

DECOMMISSIONING GUIDANCE
FOR
RADIOACTIVE MATERIALS LICENSEES

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ILLINOIS EMERGENCY MANAGEMENT AGENCY
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DECOMMISSIONING GUIDANCE FOR RADIOACTIVE MATERIALS LICENSEES

PURPOSE AND SCOPE

The Illinois Emergency Management Agency, Division of Nuclear Safety (Agency) has developed this document to provide general guidance to licensees to prepare for license termination, or partial release of facility or grounds. It is vital that the licensee understands the regulations governing license termination, and to have a familiarity with the other documents referenced here to facilitate the process. This document references these regulations and provides references to other documents that will assist in the process of license termination.

The purpose of this document is to provide general guidance—not prescriptive guidance—for decontamination and decommissioning leading up to license termination. This guidance document is not a substitute for the regulations. **The burden of proof is on the licensee to demonstrate the regulatory standards have been met to support license termination.** In addition, a determination based on the scope of work, of what field measurements and documentation are needed to assure the facility and grounds are suitable for release for unrestricted use are proposed by the licensee for Agency approval. Some of the Illinois regulations that are applicable to terminations are listed in Appendix A. In addition, this appendix includes Section 330.325 “Termination Requirements for Specific Licenses and Locations of Use” and Section 340, Appendix A “Decontamination Guidelines” for the user’s convenience.

DEFINITIONS

Decontamination and Decommissioning (D & D) is the process of the removal of radioactive contamination from facility buildings and grounds that result in release for unrestricted use of the facility and grounds upon completion. The process discussed herein applies for release of parts of a facility as well as the final release of the entire facility.

Dose- Based Release Criteria are release criteria derived from a radiation dose limit. This is calculated using computer models that take into consideration site-specific land use, population, weather, soil type, groundwater use, depth to groundwater, contaminant depth, etc.

Final Status Survey (FSS) is the measurements and sampling to describe the radiological conditions of a site, following completion of decontamination activities (if any) in preparation for release. A FSS report is prepared containing this and other information and submitted to the Agency for review. At this point the Agency determines if all steps taken by the licensee to achieve license termination are sufficient. The Agency may choose to conduct confirmatory measurements to determine if the licensee's information is adequate to demonstrate the site is acceptable for release for unrestricted use.

Historical Site Assessment is an examination of past uses of a facility and its grounds to determine the potential need for decontamination and decommissioning. It can be based on records, drawings, personnel interviews, etc. It is used to identify areas of potential contamination or on-site disposals, and also to remove these types of issues from further consideration.

License Termination is the process of releasing the licensee from the requirements of the regulations with the termination of the license.

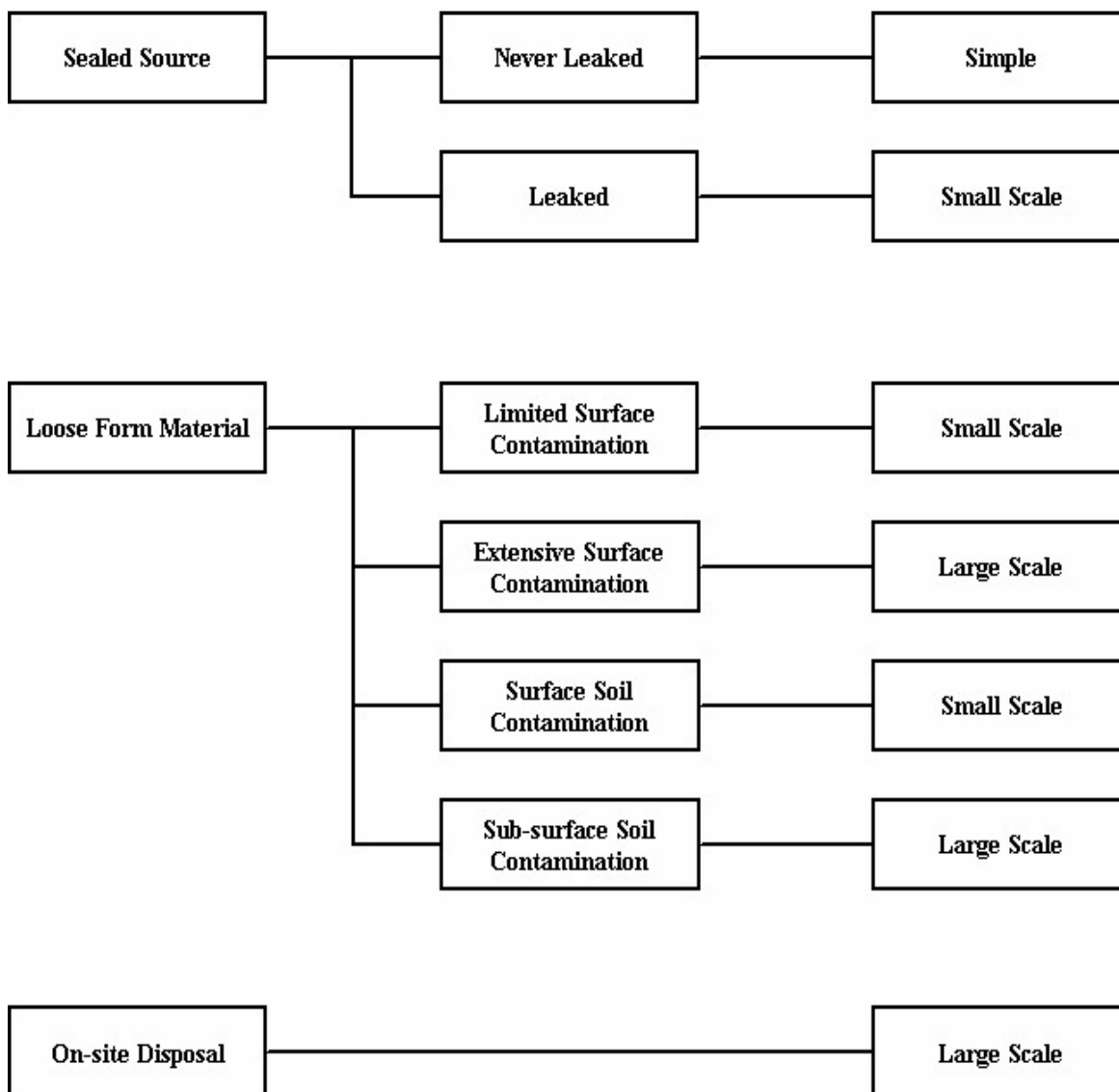
Release Criteria is the concentration or level of contamination allowed to remain after decontamination that allows a licensee to release an object, item, building, or land area from a radioactive materials license.

