or will involve, radioactive and/or fissionable materials in such form and quantity that a nuclear or a nuclear explosive hazard potentially exists to workers, the public, or the environment, but does *not* include accelerators and their operations and does *not* include activities involving only incidental use and generation of radioactive materials or radiation such as check and calibration sources, use of radioactive sources in research and experimental and analytical laboratory activities, electron microscopes, and X-ray machines.”

DOE-STD-1027-92 supplemental guidance transmitted to the MSA predecessor in 07-SED-0321 states that:

- 1) Non-fissile sealed sources may be excluded from a facilities radioactive inventory as part of the initial hazard categorization if (a) the sources meet certain DOE, NRC or ANSI testing specifications, (b) the sources have maintained documentation demonstrating that they continue to meet the applicable requirements, (c) the sources are used under a program that maintains the minimum quality assurance requirements in applicable standards, and (d) procedures are in place to address leaks of sealed radioactive sources.
- 2) Fissile material in sealed sources cannot be excluded from comparison to fissile material thresholds in DOE-STD-1027-92.
- 3) Commercially available products containing radioactive byproduct or source material as described in 10 CFR Parts 30.14-30.21 or 10 CFR 40.13, respectively, may be excluded from the facilities initial hazard categorization inventory if the commercially available product is not modified or altered from its intended use (i.e., removal of sources from a smoke detector).
- 4) Fissile material in commercially available products cannot be excluded from comparison to fissile material thresholds in DOE-STD-1027-92.

# Facility Hazard Categorization and Change Management Process

## 5.1 Pre-Screening and Initial Hazard Categorization

This subsection provides a method by which to demonstrate that all MSA facilities have been categorized to determine the applicability of Subpart B, except as excluded within Section 2.0. The process flow diagram is shown in Appendix A.

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
Facility Manager (FM) or Designee	1.	<p>Identify facilities to be categorized from the MSA-assigned property contained in the Sunflower Asset Management System (SAMS) database (transitioned reactors are included in the database) and from any MSA-assigned accepted (but not reclassified) waste sites contained in the Waste Identification Database System (WIDS).</p> <p>Identify activities or operations to be categorized. Work scope that occurs or is conducted outside of a facility categorized under this procedure, and that involves the use of or potential exposure to radioactive materials as defined by the work control processes (e.g., those defined under the Integrated Safety Management System) for that work scope, shall be categorized. This includes activities such as well drilling, characterization work on buried contamination sites, etc. In the following processes, “facility” is used to mean facility, activity, or operation.</p>
	2.	<p>Determine if radioactive materials are present in the facility. If no radiological sources are present [as defined by <i>Form A</i> (A-6003-135)], fill in <i>Form A</i>, and go to Section 5.1, Step 8.</p>
	3.	<p>Determine if the facility has been categorized consistent with DOE-STD-1027-92 and supplemental guidance transmitted to the MSA predecessor in 07-SED-0321.</p> <ol style="list-style-type: none"> <li>If the facility is determined to be a hazard category 1, 2, or 3 facility and there is no approved Documented Safety Analysis (DSA), cease all operations in and around the facility, place the facility in a safe and stable configuration, notify the Director of WP, Emergency Management, and DOE-RL and then work with the Director of WP and DOE-RL to develop a path forward.</li> <li>If the facility has previously been categorized as less than hazard category 3 (radiological facility), verify that Steps 5.1.4, 5.1.5, or 5.1.6, have been completed including revisions needed for changed information, and go to Section 5.1, Step 8.</li> </ol>
	4.	<p>If the facility can be demonstrated to be clearly below hazard category 3 threshold quantities using process knowledge, fill in <i>Form D</i> (A-6003-138), and go to Section 5.1, Step 8. This can be a qualitative argument but should be based on potential inventory, not potential dose.</p>

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<i>Actionee</i>	<i>Step</i>	<i>Action</i>
	5.	<p>a. If radiological inventory information exists, perform initial hazard categorization per DOE-STD-1027-92 and 07-SED-0321.</p> <p><b>NOTE:</b> For radionuclides not listed in DOE-STD-1027-92, Table A.1, see LA-12981-MS, "Table of DOE-STD-1027-92, Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides," and LA-12846-MS, "Specific Activities and DOE-STD-1027-92 Hazard Category 2 Thresholds", for threshold quantities.</p> <p>b. For sites in which there is conflicting inventory data the higher inventory shall be used in determining the hazard category categorization. Future excavation / remediation efforts should be based on the higher inventory, to ensure adequate worker safety.</p> <p>c. If initial hazard categorization indicates the facility is less than Category 3, then fill in <i>Form B</i> (A-6003-136) and <i>Form E</i> (A-6003-139), and go to Section 5.1, Step 8.</p>
	6.	Determine if the facility meets the definition and characteristics of an inactive waste site (IWS) as given in Appendix B. If the facility meets the IWS definition and characteristics, fill in <i>Form C</i> (A-6003-137), then the facility will be considered as below category 3, so long as the facility continues to meet the characteristics as given. Go to Section 5.1, Step 8. In case of intrusive activities, go to Section 5.3.
	7.	If the facility has an initial categorization of greater than hazard category 3 or does not satisfy any of the steps outlined above, go to Section 5.2 to prepare final hazard categorization.
	8.	Sign appropriate form and send to the MSA Director of WP or designee for compliance review in accordance with MSC-PRO-2243 <i>Identification, Reporting, and Tracking of Nuclear Safety and Worker Safety and Health Requirement Noncompliances</i> .

## 5.2 Final Hazard Categorization

Performance of this subsection is only required as deemed necessary by Section 5.1 or 5.4.

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
FM or Designee	1.	Identify hazards and energy sources, including natural phenomena hazards and external man-made hazards.

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<i>Actionee</i>	<i>Step</i>	<i>Action</i>
	2.	Evaluate (analyze) identified facility hazards, and identify hazardous conditions using one or more accepted hazard evaluation methodologies.
	3.	Perform final hazard categorization per DOE-STD-1027-92 and 07-SED-0321.

**NOTE:** *The final hazard categorization is based on an “unmitigated release” of available hazardous material. For the purposes of hazard categorization, “unmitigated” is meant to consider material quantity, form, location, dispersibility and interaction with available energy sources, but not to consider safety features (e.g., ventilation system, fire suppression, etc.) which will prevent or mitigate a release.*

- a. The hazard analysis (or other existing safety analyses) provides an understanding of the material which can physically be released from the facility. This inventory should be compared against the Threshold Quantities (TQs) identified in Attachment 1 of DOE-STD-1027-92, Change Notice 1. Alternatively, per RL Letter 03-ABD-0025, Attachment 2, the hazard category 3 threshold values for radionuclides for which food pathway or the inhalation pathway are limiting may be revised if, based on the physical and chemical form and available dispersive energy sources for the facility and its hazardous materials, the credible release fractions (airborne release fractions) can be shown to be significantly different than the values used in the Environmental Protection Act Technical Background Document (see also WHC-SD-GN-HC-20002) which was used in the development of the Table A.1 Threshold Quantities in DOE-STD 1027-92 (provided in Appendix C). Revision of the threshold values assumes that all potential accident scenarios are considered under unmitigated conditions, all the pathways are considered and the most limiting pathway is used, and that all data and assumptions used to modify the threshold values are supported in the hazard analysis.

**NOTE:** *The following discussion is from supplemental guidance given in 07-SED-0321 and should be considered:*

*The release fraction assigned in DOE Standard 1027 for nonvolatile solids/powders/liquids (1E-3) is based on release fractions used by the NRC in NUREG-1140, as modified by DOE as described in DOE Standard 1027 Attachment 1. In verifying the appropriateness of the DOE Standard 1027 values, an evaluation was performed to verify that the 1E-3 value cited was an adequate average for hazard categorization purposes. This was done by considering various facility descriptions, applying the release fraction values to the materials in question and the accident stresses that such facilities might experience. The 1E-3 value is therefore considered*

**NOTE:** *Before each use, check MSC Docs Online to ensure this copy is current.*

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Actionee	Step	Action
		<p><i>appropriate for the typical processing and storage operations historically performed at DOE facilities.</i></p>
		<p><i>Alternate release fractions than specified in DOE Standard 1027 should not be attempted unless there is some obvious gross inconsistency between a facility's material forms or circumstances and those of most of DOE's nuclear facilities that were considered in verifying the applicability of the DOE Standard 1027 release fraction value of 1 E-3. Examples might include exceptions such as contaminated soil, activated metals in a deinventoried facility, and vitrified glass.</i></p>
		<p><i>The conditions, parameters, and assumptions that form the basis for the initial hazard category of the facility need to be evaluated to determine whether the hazard categorization should be increased. Examples would include the following:</i></p>
		<ul style="list-style-type: none"> <li>• <i>Dispersibility (e.g., less conservative release fractions relative to the material that would be in the facility);</i></li> <li>• <i>Interaction with available energy sources that could result in release of materials from Type B containers or sealed sources; and,</i></li> <li>• <i>Other parameters that would result in less conservative assumptions associated with the methodology supporting threshold quantities given in Appendix C.</i></li> </ul>
		<p><i>Similarly, guidance is provided in the DOE-STD-1027-92 supplemental guidance transmitted to the MSA predecessor in 07-SED-0321 for final categorization specific to following topical areas:</i></p>
		<p><i>Facility segmentation (Section 4.2.2 of 07-SED-0321), DOT Shipping Containers (Section 4.2.3 of 07-SED-0321), Use of Nature of Process (Section 4.2.4 of 07-SED-0321).</i></p>
		<p>b. If the Inadvertent Ground Penetration scenario of RL Letter 03-ABD-0008, Attachment 4, is used as the basis for determining a site or activity to be less than Hazard Category 3, it must be demonstrated that:</p> <ol style="list-style-type: none"> <li>1) The Source Term (ST) for the site's or activity's worst case accident is bounded by the 9.6E-06 kg <sup>239</sup>Pu ST in the Inadvertent Ground Penetration scenario. This determination shall be made using Airborne Release Fractions (ARFs) and Respirable Fractions (RFs) that are applicable to the proposed activities at the subject site.</li> </ol>

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		<p><b>NOTE:</b> <i>The ARF and RF for the Inadvertent Ground Penetration scenario were developed for large drops of soil (about 1 cubic yard each). If the activity being categorized involves removing waste using a hand shovel, for example, different values for ARF and RF need to be identified and justified.</i></p>
		<p>2) The fissile material concentrations are bounded by concentrations cited in RL Letter 03-ABD-0008, Attachment 3, Section 3.1 (i.e., 2.5 g <sup>239</sup>Pu per liter of soil and 1.8 g <sup>235</sup>U per liter of soil).</p>
		<p><b>NOTE:</b> <i>For Inactive Waste Sites, criteria in Appendix B must be met.</i></p>
		<p>4. If the facility is determined to be a hazard category 1, 2, or 3 facility and there is no approved Documented Safety Analysis (DSA), cease all operations in and around the facility, place the facility in a safe and stable configuration, notify the Director of WP, Emergency Management, and DOE-RL and then work with the Director of WP and DOE-RL to develop a path forward.</p>
		<p>5. If the facility is determined to be a &lt; HC 3 facility (radiological facility), then:</p>
		<p>a. Fill in <i>Form B</i> (A-6003-136), <i>Form E</i> (A-6003-139), and attach supporting information. (This package is the “forms package”).</p>
		<p>b. Obtain peer review (A peer who is capable of doing the work but did not contribute to the work) of new or revised hazard categorization document (e.g., revised hazard or accident analysis involving dose consequence assessment).</p>
		<p>c. Obtain functional independent review (The other working groups within the plant, e.g., Rad Con, QA, Engineering, etc.) of hazard categorization document.</p>
		<p>d. Obtain Director of WP (or designee) review of hazard categorization documents and the forms package against DOE-STD-1027-92 and 07-SED-0321.</p>

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<i>Actionee</i>	<i>Step</i>	<i>Action</i>
	e.	Approve the hazard categorization document.
	f.	Draft a hazard categorization document transmittal letter for the Director of WP.
	g.	Route the hazard categorization document transmittal and the forms package to the Director of WP (or designee) for compliance review in accordance with MSC-PRO-2243.
	h.	Obtain the Director of WP or designee's concurrence.
	i.	Transmit hazard categorization document to the DOE Richland Operations Office for final approval. See Appendix A for process flow diagram.