Unrestricted release means the return of the facility and grounds to background levels or the levels outlined in 32 Illinois Administrative Code 330.325b)1)B. A reference to the regulations and further information is included in Appendix A of this guidance document.

GRADED APPROACH

The Agency uses a graded approach to decontamination and decommissioning (D&D) projects. The simplest project would involve a licensee that only used sealed sources. A small-scale project would typically be a licensee that used sealed sources and relatively small amounts of loose material. A large-scale project will have used large amounts of loose material. Past practices, undocumented uses, the length of time radioactive material was used, the presence of un-remediated spills, and the possibility of historical on-site disposal all serve as complicating factors in this graded approach. Figure 1 shows a simplified decision tree for determining the level of decommissioning complexity. The degree of complexity for a given project corresponds to differing levels of Agency involvement and oversight. **In many cases a license amendment is necessary to authorize the decommissioning activities.**

Figure 1 - Decommissioning Project Classification



The Agency endorses a risk-informed, performance-based approach to the demonstration of compliance with radiological criteria for decommissioning and license termination. The primary remedial objective is a dose-based cleanup standard of 25mrem plus ALARA (as low as reasonably achievable) to release a site, facility or area for unrestricted use. Adopting the ALARA principle is a key component and goals should be established early in the decommissioning planning stage so that measured results

could be demonstrated. A dose-based cleanup criterion is subject to Agency approval and should be established prior to initiating remedial activities. Further explanations about release standards are provided in a following section of this guidance.

A licensee may request a Location of Use partial license termination in which a specific room, building, or use address is removed from a license, or full license termination in which the entire license is terminated. In either case the area, facility or grounds must be demonstrated as releasable for unrestricted use.

In other instances the licensee may be selling the facility to another licensee or license applicant that is willing to take responsibility for some on-site contamination and only limited decommissioning may be necessary. All records concerning surveys, wipe tests, quality control, past spill cleanup, and levels of residual fixed and removable contamination, including methods and sensitivity used for determining ambient radiation levels must be provided.

As described below, certain decommissioning activities require the preparation of a decommissioning plan that requires review and approval by the Agency. These decommissioning plans are required for facilities that possessed and or used loose form radioactive material with half-lives greater than 275 days in quantities greater than 1000 times the exempt quantity value found in 32 Illinois Administrative Code (IAC) 330.Appendix B or possessed or used loose form radioactive material (in any quantity) that is not listed in 32 IAC 330.Appendix B.

If the facility possessed or used loose form radioactive material with multiple radionuclides, then the sum of the fractions rule applies. If the sum of the fractions is greater than or equal to 1, then a decommissioning plan must be prepared and reviewed and approved by the Agency. The following equation can be used to calculate the sum of the fractions:

$$\sum_{x=1}^n \frac{A(x)}{1000Q(x)} \geq 1$$

where:

n is the number of different radionuclides,
A(x) is the amount of loose form radioactive material for radionuclide x, and
Q(x) is the 32 IAC 330.Appendix B exempt quantity amount.

Simple Projects

A licensee that only used sealed sources of radioactive material is the simplest type of D&D. The licensee must review past practices (historical site assessment) to ensure that only sealed sources were used during the course of licensed activities. The licensee must demonstrate that the sources have been properly transferred to licensed recipients, and prove that all periodic leak tests were negative. The licensee must submit a completed form KLM.007 (see Appendix B) along with documentation of the above listed steps.

If there were any positive leak tests, the work area, facility, and possibly even the grounds may need to be surveyed for contamination, depending on the extent of the leak. Documentation must be provided as to how the leak was dealt with, and what remedial action was taken. Essentially, if there were positive leak tests, the simple project is upgraded to a small scale one. In some cases, an Agency representative may visit the licensee, prior to termination, to perform an inspection and conduct independent surveys including sampling. The Agency will review all necessary documentation, and upon determining that the information provided is adequate, will terminate the license.