**NOTE 1:** *Assumptions and controls (e.g., inventory control) defined in the approved final hazard categorization need to be maintained. This also applies to those facilities which have been downgraded from  $\geq$  HC 3 facility to  $\leq$  HC 3 facility in the final hazard categorization.*

**NOTE 2:** *If hazard categorization is not final or DOE approval of the final hazard categorization downgrade is pending, comply with 10 CFR 830, Subpart B, in accordance with the preliminary hazard categorization or the current approved final hazard categorization.*

- If the facility is determined to be a hazard category 1, 2, or 3 facility and there is no approved Documented Safety Analysis (DSA), cease all operations in and around the facility, place the facility in a safe and stable configuration, notify the Director of WP, Emergency Management, and DOE-RL and then work with the Director of WP and DOE-RL to develop a path forward.*
- If the facility has a safety basis and is being downgraded from a greater than hazard category 3 facility to a below hazard category 3 facility, then the safety basis is to be maintained in accordance with appropriate procedures until the new categorization is approved.*

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### 5.3 Categorization for Intrusive Activities within < HC 3 Inactive Waste Sites

This subsection is used to prepare a hazard categorization of intrusive activities within facilities previously defined as < HC 3 IWS.

**NOTE:** *Per 03-ABD-0052, minor intrusive activities performed for the purpose of characterization may be necessary for planning future site remediation. In such instances, a hazard analysis of the activity is to be performed to support hazard categorization of that activity independent of the site categorization. If the activity categorizes as < HC 3 activity, and the remaining IWS criteria continue to be met, the categorization remains < HC 3.*

Actionee	Step	Action
FM or Designee	1.	Request a hazard categorization of the proposed activity.
	2.	Perform an initial hazard categorization of the proposed activity per DOE-STD-1027-92. <ul style="list-style-type: none"> <li>• Consider the hazards, energy sources, and material at risk associated with that activity; do <b>not</b> include facility hazards or potential accidents that exist independent of the proposed activity.</li> </ul> <p><b>NOTE:</b> <i>For radionuclides not listed in DOE-STD-1027-92, Table A.1, see LA-12981-MS, "Table of DOE-STD-1027-92, Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides," and LA-12846-MS, "Specific Activities and DOE-STD-1027-92 Hazard Category 2 Thresholds", for threshold quantities.</i></p> <p><i>For sites in which there is conflicting inventory data a cautionary note should be added to the categorization documentation. The higher inventory should be used for future excavation / remediation work to ensure prudent conservatism is built into the hazard analysis.</i></p>
	3.	If the activity has an initial categorization of < HC 3, and the remaining IWS criteria continue to be met, document the categorization as < HC 3 using Form B and Form E (attach or reference supporting information as necessary).
	4.	If the facility has an initial categorization of greater > HC 3, go to Section 5.2 to prepare a final hazard categorization.
	5.	Obtain independent review and approval of the activity hazard categorization.
	6.	Transmit the approved activity hazard categorization to the requesting activity manager.

## Facility Hazard Categorization and Change Management Process

### 5.4 Nuclear Safety Management and Change Management Process for < HC 3 Facilities

In order to maintain a < HC 3 categorization, the < HC 3 facilities must have:

(a) a process in place to ensure that the hazard categorization is revisited for any changes that may affect the approved hazard categorization controls or assumptions (see Section 5.4.1 below), and

(b) in the case of facilities with an initial categorization of 2 or 3 and a final hazard categorization of < HC 3 (based on adjusted values and assumptions for radionuclide form or dispersibility, segmentation, etc.), these facilities must have controls to maintain the conditions, parameters and assumptions that form the basis of the hazard categorization.

#### 5.4.1 Change Management Process for < HC 3 Facilities

The Change Management process ensures that proposed changes to < HC 3 facilities cannot increase the radioactive inventory or alter its form and distribution in a manner that would cause the HC 3 threshold to be exceeded (e.g. introduce a new energy source). The process applies a graded approach to protect the key assumptions underlying the hazard categorization to ensure that HC 3 threshold is not exceeded.

Proposed changes to a < HC 3 facility or work planned in areas contiguous to the facility may include plans, Work Packages, procedure changes, or facility modifications, for example. Most such changes are planned and conducted consistent with the planned operation of the facility as evaluated in the hazard categorization. Thus, proposed changes will typically have little or no potential to impact the facility hazard categorization. The Change Management process relies upon the Responsible Manager (RM) (or delegate) to identify instances where an impact might occur. Potential impacts are then reviewed by a Nuclear Safety qualified evaluator (QE) to determine whether there is an actual impact that would require an update to the hazard categorization (and possibly DOE approval) before the proposed action can take place.

The QE must be approved by the Director of Worker Protection (WP) and have intimate knowledge of the facilities FHC. The QE will be placed on the required reading list for both this document and the facilities FHC.

The QE must be sufficiently familiar with the controls and conditions/assumptions needed to protect the < HC 3 designation as documented in the compliance matrix to determine when there is potential for an impact warranting a formal evaluation.

**NOTE:** *Change Management process for hazard category 1, 2, and 3 nuclear facilities is the responsibility of the Hanford contractor who owns/operates the facility.*

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### 5.4.1.1 Screening

**NOTE 1:** *This process is applicable to proposed changes that are identified by the RM/delegate for QE review because they have the potential to impact the facility hazard categorization.*

**NOTE 2:** *Examples of changes that could potentially impact the hazard categorization or its SER include:*

- *Changes that could increase the radiological inventory of the facility or later an established Material at Risk (MAR) control process.*
- *Changes that introduce new radiological hazards or dispersive energy sources not previously evaluated for Final Hazard Categorization.*
- *Changes that affect any of the controls and conditions/assumptions needed to protect the < HC 3 designation as documented in the compliance matrix, including:*
  - *Changes that affect the facility MAR segmentation strategy where segmentation is credited for Final Hazard Categorization.*
  - *Changes that affect the facility MAR form and distribution or the applicable ARF\* RF as credited for Final Hazard Categorization.*

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
FM or Designee	1.	<p>Document the evaluation of changes in the facility design, processes, or procedures using the following process whenever the following conditions exist:</p> <ul style="list-style-type: none"> <li>• Change in the facility design, processes, or procedures that could affect the assumptions or constraints established in the Facility Final Hazard Categorization (e.g., modification of previously defined segmentation barrier, change in scope, introduction of a new activity within the defined facility),</li> <li>• Change in the radiological inventory or form and distribution of the inventory that could affect the hazard categorization basis.</li> <li>• New information (changes of discoveries with the potential to impact the hazard categorization) is identified.</li> <li>• Activities that may impact another facility (HC 3 or above).</li> </ul>
	2.	<p>REQUEST support from the QE and the Director of WP to aid in the determination/concurrence and document on <i>Form F</i>, A-6006-503, <i>Screening Review for the Change Management Evaluation</i>.</p>
	3.	<p>DO NOT PROCEED with the change until an evaluation permitting the activity is completed.</p>

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### 5.4.1.2 Evaluation of the Proposed Change

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
FM or Designee	1.	<p>Review the activity with the QE and/or the Director of WP to ensure that the following conditions do not exist:</p> <ul style="list-style-type: none"> <li>• Change in the facility design, processes, or procedures that could affect the assumptions or constraints established in the Facility Final Hazard Categorization (e.g., modification of previously defined segmentation barrier, change in scope, introduction of a new activity within the defined facility),</li> <li>• Change in the radiological inventory or form and distribution of the inventory that could affect the hazard categorization basis.</li> <li>• New information (changes of discoveries with the potential to impact the hazard categorization) is identified.</li> <li>• Activities that may impact another facility (HC 3 or above).</li> </ul>
QE & Director of WP	2.	Review the Change Management screening form and if all the answers are “NO” sign and date the screening form.
FM or Designee	3.	Place completed and signed screening forms in the project files and scan and place the document into IDMS. Send a copy to the Director of WP for the Worker Protection files.
	4.	If any answer is “YES”, then, cease all operations in and around the facility, place the facility in a safe and stable configuration, notify the Director of WP, Emergency Management and DOE-RL and then work with the Director of WP and DOE-RL to develop a path forward.

### 5.4.1.3 Evaluation of Discoveries

**NOTE:** Discoveries include the identification of any as-found state or new information, whether or not resulting from an event, which may invalidate the assumptions, defined in the hazard categorization for a < HC 3 facility.

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
FM or Designee	1.	IDENTIFY any discovery condition and evaluate via the Change Management process on <i>Form F</i> , A-6006-503 with concurrence from the QE and/or the Director of WP, viewing the discovery as if it were a proposed change.
	2.	IF all the answers are “NO” then the discovery condition is not significant and no further action is required.

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<i>Actionee</i>	<i>Step</i>	<i>Action</i>
	3.	If any answer is “YES”, then, cease all operations in and around the facility, place the facility in a safe and stable configuration, notify the Director of WP, Emergency Management and DOE-RL and then work with the Director of WP and DOE-RL to develop a path forward.

### 5.4.2 Nuclear Safety Controls for Final < HC 3 Facilities

**NOTE:** *Nuclear Safety controls for hazard category 1, 2 and 3 nuclear facilities are the responsibility of the Hanford contractor who owns/operates the facility.*

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
FM	1.	Select controls to maintain the conditions, parameters and assumptions that form the basis of the hazard categorization in accordance with 07-SED-0321, facilities with an initial categorization of 2 or 3 and a final hazard categorization of < HC 3 (based on adjusted values and assumptions for radionuclide form or dispersibility, segmentation, etc.) Examples of control topics provided in 07-SED-0321 are: <ul style="list-style-type: none"> <li>• Radionuclide inventory</li> <li>• Form of material</li> <li>• Dispersibility</li> <li>• Interaction with available energy sources</li> <li>• Segmentation</li> <li>• Nature of processes that may affect criticality safety assumptions</li> </ul>
	2.	Evaluate changes to these aspects (e.g., increase in material to be stored or processed, change in process, new sample data, change in how materials are contained, change in facility physical features) in accordance with Section 5.4.1 above.

## 6.0 FORMS

Form A, *Certification of Facilities Which Do Not Involve Radiological Sources*, A-6003-135

Form B, *Certification of Facilities/Activities with Radioactive Material Inventories in Quantities Less Than Category 3 Quantities*, A-6003-136

Form C, *Certification of Inactive Waste Sites, Defined to be Less Than Category 3*, A-6003-137

Form D, *Certification of Facilities with Radioactive Material Inventories, Defined to be Less Than Category 3, Based on Process Knowledge*, A-6003-138

Form E, *Radionuclide Baseline Inventory*, A-6003-139

Form F, *Change Management Evaluation Form*, A-6006-503

## Facility Hazard Categorization and Change Management Process

### 7.0 RECORD IDENTIFICATION

All records are generated, processed, and maintained in accordance with MSC-PRO-10588, *Records Management Processes*.