Small Scale Projects

Small-Scale projects involve the use of limited amounts of loose radioactive material and consequently, potential contamination of work areas, buildings, and grounds are a concern. These projects may also have used sealed sources. Involving Agency staff in the planning to decommission this type of project is highly recommended. Experience has shown that an early dialog with Agency personnel facilitates the project, clarifies expectations, and resolves licensee questions prior to remedial actions.

The licensee must review past practices (historical site assessment) to ensure that only activities and radionuclides authorized on the license were used. For example, long-standing licensees may have revised their process and changed radionuclides, such that the isotopes listed on the current license may not be the only ones used by the licensee in the past. A full license termination will need to take all radionuclides into consideration. The licensee will need: to demonstrate that sealed sources have been properly transferred to licensed recipients; to prove that all periodic leak tests of these sources were negative; and that all wastes were disposed of properly.

A final status survey is performed to determine the extent of residual contamination, if any, remaining on the buildings or grounds. A final status report and completed form KLM.007 (see Appendix B) is prepared and submitted to the Agency for

review. Depending on the nuclides, form of material used, and completeness of the information provided in the final status report, an Agency representative may visit the licensee to perform an inspection and conduct confirmatory surveys and sample collection. The Agency will review all necessary documentation, and upon determining that the information provided is adequate, will terminate the license.

If there are elevated levels of contamination on work areas, buildings, or grounds, a characterization survey will be required, followed by remediation of the contamination to the release criteria established by regulations or other criteria established by the Agency. Depending on the degree of contamination, surficial soil sampling, sampling at depth (via boreholes), and possibly ground water sampling or monitoring may be required. This level of effort essentially transforms a small-scale project into a large-scale project. Early involvement of Agency personnel will ensure that required information is collected up front and is reviewed for adequacy on a periodic basis.

Large Scale Projects

Large-Scale projects always require advanced notification, preferably 90 to 120 days, and submission of a work plan to the Agency. This contact develops an interactive and cooperative relationship between the Agency and the licensee to assure that the planning and completion of decommissioning is cost effective and timely. The Agency will have personnel visit periodically or may have a continuous on-site presence during D&D activities. Agency personnel may inspect and confirm remedial activity several times during the project, rather than waiting until licensee activities are complete.

The Agency will review the licensee's plans and schedule prior to authorizing activities to proceed. The Agency will evaluate the licensee's commitment to meet 32 Ill. Adm. Code 340, Appendix A, Decontamination Guidelines (see Appendix A of this guidance document), and to meeting 32 Ill. Adm. Code 330.325 b)1)B)ii) plus ALARA should that become necessary. The Agency requires that the D&D activities are conducted in accordance with a verification framework using either *NUREG 5849, Manual for Conducting Radiological Surveys in Support of License Termination*, or *NUREG 1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, or a reasonable combination thereof.

In addition to the commitments above, a minimum of the following information is also required:

1. A review of the license history is necessary to help determine all the radioactive materials that may have been used and the locations of use during the full life of the license (Historical Site Assessment);
2. A brief description of the site, the extent of the contamination (as it is currently known), and whether the cleanup is expected to extend into groundwater or offsite (a characterization survey provides this information);
3. A complete description of any additional contaminants of concern, that are not included in the radioactive materials license; examples include non-licensed radioactive material, chemical or biological contaminants, etc. Submittal of non-radiological information to the Agency does not relieve the licensee of other regulatory requirements (e.g. EPA, etc. for remedial actions of those contaminants).
4. A brief description of the D&D project, as it is currently envisioned, including the use of contractors or subcontractors and their respective roles (Decommissioning Plan);
5. A project management organization chart;
6. For large scale projects, the Agency will require a Quality Assurance Project Plan (QAPP), a Health and Safety Plan (HASP), and a plan for survey and sampling to verify remedial objectives, including procedures and instrumentation proposed;
7. An itemized cost estimate for the project; and,
8. A proposed schedule for the project showing the phases of work and identifying interim documentation submittals.

Together, the above elements constitute the scope of a decommissioning plan. Depending on the size and complexity of the project, refinements to the above activities may be warranted as well as additional actions, i.e. further characterization data may be required over the course of the project. An example Table of Contents for a Decommissioning Work Plan is provided in Appendix C. Not all elements may be appropriate for an individual location or facility.

IMPORTANT CONSIDERATIONS

There are several factors that should be considered when planning a decontamination and decommissioning project. Some of these include regulatory timelines, release standards that can be prescriptive or dose-based, cost recovery for oversight and review of decommissioning projects by the Agency and financial assurance. In addition, guidance on assessments and selected remedial actions has been provided. Each of these factors is discussed below.

Timeliness in Decommissioning

Although a licensee may still be operating, conditions may warrant the termination of activities in a particular area. If this should occur, the licensee has certain obligations to decontaminate this area. Agency regulations require licensees to notify the Agency when licensed activities involving radioactive materials have not occurred for a period of two years. Detailed requirements regarding this notification and other requirements are included in *32 Ill. Adm. Code 330.310 i*).

It is still important that a licensee contact the Agency to assist in the planning process even if the decontamination takes place prior to the 2-year limit specified in the regulations.

Release Standards

Agency regulations require that decontamination and decommissioning of facilities and grounds be completed to a level that is acceptable for release for unrestricted use.

Requirements for obtaining termination of a specific license, removal of a site or locations of use from a specific license are found in IL. Adm. Code 330.325. Flexibility in demonstrating that levels of radioactive contamination are acceptable for unrestricted use is provided in 330.325b)1)B. A licensee may demonstrate that radioactive contamination is removed to levels outlined in 32 IL Adm. Code 340 Appendix A. For certain licensed uses of radioactive materials, these limits can be easily demonstrated through surveys and sampling and the more time consuming and costly risk assessment and dose modeling can be avoided. Appendix A decontamination guidelines are considered ALARA.

If the above decontamination guidelines cannot be achieved, the Agency will consider a dose based standard on any residual radioactive contamination as long as the residual radioactive contamination, excluding radon, thoron and their progeny, that is distinguishable from background radiation results in a TEDE (total effective dose equivalent) to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to ALARA. The licensee must make every effort to go as low as possible below this dose-based limit. In other words, if a licensee was to demonstrate that the facility and/or grounds meet the dose standard of 25 mrem (0.25 mSv) with no attempt at any type of decontamination and no justification on why a lower limit should not be used, the Agency will not approve this request.

For decommissioning projects involving contamination from source material or radium, exposure due to radon and thoron and their progeny must be included. The Agency will give consideration to values suggested by the licensee for radon and thoron and their progeny if justification with proper documentation is submitted to the Agency for review.

More information on dose-based standards and the approach necessary to determine the information required for the Agency's review can be found in NUREG 1757, *Consolidated NMSS Decommissioning Guidance, Volumes 1, 2, and 3*. The Agency will give consideration to acceptance of the screening values in this NUREG on a case-by-case basis. These screening values are not regulatory limits or cleanup standards and must be justified by verifiable assumptions on the foreseeable future use of the facility or property. Topography, meteorology, hydrology, land use (current and projected), and population density all come into play.

Full Cost Recovery

Illinois regulations (32 Ill Adm. Code 331.120(f)) allow for the Agency to assess full cost fees for Agency confirmatory measurements and assessment of decommissioning and decontamination activities associated with the termination of a license or use of a site. This includes hourly labor rates and sample analysis costs. The applicable hourly labor rate is defined in the regulations. The Agency normally bills the licensee after decommissioning activities have been completed and must receive payment before a license is terminated. For large-scale projects with extended completion schedules, the Agency may bill on a quarterly basis.

Financial Assurance

Part 326, Financial Assurance Requirements, of 32, Ill Adm. Code, prescribes requirements for ensuring that certain specific and general licensees, including applicants for licensure, have sufficient funds to reclaim properties. The cost estimate prepared pursuant to this decontamination and decommissioning process becomes the new cost estimate for financial assurance purposes. Agency rules do not allow draw down of the financial assurance amount. The Agency may allow reduction in the required financial assurance if a long term, phased decommissioning action is authorized and a revised Decommissioning Plan and Cost Estimate is submitted and approved by the Agency. The Agency will release all financial assurance arrangements upon termination of the license.

For more information on financial assurance requirements, the *Guidance Document on Financial Assurance* is available from the Agency or it can be found on the Agency's Web site at <http://www.state.il.us/iema/radiation/pdf/fassur.pdf>.

Use of Consultants and Contractors

Hiring trained radiation professionals is paramount to achieving a successful, cost effective site cleanup. There are a limited number of consultants with radiological site decommissioning experience and, fewer contractors with a thorough understanding of the field surveying and sampling techniques necessary to demonstrate areas with residual radioactive contamination has been effectively remediated. Upon request, the Agency can provide a list of firms familiar with the requirements and practices for radiological cleanups.

Guidance for Selected Remedial Actions

The Agency has developed some directives resulting from various requests made by licensees during D&D projects.

- The Agency may allow intentional mixing of contaminated soils to take advantage of waste acceptance criteria that results in more favorable, cost effective disposal options. Mixing of clean soils with contaminated is not allowed to meet waste acceptance criteria—only higher and lower concentrations of contaminated material can be used for mixing. Intentional mixing of contaminated soils should not result in an increase in waste volume beyond a nominal bulking factor of +/- 10%.

- All contaminated materials removed from excavations are considered waste and cannot be used for backfill. Materials diluted through the excavation removal process must be handled as waste.
- Clean overburden may be used as onsite backfill provided verification surveys and, if necessary, sampling is performed. The Agency may choose to perform confirmatory measurements before authorizing the use of material for backfill.
- The Agency will consider realistic exposure scenarios for determining a dose-based cleanup standard (foreseeable use over the next few decades) for meeting decommissioning criteria. As an example, the resident farmer scenario is not practical if the area will likely be used for industrial expansion. However, additional modeling may be required to assure the public dose limit of 100 mrem (1.0 mSv) will not be exceeded should unforeseeable intrusion occur.

DECOMMISSIONING PROCESS

The Agency has no prescribed method a licensee must follow to demonstrate the requirements in Section 330.325 have been met to terminate a license. Licensees are encouraged to contact the Agency when a decision is made to terminate a license. At that time the Agency can indicate what actions the licensee must take and determine how much involvement it will have in the licensee's overall decommissioning process. For example, for simple projects as described above, the Agency will indicate the documentation the licensee must have before the Agency can terminate the license. Once this documentation has been submitted, reviewed and approved by the Agency and any outstanding fees have been paid, the license may be terminated. For small and large-scale projects that include the use of loose material, the licensee will also have to submit a final status survey (FSS) report for Agency review and approval. Ill. Adm. Code 330.325 outlines the measures licensees must take to document license termination activities. When all the information has been examined and accepted, the Agency will determine if confirmatory surveys and/or sampling is necessary. Once the Agency has determined that all regulations have been met, the license will be terminated or a specific area released for unrestricted use.