**Records Capture Table**

<b>Name of Document</b>	<b>Submittal Responsibility</b>	<b>Retention Responsibility</b>
Form A, <i>Certification of Facilities Which Do Not Involve Radiological Sources</i>	Facility Manager	Facility Manager
Form B, <i>Certification of Facilities/Activities with Radioactive Material Inventories in Quantities Less Than Category 3 Quantities</i>	Facility Manager	Facility Manager
Form C, <i>Certification of Inactive Waste Sites, Defined to be Less Than Category 3</i>	Facility Manager	Facility Manager
Form D, <i>Certification of Facilities with Radioactive Material Inventories, Defined to be Less Than Category 3, Based on Process Knowledge</i>	Facility Manager	Facility Manager
Form E, <i>Radionuclide Baseline Inventory</i>	Facility Manager	Facility Manager
Form F, <i>Change Management Evaluation Form</i>	Facility Manager	Facility Manager

### 8.0 REFERENCES

#### 8.1 Source References

Title 10, Code of Federal Regulations, Part 830 (10 CFR 830), *Nuclear Safety Management*

Title 10, Code of Federal Regulations, Part 30.72, Schedule C, *Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release*

RL Letter 02-ABD-0109, *Contract No. DE-AC06-96RL13200 - Transmittal of Memorandum "Supplemental Environmental Management (EM) Guidance for Implementing 10 CFR 830, Subpart B Safety Basis Requirements,"* June 26, 2002

DOE-STD-1027-92, *Change Notice 1, Hazard Categorization and Accident Analysis Techniques for compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, September 1997*

## Facility Hazard Categorization and Change Management Process

RL Letter 07-SED-0321, *Contract No. DE-AC06-96RL13200 – Department of Energy Standard 1027 Supplemental Guidance*, July 24, 2007

DOE Order 5480.30, Change Notice 1, *Nuclear Reactor Safety Design Criteria*, January 1993

DOE Order 420.1C, *Facility Safety*, December 2012

DOE G 420.1-1A, *Nonreactor Nuclear Safety Design Guide for use with DOE O 420.1C, Facility Safety*, December 2012

### 8.2 Working References

MSC-PRO-2243, *Identification, Reporting, and Tracking of Nuclear Safety and Worker Safety and Health Requirement Noncompliances*

MSC-PRO-10588, *Records Management Processes*

LA-12846-MS, *Specific Activities and DOE-STD-1027-92 Hazard Category 2 Thresholds*, LANL Fact Sheet, Los Alamos National Laboratory

LA-12981-MS, *Table of DOE-STD-1027-92, Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides*, LANL Fact Sheet, Los Alamos National Laboratory

RL Letter 03-ABD-0008, *Contract No. DE-AC06-96RL13200 - Hazard Categorization of Hanford Inactive Waste Sites*, October 18, 2002

RL Letter 03-ABD-0025, *Contract No. DE-AC06-96RL13200 - Approval of Hazard Categorization Procedure for Inactive Waste Sites (IWS)*, December 13, 2002

RL Letter 03-ABD-0052, *Contract No. DE-AC06-96RL13200 - Inactive Waste Sites Categorized Using EM-1 Guidance*, February 19, 2002

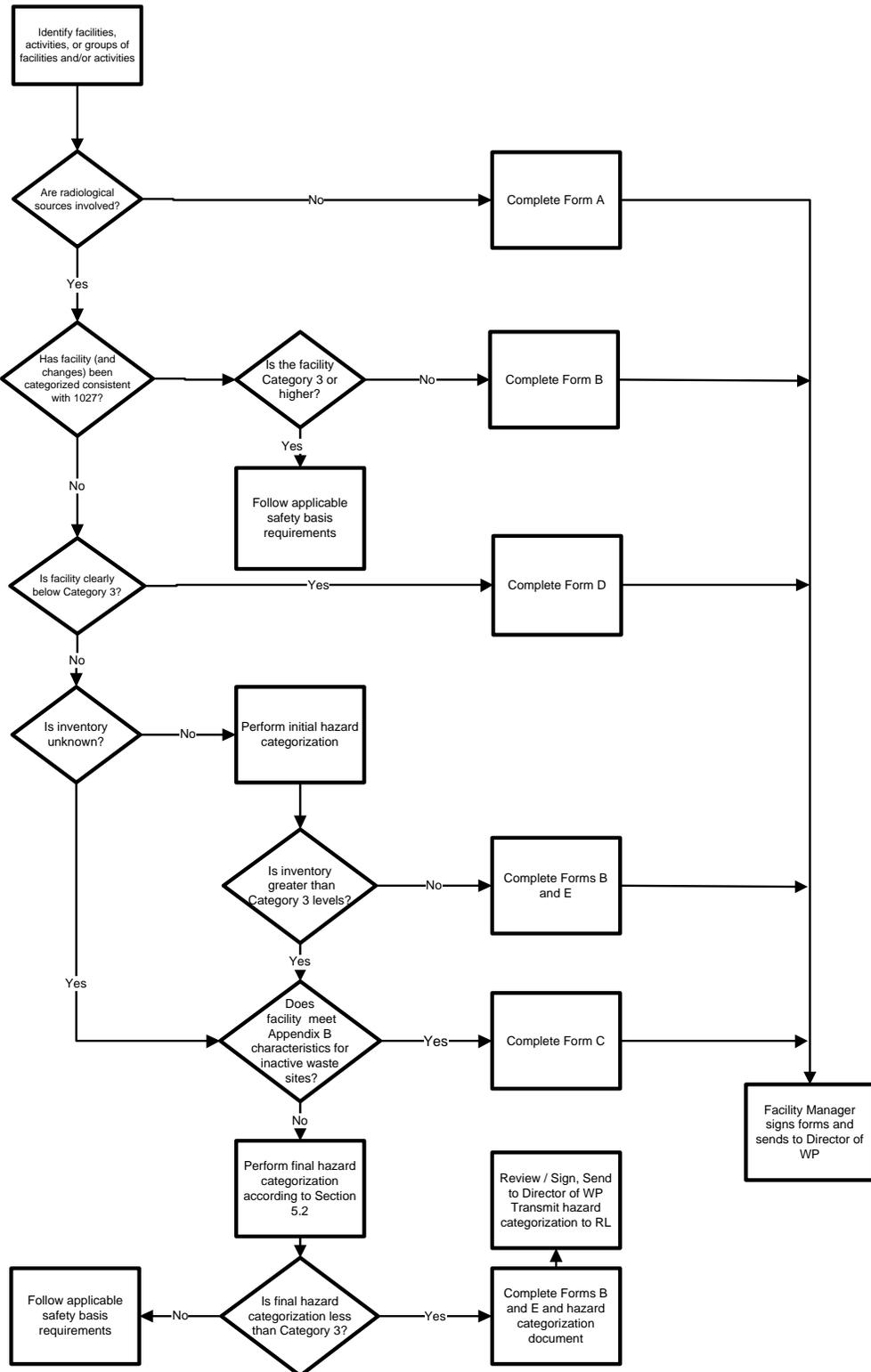
WHC-SD-GN-HC-20002, *Category 3 Threshold Quantities for Hazard Categorization of Nonreactor Facilities*, Westinghouse Hanford Company