Final Status Survey

The final status survey (FSS) is the verification process that includes the measurements and sampling to describe the radiological conditions of a site, following

completion of decontamination activities (if any) in preparation for release. Upon completion of the FSS, a report is prepared containing the results of the FSS and other information and submitted to the Agency for review. The report should include the process the licensee performed in conducting the survey. Information the Agency requires in the FSS report includes, but is not limited to:

- Site description
- License history
- Impacted areas and systems
- Applicable maps and detailed drawings
- Equipment and Instrumentation used
- Release criteria including ALARA goals
- Remedial actions
- Waste Management and Disposal
- Verification survey & sampling protocol
- Sampling analysis and measurement results
- Data Validation procedures

Agency Post-Remedial Report

The Agency may prepare a post-remedial report that outlines the evaluation of licensee documents submitted to demonstrate remedial actions support license termination and the confirmatory activities conducted by Agency personnel. Upon request, a copy of this report will be provided to the licensee.

CONTACT

Questions regarding the process, the licensee or his representative may contact the Manager of LLRW and Site Decommissioning, Bureau of Environmental Safety at (217) 782-1329 or the Manager of Radioactive Materials, Bureau of Radiation Safety at (217) 785-9947. Correspondence may be addressed to either representative at 1035 Outer Park Drive, Springfield, Illinois 62704.

REFERENCES

Illinois Administrative Code / Title 32 / Chapter II: Illinois Emergency Management Agency. Available at <http://www.state.il.us/iema/legal/regs/radmatl.asp>.

Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575 or EPA 402-R-97-016. Available at <http://www.epa.gov/radiation/marssim/obtain.htm>.

Manual for Conducting Radiological Surveys in Support of License Termination, NUREG/CR-5849, Draft. Available at http://www.ornl.gov/busops/ivhp/survey-projects/additional_guidance_5849.htm.

U.S. Nuclear Regulatory Commission (NRC), NUREG-1757, Volumes 1, Rev. 2, Consolidated Decommissioning Guidance: Decommissioning Process for Materials Licensees, September 2006

U.S. Nuclear Regulatory Commission (NRC), NUREG-1757, Volume 2, Rev.1, Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria, September 2006

U.S. Nuclear Regulatory Commission (NRC), NUREG-1757, Volume 3, Consolidated NMSS Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness, September 2003

Appendix A – Partial List of Applicable Illinois Rules

The following regulatory requirements must be satisfied to terminate licenses when decontamination and decommissioning activities are involved. While this list will help the licensee to understand the scope of decommissioning regulations, the Agency recommends that the licensee consult the full volume of regulations or a consultant who can advise you on your specific use of licensed materials.

32 Illinois Administrative Code Parts:

- 310: General Provisions for Radiation Protection
- 330: Licensing of Radioactive Material (32 Ill. Adm. Code 330)
- 331: Fees for Radioactive Material Licenses
- 340: Standards for Protection Against Radiation
- 400: Notices, Instructions, and Reports to Workers; Inspections

Codes of Federal Regulation 49 CFR 172 & 173, that establish requirements for Placarding and Transportation, respectively, may also be relevant to the removal and disposal of contaminated materials from your site.

Section 330.325 Termination Requirements for Specific Licenses and Locations of Use

- a) To lawfully obtain termination of a specific license or a location of use, each licensee shall meet the requirements of this Section no later than the end of the expiration date on the specific license or on any applicable amendment to the specific license unless the licensee has filed an application for renewal in accordance with Section 330.320(a) of this Part prior to the expiration date.

AGENCY NOTE: If the licensee has filed a renewal application in accordance with Section 330.320(a) of this Part and the Agency subsequently denies the application, the Agency shall, in an order issued to the licensee in accordance with the Act, the Illinois Administrative Procedure Act [5 ILCS 100] and 32 Ill. Adm. Code 200, specify the time by which the licensee must meet the requirements of this Section.

- b) Requirements for Obtaining Termination of a Specific License, Removal of a Site or Location of Use from a Specific License
 - 1) The licensee shall:
 - A) Cease use of radioactive material;

- B) Remove radioactive contamination to levels considered acceptable for unrestricted use. A site will be considered acceptable for unrestricted use when:
- i) Radioactive contamination is removed to levels outlined in 32 Ill. Adm. Code 340.Appendix A; or
 - ii) The residual radioactivity, excluding radon, thoron and their progeny, that is distinguishable from background radiation does not result in a total effective dose equivalent (TDE) to an average member of the critical group that exceeds 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels that are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal;
- C) Properly transfer and/or dispose of radioactive material;
- D) Submit a completed Agency Form KLM.007 (Certificate Termination and Disposition of Radioactive Material) or provide equivalent information;
- E) For licensees authorized to possess sealed sources, submit evidence of transfer and/or disposal of all sealed sources authorized on the license and a copy of the most recent leak test; and
- F) For licensees authorized to possess radioactive material in forms other than sealed sources, submit a radiation survey report to confirm the absence of radioactive materials or to establish the levels of residual radioactive contamination, unless the licensee demonstrates the absence of residual radioactive contamination in some other manner. The radiation survey report shall specify the date of the survey and the instrumentation used and shall certify that each instrument was properly calibrated and tested. The licensee shall, as applicable, report levels or quantities of:
- i) Beta and gamma radiation at 1 centimeter from surfaces in units, multiples, or subunits of Sieverts or rem per hour;
 - ii) Gamma radiation at 1 meter from surfaces in units, multiples, or subunits of Sieverts or rem per hour;