10 CFR 835, *Occupational Radiation Protection*

NUREG 1140, *A Regulatory Analysis on Emergency. Preparedness for Fuel Cycle and Other Radioactive Material Licensees*

# Facility Hazard Categorization and Change Management Process

## APPENDIX A Hazard Categorization Process Flow



## Facility Hazard Categorization and Change Management Process

### APPENDIX B

#### Definition and Characteristics of Inactive Waste Sites Categorized as Below Category 3

In September 2002, a letter was issued by J. H. Roberson (received under RL Letter 03-ABD-0008). The letter stated that all DOE Office of Environmental Management (EM) inactive waste sites (IWS) which meet the following terms and conditions were to be documented and categorized as below hazard category 3 nuclear facilities.

DOE-RL has, by way of approving the terms and conditions within this appendix (RL Letter 03-ABD-0025), approved categorizations prepared in accordance with these terms and conditions. Therefore, this appendix is not to be altered without RL review and approval.

A. IWS – Waste sites covered with a soil or engineered barrier. The waste materials are in a general soil matrix as a result of liquid discharge or spill, legacy burial grounds, or are areas that contain contaminated equipment, tanks, pipes, or other items. There are no current work activities occurring at the IWS which could cause a release of the radioactive hazardous material.

The following items are specifically *not* included in the definition of IWS:

1. Above ground structures or containers.
2. Below-grade facilities/structures with human access or active provision of services (e.g., ventilation, electricity, steam).
3. Any intrusive activity of the inactive waste site (e.g., waste sampling, acceptance or retrieval activities).
4. Above-ground remediation activities for an inactive waste site (e.g., pump and treat facilities adjacent to an inactive waste site).
5. Evaporation ponds and sludges.
6. Waste sites that could contain fissile material such that there is the potential for a criticality hazard because of water intrusion or material rearrangement.

**NOTE:** *Section 3.1 of Attachment 3 of RL Letter 03-ABD-0008 presents arguments that a waste site does not have the potential for a criticality if the <sup>239</sup>Pu concentration is less than 2.5 g/L soil, and the <sup>235</sup>U concentration is less than 1.8 g/L soil. Waste sites that contain spent nuclear fuel rods or assemblies **do not** qualify as an IWS that is “below Category 3.”*

7. Waste sites that could contain explosives or chemicals that might react with sufficient energy to cause a significant release.

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**NOTE:** *Section 3.2 of Attachment 3 to RL Letter 03-ABD-0008 defines “sufficient energy to cause a significant release” as 5 lbs of Trinitrotoluene (TNT) equivalent. That is, waste sites that contain explosives or chemicals that could exothermically react with an energy release of the equivalent of 5 lbs of TNT or more **do not** qualify as an IWS that is below Category 3.*

8. Unvented tanks, unless demonstrated that there is no potential to exceed tank bursting limits due to over pressurization. (See Section 3.3 of Attachment 3 to RL Letter 03-ABD-0008).
- B. The overburden on the IWS provides an inherent control from release of hazardous materials, and the overburden is at least 3 feet in depth.
- C. The IWS is located on DOE property and is therefore not readily accessible to the public.
- D. Workers are precluded from conducting activities that may disturb the IWS through mechanisms provided by established work control systems (e.g., Automated Job Hazard Analysis (AJHAs), excavation permits, or radiation work permits).
- E. Radiological controls are provided at the IWS per 10 CFR 835, *Occupational Radiation Protection*.
- F. The IWS is being regulated under the Resource Conservation and Recovery Act (RCRA) and/or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

**NOTE:** *Once intrusive activities are commenced, the waste site no longer meets the description of an inactive waste site.*

- G. The IWS contains  $\leq 0.7$  g Pu per liter of soil.
  1. If there is no information present to indicate that the concentration might be greater than 0.7 g Pu/L soil, there is no need to further characterize. Discussion of the basis for that judgment may be used in place of actual data. The limit of 0.7 g Pu per liter of soil is based on the calculations provided in the J. H. Roberson letter (received under RL Letter 03-ABD-0008). The calculations looked at inadvertent intrusion into the Z-9 crib, which was judged to be the most contaminated waste site at Hanford. This judgment was based on the fact that the site contained plutonium (with americium), yielding a greater dispersed dose than that of strontium or uranium. The dose factor within the calculations was based on 0.7 g Pu/L and then rounded up to the nearest whole number.
  2. If there is information indicating the concentration might be greater than 0.7 g Pu per liter of soil in some places, the site may still qualify as an IWS if it can be demonstrated that:

## Facility Hazard Categorization and Change Management Process

- a. The site's Material at Risk (MAR) is bounded by the MAR of 9.6 kg <sup>239</sup>Pu in the Z-9 crib Inadvertent Ground Penetration scenario in Attachment 4 of RL Letter 03-ABD-0008, using bounding assumptions. This is allowable when the MAR is based on a lower volume of soil being disturbed or knowledge that the peak concentration is not present throughout the entire volume of disturbed soil.
- b. The fissile material concentrations are bounded by those cited in RL Letter 03-ABD-0008, Attachment 3, Section 3.1 (i.e., 2.5 g <sup>239</sup>Pu per liter of soil and 1.8 g <sup>235</sup>U per liter of soil).