- iii) Removable radioactivity on surfaces in units, multiples, or subunits of Becquerels or Curies per 100 square centimeters of surface area, or in disintegrations (transformations) per minute per 100 square centimeters of surface area;
 - iv) Fixed radioactivity on surfaces in units, multiples, or subunits of Becquerels or Curies per 100 square centimeters of surface areas or in disintegrations (transformations) per minute per 100 square centimeters of surface area;
 - v) Radioactivity in contaminated liquids, such as water, oils or solvents, in units, multiples, or subunits of Becquerels or Curies per milliliter of volume; and
 - vi) Radioactivity in contaminated solids, such as soils or concrete, in units, multiples, or subunits of Becquerels or Curies per gram of solid.
- 2) If no residual radioactive contamination attributable to activities conducted under the license is detected, the licensee shall submit a certification that no detectable radioactive contamination was found.
- 3) If detectable levels or residual radioactive contamination attributable to activities conducted under the license are found, the licensee shall:
- A) In addition to the information submitted under subsections (b)(1)(D) and (b)(1)(F) of this Section, submit for Agency approval a plan for reclaiming the facility, including decontamination and removal of residual radioactive contamination;
 - B) Limit actions involving radioactive material to those approved under the decontamination plan in subsection (b)(3)(A) of this Section;
 - C) Continue to control entry to restricted areas until they are suitable for release for unrestricted use; and
 - D) Implement and complete the plan approved under subsection (b)(3)(A) of this Section.
- c) When a licensee ends activities authorized under a specific license and has met the termination requirements of subsection (b) of this Section, the licensee shall

immediately notify the Agency in writing and request that the license be terminated. This notification and request for termination shall include the documents required by subsection (b) of this Section and shall otherwise substantiate that the licensee has met all of the requirements in subsection (b) of this Section.

- d) After receiving a request for license termination pursuant to subsection (c) of this Section, the Agency shall confirm, through such inspections and record reviews as may be necessary, that the licensee has met the requirements of subsection (b) of this Section. Upon confirmation, the Agency shall issue an amendment to terminate the licensee. Until issued the termination amendment, the licensee shall maintain a valid specific license in accordance with Section 330.320 of this Part.
- e) A licensee who fails to comply with the pertinent requirements of this Section shall be subject to such civil penalties and sanctions as may be appropriate in accordance with the Act and 32 Ill. Adm. Code 310. The passing of the expiration date shall not relieve the licensee of the duties and responsibilities of applying for and maintaining a valid specific license in accordance with Section 330.320 of this Part, decommissioning, reclaiming, and meeting the license termination requirements of this Section. Immediately upon the passing of the expiration date, a licensee that fails to comply with subsection (a) of this Section shall comply with the requirements of Section 330.320(c) of this Part.

Section 340 Appendix A Decontamination Guidelines

a) Surface Contamination Guide

Alpha Emitters:

Removable	555 mBq (15 pCi) per 100 cm ²	average over any one surface
	33 dpm per 100 cm ²	
Total Fixed	1.67 Bq (45 pCi) per 100 cm ²	maximum
	100 dpm per 100 cm ²	
Total Fixed	16.7 Bq (450 pCi) per 100 cm ²	average over any one surface
	1,000 dpm per 100 cm ²	
Total Fixed	83.3 Bq (2,250 pCi) per 100 cm ²	maximum
	5,000 dpm per 100 cm ²	

Beta-Gamma Emitters:

Removable (all beta-gamma emitters except hydrogen 3)	3.7 Bq (100 pCi) per 100 cm ²	average over any one surface
	222 dpm per 100 cm ²	
Removable (hydrogen-3)	18.5 Bq (500 pCi) per 100 cm ²	maximum
	1,110 dpm per 100 cm ²	
Removable (hydrogen-3)	37 Bq (1,000 pCi) per 100 cm ²	average over any one surface
	2,220 dpm per 100 cm ²	
	185 Bq (5,000 pCi) per 100 cm ²	maximum
	11,000 dpm per 100 cm ²	

Total Fixed 2.5 microSv (250 microrem) per hour at 1 cm from surface

- b) Concentration in air and water: Appendix B, Table I and II of 10 CFR 20.
- c) Concentrations in soil and other materials except water:
 - 1) Radioactive material except source material and radium: Column II of 32 Ill. Adm. Code 330.Appendix A.
 - 2) Source material and radium: Concentration of radionuclides above background concentrations for total radium, averaged over areas of 100 square meters, shall not exceed:
 - A) 185 mBq (5 pCi) per gram of dry soil, averaged over the first 15 centimeters below the surface; and
 - B) 185 mBq (5 pCi) per gram of dry soil, averaged over layers of 15 centimeters thickness more than 15 centimeters below the surface.
- d) The level of gamma radiation measured at a distance of 100 centimeters from the surface shall not exceed background.

AGENCY NOTE: This Appendix shall be used only as a guide. The Agency may require lower values in specific instances, depending upon radionuclides, type of surface, intended present and future use, etc.

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Appendix B – KLM.007

For *all* terminations, the Agency's form KLM.007 or equivalent information must be submitted. The form may be found at the Agency's web site at <http://www.state.il.us/idns/html/materials/guidance.asp>. A copy of the form is presented on the following page.

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Illinois Emergency Management Agency
Division of Radioactive Materials
1035 Outer Park Drive
Springfield, Illinois 62704

This State agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under 420 ILCS 40/1-40/44. Disclosure of this information is required. Failure to provide any information will result in this form not being processed. This form has been approved by the Forms Management Center.

**CERTIFICATE - TERMINATION
AND DISPOSITION OF RADIOACTIVE MATERIAL**

LICENSEE: _____	LICENSE NUMBER: _____
ADDRESS: _____ _____	TELEPHONE NUMBER: _____

The following information is provided in accordance with 32 Ill. Adm. Code 330.325, "Termination Requirements for Specific Licenses and Locations of Use." This regulation appears on the back of this form. Check all that apply below.

1.	All use of radioactive material authorized under the above referenced license has been terminated.
2.	Radioactive contamination has been removed to the level outlined in 32 Ill. Adm. Code 340.Appendix A, to the extent practicable.
3.	All radioactive material previously procured and/or possessed under the authorization granted by the above referenced license has been disposed of as follows: _____ Transferred to (Name and Address): _____ _____ _____ who is authorized to possess such material under License Number _____ issued by (Licensing Agency): _____ _____ Decayed, surveyed and disposed of as non-radioactive waste. _____ Licensed under License Number: _____ Issued by (Licensing Agency): _____ _____ No radioactive material has ever been procured and/or possessed by the licensee under the authorization granted by the above referenced license. _____ Other (Attach additional pages).
4.	Attached are radiation surveys or the equivalent as specified in 32 Ill. Adm. Code 330.325(b)(1)(F).
5.	Records required to be maintained for the license requested to be terminated are available at the following location: Name: _____ Address: _____ _____ Telephone No.: _____ Contact Person: _____
6.	Additional remarks. (Attach additional pages.)

THE UNDERSIGNED, ON BEHALF OF THE LICENSEE, HEREBY CERTIFIES THAT LICENSABLE QUANTITIES OF RADIOACTIVE MATERIAL UNDER THE JURISDICTION OF THE ILLINOIS EMERGENCY MANAGEMENT AGENCY DIVISION OF NUCLEAR SAFETY ARE NOT POSSESSED BY THE LICENSEE. IT IS THEREFORE REQUESTED THAT THE ABOVE REFERENCED LICENSE BE TERMINATED.

SIGNATURE: _____ **DATE:** _____

NAME: _____ **TITLE:** _____

(print or type)

Section 330.325 Termination Requirements for Specific Licenses and Locations of Use

- a) To lawfully obtain termination of a specific license or a location of use, each licensee shall meet the requirements of this Section no later than the end of the expiration date on the specific license or on any applicable amendment to the specific license unless the licensee has filed an application for renewal in accordance with Section 330.320(a) of this Part prior to the expiration date.

AGENCY NOTE: If the licensee has filed a renewal application in accordance with Section 330.320(a) of this Part and the Agency subsequently denies the application, the Agency shall, in an order issued to the licensee in accordance with the Act, the Illinois Administrative Procedure Act [5 ILCS 100] and 32 Ill. Adm. Code 200, specify the time by which the licensee must meet the requirements of this Section.

b) Requirements for Obtaining Termination of a Specific License, Removal of a Site or Location of Use from a Specific License

- 1) The licensee shall:
- A) Cease use of radioactive material;
- B) Remove radioactive contamination to levels considered acceptable for unrestricted use. A site will be considered acceptable for unrestricted use when:
- i) Radioactive contamination is removed to levels outlined in 32 Ill. Adm. Code 340.Appendix A; or
- ii) The residual radioactivity, excluding radon, thoron and their progeny, that is distinguishable from background radiation does not result in a total effective dose equivalent (TDE) to an average member of the critical group that exceeds 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels that are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal;
- C) Properly transfer and/or dispose of radioactive material;
- D) Submit a completed Agency Form KLM.007 (Certificate Termination and Disposition of Radioactive Material) or provide equivalent information;
- E) For licensees authorized to possess sealed sources, submit evidence of transfer and/or disposal of all sealed sources authorized on the license and a copy of the most recent leak test; and
- F) For licensees authorized to possess radioactive material in forms other than sealed sources, submit a radiation survey report to confirm the absence of radioactive materials or to establish the levels of residual radioactive contamination, unless the licensee demonstrates the absence of residual radioactive contamination in some other manner. The radiation survey report shall specify the date of the survey and the instrumentation used and shall certify that each instrument was properly calibrated and tested. The licensee shall, as applicable, report levels or quantities of:
- i) Beta and gamma radiation at 1 centimeter from surfaces in units, multiples, or subunits of Sieverts or rem per hour;
- ii) Gamma radiation at 1 meter from surfaces in units, multiples, or subunits of Sieverts or rem per hour;

- iii) Removable radioactivity on surfaces in units, multiples, or subunits of Becquerels or Curies per 100 square centimeters of surface area, or in disintegrations (transformations) per minute per 100 square centimeters of surface area;
- iv) Fixed radioactivity on surfaces in units, multiples, or subunits of Becquerels or Curies per 100 square centimeters of surface areas or in disintegrations (transformations) per minute per 100 square centimeters of surface area;
- v) Radioactivity in contaminated liquids, such as water, oils or solvents, in units, multiples, or subunits of Becquerels or Curies per milliliter of volume; and
- vi) Radioactivity in contaminated solids, such as soils or concrete, in units, multiples, or subunits of Becquerels or Curies per gram of solid.