# Facility Hazard Categorization and Change Management Process

## APPENDIX C

**Table A.1 Thresholds for Radionuclides**  
(From DOE-STD-1027-92, ATTACHMENT 1)

Isotope	Category 2 <sub>1</sub> Threshold		Category 3 <sub>2</sub> Threshold	
	Curies	Grams	Curies	Grams
H-3	3.0E+05	3.0E+01	1.6E+04*	1.6E+00*
C-14	1.4E+06	3.1E+05	4.2E+02	9.4E+01
Na-22	6.3E+03	1.0E+00	2.4E+02	3.8E-02
P-32	4.4E+03	1.5E-04	1.2E+01	4.2E-05
P-33	3.0E+04	1.9E-01	.4E+01	6.0E-04
P-32, acid**	2.2E+06	7.7E-02	1.2E+01	4.2E-05
P-33, acid**	1.5E+07	9.6E+01	9.4E+01	6.0E-04
S-35	2.5E+04	5.8E-01	7.8E+01	1.8E-03
Cl-36	1.4E+03	4.3E+04	3.4E+02	1.0E+04
K-40	4.7E+03	6.8E+08	1.7E+02	2.4E+07
Ca-45	4.7E+06	2.6E+02	1.1E+03	6.2E-02
Ca-47	4.8E+06	7.8E+00	7.0E+02	1.1E-03
Sc-46	1.4E+06	4.0E+01	3.6E+02	1.1E-02
Ti-44	3.2E+04	1.9E+02	6.2E+01	3.6E-01
V-48	3.0E+06	1.8E+01	6.4E+02	3.8E-03
Cr-51	1.0E+08	1.1E+03	2.2E+04	2.4E-01
Mn-52	4.0E+06	8.8E+00	3.4E+02	7.6E-04
Fe-55	1.1E+07	4.6E+03	5.4E+03	2.2E+00
Fe-59	1.8E+06	3.7E+01	6.0E+02	1.2E+02
Co-60	1.9E+05	1.7E+02	2.8E+02	2.5E-01
Ni-63	4.5E+06	8.0E+04	5.4E+03	9.5E+01
Zn-65	1.6E+06	1.9E+02	2.4E+02	2.9E-02
Ge-68	5.8E+05	8.8E+01	1.0E+03	1.5E-01
Se-75	3.4E+05	2.4E+01	3.2E+02	2.2E-02
Kr-85	2.8E+07	7.2E+04	2.0E+04	5.1E+01
Sr-89	7.7E+05	2.7E+01	3.4E+02	1.2E-02
Sr-90	2.2E+04	1.6E+02	1.6E+01	1.2E-01
Y-91	6.5E+05	2.7E+01	3.6E+02	1.5E-02
Zr-93	8.9E+04	3.6E+07	6.2E+01	2.5E+04
Zr-95	1.5E+06	6.9E+01	7.0E+02	3.3E-02
Nb-94	8.6E+04	4.6E+05	2.0E+02	1.1E+03
Mo-99	7.8E+06	1.6E+01	3.4E+03	7.1E-03
Tc-99	3.8E+06	2.3E+08	1.7E+03	1.0E+05
Ru-106	6.5E+03	1.9E+00	1.0E+02	3.0E-02
Ag-110m	5.3E+05	1.1E+02	2.6E+02	5.5E-02
Cd-109	2.9E+05	1.1E+02	1.8E+02	7.0E-02
Cd-113	1.8E+04	5.3E+16	1.1E+01	3.2E+13
In-114m	3.7E+05	1.6E+01	2.2E+02	9.5E-03
Sn-113	3.2E+06	3.2E+02	1.3E+03	1.3E-01
Sn-123	9.5E+05	1.2E+02	3.2E+02	3.9E-02
Sn-126	3.3E+05	1.2E+07	1.7E+02	6.0E+03
Sb-124	1.3E+06	7.5E+01	3.6E+02	2.1E-02
Sb-126	2.5E+06	3.0E+01	2.8E+02	3.4E-03
Te-127m	1.5E+05	1.6E+01	4.0E+02	4.2E-02
Te-129m	1.4E+05	4.7E+00	4.0E+02	1.3E-02
I-125	2.4E+03	1.4E-01	5.6E-01	3.2E-05
I-131	1.8E+03	1.4E-02	9.2E-01	7.4E-06
Xe-133	1.8E+06	9.6E+00	2.0E+04	1.1E-01

# Facility Hazard Categorization and Change Management Process

## APPENDIX C

**Table A.1 Thresholds for Radionuclides (cont.)**

(From DOE-STD-1027-92, ATTACHMENT 1)

Isotope	Category 2 <sub>1</sub> Threshold		Category 3 <sub>2</sub> Threshold	
	Curies	Grams	Curies	Grams
Cs-134	6.0E+04	4.6E+01	4.2E+01	3.3E-02
Cs-137	8.9E+04	1.0E+03	6.0E+01	6.9E-01
Ba-133	4.0E+06	1.6E+04	1.1E+03	4.3E+00
Ba-140	7.8E+06	1.1E+02	6.0E+02	8.2E-03
Ce-141	3.3E+06	1.2E+02	1.0E+03	3.5E-02
Ce-144	8.2E+04	2.6E+01	1.0E+02	3.1E-02
Pm-145	1.1E+06	7.6E+03	2.0E+03	1.4E+01
Pm-147	8.4E+05	9.0E+02	1.0E+03	9.5E-01
Sm-151	9.9E+05	3.7E+04	1.0E+03	3.8E+01
Eu-152	1.3E+05	7.5E+02	2.0E+02	1.2E+00
Eu-154	1.1E+05	4.2E+02	2.0E+02	7.6E-01
Eu-155	7.3E+05	1.6E+03	9.4E+02	2.0E+00
Gd-153	1.4E+06	3.9E+02	1.0E+03	2.8E-01
Tb-160	1.3E+06	1.1E+02	5.6E+02	5.0E-02
Ho-166m	4.0E+04	2.2E+04	7.2E+01	4.0E+01
Tm-170	1.2E+06	2.1E+02	5.2E+02	8.7E-02
Hf-181	2.2E+06	1.3E+02	7.6E+02	4.5E-02
Ir-192	1.2E+06	1.3E+02	9.4E+02	1.0E-01
Au-198	9.3E+06	3.8E+01	2.0E+03	8.2E-03
Hg-203	4.3E+05	3.1E+01	3.6E+02	2.6E-02
Pb-210	2.2E+03	2.9E+01	3.6E-01	4.7E-03
Bi-207	2.2E+06	4.3E+04	5.0E+02	1.1E+01
Bi-210	1.5E+05	1.2E+00	3.2E+02	2.6E-03
Po-210	3.5E+02	7.8E-02	1.9E+00	4.2E-04
Rn-222	1.6E+08	1.1E+03	1.0E+01	6.5E-05
Ra-223	3.8E+03	7.4E-02	6.2E+01	1.2E-03
Ra-224	9.9E+03	6.1E-02	2.0E+02	1.2E-03
Ra-225	3.8E+03	9.6E-02	7.2E+01	1.8E-03
Ac-225	2.9E+03	4.9E-02	3.2E+01	5.5E-04
Ac-227	4.3E+00	5.9E-02	4.2E-02	5.8E-04
Th-228	9.2E+01	1.1E-01	1.0E+00	1.2E-03
Th-230	8.9E+01	4.4E+03	6.2E-01	3.1E+01
Th-232	1.8E+01	1.6E+08	1.0E-01	9.1E+05
U-233	2.2E+02***	2.3E+04***	4.2E+00	4.4E+02
U-234	2.2E+02	3.5E+04	4.2E+00	6.7E+02
U-235	2.4E+02***	1.1E+08***	4.2E+00	1.9E+06
U-238	2.4E+02	7.1E+08	4.2E+00	1.3E+07
Np-237	5.8E+01	8.3E+04	4.2E-01	6.0E+02
Np-238	9.1E+05	3.5E+00	1.3E+03	5.0E-03
Pu-238	6.2E+01	3.6E+00	6.2E-01	3.6E-02
Pu-239	5.6E+01***	9.0E+02***	5.2E-01	8.4E+00
Pu-241	2.9E+03	2.8E+01	3.2E+01	3.1E-01
Am-241	5.5E+01	1.6E+01	5.2E-01	1.5E-01
Am-242m	5.6E+01	5.8E+00	5.2E-01	5.3E-02
Am-243	5.5E+01	2.8E+02	5.2E-01	2.6E+00
Cm-242	1.7E+03	5.1E-01	3.2E+01	9.7E-03
Cm-245	5.3E+01	3.1E+02	5.2E-01	3.0E+00
Cf-252	2.2E+02	4.1E-01	3.2E+00	5.9E-03

# Facility Hazard Categorization and Change Management Process

## APPENDIX C

### Table A.1 Thresholds for Radionuclides (cont.)

(From DOE-STD-1027-92, ATTACHMENT 1)

#### NOTES:

- 1 *For isotopes not listed below, users may refer to LA-12846-MS, Specific Activities and DOE-STD-1027-92 Hazard Category 2 Thresholds, LANL Fact Sheet or to 10 CFR 30.72, Schedule C and adjust the values consistent with the X/Q value described in Attachment 1 of this Standard. (Note that although LA-12846-MS misstates the Category 2 threshold criterion, its use of the proper X/Q negates any effect of the misstatement. See Radiological Criteria, p A-3 and Meteorological Conditions, p A-7 of DOE-STD-1027-92 for clarification) Any other beta-gamma emitter -  $4.3E+05$  Ci Mixed fission products -  $1.0E+03$  Ci Any other alpha emitter -  $5.5E+01$  Ci*
- 2 *For isotopes not listed below, users may refer to LA-12981-MS, Table of DOE-STD-1027-92 Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides, LANL Fact Sheet for threshold quantities of any isotopes of interest.*
- \* *At the recommendation of the Tritium Focus Group, the Category 3 tritium threshold value has been increased from  $1.0E+03$  Ci and  $1.0E-01$  grams to  $1.6E+04$  Ci and  $1.6E+00$  grams, consistent with the methodology of EPA used for the other nuclides.*
- \*\* *Provided as an example to indicate that when a substance such as  $^{32}\text{P}$  is used in a solution (i.e., phosphoric acid) for experimentation, medical treatment, etc., it should no longer be considered as highly volatile/combustible.*
- \*\*\* *To be used only if segmentation or nature of process precludes potential for criticality. Otherwise, use the criticality lists for  $^{233}\text{U}$ ,  $^{235}\text{U}$  and  $^{239}\text{Pu}$  of 500, 700, and 450 grams, respectively.*

## Facility Hazard Categorization and Change Management Process

### APPENDIX D – Definitions

**New Facility** - A DOE nuclear facility that does not qualify as an existing facility.

**Nuclear Facility** - Reactor and nonreactor nuclear facilities.

**Nuclear Safety** - Those aspects of safety that encompass activities and systems that present the potential for uncontrolled releases of fission products or other radioactive materials to the environment or for inadvertent criticality.

**Radiological Facility** – A facility that does not meet or exceed hazard category 3 threshold criteria published in DOE-STD-1027-92, but still possesses some amount of radioactive material below the threshold values of Appendix C of this document.

**Safety Basis** - A combination of information relating to the control of hazards at a nuclear facility (including design, engineering analyses, and administrative controls) upon which DOE depends for its conclusion that activities at the facility can be conducted safely.