2) If no residual radioactive contamination attributable to activities conducted under the license is detected, the licensee shall submit a certification that no detectable radioactive contamination was found.

3) If detectable levels or residual radioactive contamination attributable to activities conducted under the license are found, the licensee shall:

- A) In addition to the information submitted under subsections (b)(1)(D) and (b)(1)(F) of this Section, submit for Agency approval a plan for reclaiming the facility, including decontamination and removal of residual radioactive contamination;
- B) Limit actions involving radioactive material to those approved under the decontamination plan in subsection (b)(3)(A) of this Section;
- C) Continue to control entry to restricted areas until they are suitable for release for unrestricted use; and
- D) Implement and complete the plan approved under subsection (b)(3)(A) of this Section.

c) When a licensee ends activities authorized under a specific license and has met the termination requirements of subsection (b) of this Section, the licensee shall immediately notify the Agency in writing and request that the license be terminated. This notification and request for termination shall include the documents required by subsection (b) of this Section and shall otherwise substantiate that the licensee has met all of the requirements in subsection (b) of this Section.

d) After receiving a request for license termination pursuant to subsection (c) of this Section, the Agency shall confirm, through such inspections and record reviews as may be necessary, that the licensee has met the requirements of subsection (b) of this Section. Upon confirmation, the Agency shall issue an amendment to terminate the licensee. Until issued the termination amendment, the licensee shall maintain a valid specific license in accordance with Section 330.320 of this Part.

e) A licensee who fails to comply with the pertinent requirements of this Section shall be subject to such civil penalties and sanctions as may be appropriate in accordance with the Act and 32 Ill. Adm. Code 310. The passing of the expiration date shall not relieve the licensee of the duties and responsibilities of applying for and maintaining a valid specific license in accordance with Section 330.320 of this Part, decommissioning, reclaiming, and meeting the license termination requirements of this Section. Immediately upon the passing of the expiration date, a licensee that fails to comply with subsection (a) of this Section shall comply with the requirements of Section 330.320(c) of this Part.

(Source: Amended at 30 Ill. Reg. 8928, effective April 28, 2006)

Appendix C – Example Table of Contents for a Decommissioning Work Plan

- Executive Summary
- Facility Operating History
 - License History
 - Previous Decommissioning Activities
 - Current/Future Use
- Facility Description
 - Site Description
 - Building Structure
 - Building Systems
 - General Ventilation
 - Fume Hood Ventilation
 - Vacuum System
 - Drain System
- Radiological Status of Facility
 - Overview
 - Contaminated Structures
 - Contaminated Systems and Equipment
 - On-site Buried Waste or Contaminated Outdoor Areas
- Release Criteria and Dose Modeling Evaluation
 - Release Criteria
 - Derived Concentration Guideline Levels (DCGL)
- ALARA Analysis
- Planned Decommissioning Activities
 - Contaminated Structures
 - Contaminated Systems and Equipment
 - Outdoor Areas/Subsurface Contamination
 - Schedules
- Project Management and Organization
 - Decommissioning Management Organization
 - Training
 - Contractor Support
- Radiation Safety and Health Program
- Environmental Monitoring Program
- Radioactive Waste Management
- Quality Assurance Program
- Survey Instrumentation
 - Instrument Calibration
 - Functional Checks
 - Determination of Counting Times and Minimum Detectable Concentration

- Static Counting
 - Beta Rate meter Scanning
 - Smear Counting
- Instrumentation Specification
- Characterization Surveys and Sampling
- Remedial Action Surveys
- Design and Performance of Final Status Surveys
 - Data Quality Objectives (DQO)
 - Area Classifications
 - Class 1 Area
 - Class 2 Area
 - Class 3 Area
 - Survey Units
 - Survey Scans
 - Total Surface Activity Measurements
 - Determining the Number of Samples Needed
 - Determining Class 1 and Class 2 Sample Locations
 - Determining Class 3 Sample Locations
 - Removable Contamination Measurements
 - Surveys of Building Mechanical System Internals
 - Ventilation Systems
 - Vacuum Systems
 - Drain Systems
 - Survey Investigation Levels
 - Data Validation
 - Sample Chain-of-Custody
- Data Quality Assessment (DQA) and Interpretation of Survey Results
 - Preliminary Data Review
 - Determining Compliance
 - Building Mechanical System Survey Data Analysis
- Final Report
- References

Appendices (Site and Building Maps; Survey unit Designations, Photos, Dose Modeling Reports, etc.)

Note: For subsurface soils and/or groundwater contamination, additional site investigations, compliance monitoring, evaluation of alternative remedial actions and dose modeling is required to justify cleanup standards and release criteria.