

TITLE 32: ENERGY
CHAPTER II: ILLINOIS EMERGENCY MANAGEMENT AGENCY
SUBCHAPTER b: RADIATION PROTECTION

PART 601
LICENSING REQUIREMENTS FOR A LOW-LEVEL
RADIOACTIVE WASTE DISPOSAL FACILITY

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AUTHORITY: Implementing and authorized by the Illinois Low-Level Radioactive Waste Management Act [420 ILCS 20].

SOURCE: Adopted at 10 Ill. Reg. 17465, effective September 25, 1986; amended at 18 Ill. Reg. 16579, effective November 1, 1994; amended at 20 Ill. Reg. 6904, effective May 1, 1996; old Part repealed at 34 Ill. Reg. 12156, and new Part adopted at 34 Ill. Reg. 12158, effective August 5, 2010.

SUBPART A: GENERAL PROVISIONS

Section 601.10 Purpose and Scope

- a) This Part establishes procedures, criteria, performance objectives, and terms and conditions upon which the Illinois Emergency Management Agency – Division of Nuclear Safety (Agency) issues licenses for a low-level radioactive waste disposal facility. Disposal of waste by an individual licensee is set forth in 32 Ill. Adm. Code 340. The requirements of this Part are in addition to, and not in substitution for, the requirements of 32 Ill. Adm. Code Chapter II, Subchapters b and d.
- b) This Part does not apply to disposal of licensed material as provided for in 32 Ill. Adm. Code 340.
- c) This Part is intended to *reflect the best available management technologies which are economically reasonable, technologically feasible, and environmentally sound* for the disposal of low-level radioactive waste, as required by Section 6 of the Illinois Low-Level Radioactive Waste Management Act [420 ILCS 20/6].
- d) The use of shallow land burial of low-level radioactive waste at a disposal facility is prohibited.

Section 601.15 Incorporations by Reference

All rules, standards and guidelines of agencies of the United States or nationally recognized organizations or associations that are incorporated by reference in this Part are incorporated as of the date specified. All references to 10 CFR are incorporated as of July 1, 2009, unless otherwise specified in this Part, and do not include any later amendments or editions. Copies of rules, standards and guidelines that have been incorporated by reference are available for public inspection at the Illinois Emergency

Management Agency – Division of Nuclear Safety, 1035 Outer Park Drive, Springfield, Illinois.

Section 601.20 Definitions

As used in this Part, the following definitions apply:

"Accepted engineering principles and practices" means those engineering principles and practices that are used by engineers when fulfilling their requirements and duties consistent with the specific requirements of this Part and as certified by a Professional Engineer licensed under the Professional Engineering Practice Act [225 ILCS 325].

"Active maintenance" means activity needed during the institutional control period to provide reasonable assurance that the performance objectives in Section 601.30 are met. Active maintenance includes ongoing activities such as the pumping and treatment of water from a disposal unit and one-time measures such as replacement of a disposal unit cover. Active maintenance does not include minor custodial care such as repair of fences, repair or replacement of monitoring equipment, revegetation, minor additions to soil cover, minor repair of disposal unit covers, and general disposal site upkeep such as mowing grass.

"As low as is reasonably achievable" or "ALARA" means making every reasonable effort to maintain exposures to radiation as far below the dose limits in 32 Ill. Adm. Code: Chapter II, Subchapters b and d as is practical consistent with the purpose for which the licensed or registered activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to the public health and safety and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed or registered sources of radiation in the public interest.

"Buffer zone" means a portion of the disposal site that is controlled by the licensee and that lies under the disposal units and between the disposal units and the boundary of the site.

"Chelating agent" means amine polycarboxylic acids, hydroxycarboxylic acids, glucinic acid and polycarboxylic acids.

"Commence construction" means any clearing of land, excavation or other substantial action that would adversely affect the environment of a disposal facility. The term does not mean disposal site exploration, necessary roads for disposal site exploration, borings to determine foundation conditions, or other preconstruction monitoring or testing to

establish background information related to the suitability of the disposal site or the protection of the environment.

"Disposal" means *the isolation of waste from the biosphere in a permanent facility designed for that purpose* [420 ILCS 20/3(f)].

"Disposal facility" or "facility" means a parcel of land, together with buildings, structures, equipment and improvements on or appurtenant to the land, that is used or is being developed for the disposal of low-level radioactive waste.

"Disposal site" means that portion of a disposal facility that is used for disposal of waste. It consists of disposal units and a buffer zone.

"Disposal unit" means a discrete portion of the disposal site into which waste is placed for disposal.

"Engineered barrier" means a man-made structure or device that is intended to improve the disposal facility's ability to meet the performance objectives in this Part.

"Inadvertent intruder" means a person who might occupy the disposal site after the institutional control period and engage in normal activities, such as agriculture, dwelling construction, or other pursuits in which an individual might be unknowingly exposed to radiation from the waste.

"Institutional control period" means the period of time after the termination of the license during which the State implements an institutional control program based upon the institutional control plan to protect public health and safety and the environment.

"Intruder barrier" means a sufficient depth of cover over the waste that inhibits contact with waste and helps to ensure that radiation exposures to an inadvertent intruder will meet the performance objectives set forth in this Part, or engineered structures that provide equivalent protection to the inadvertent intruder.

"Low-level radioactive waste" or "waste" means *radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel or byproduct material as defined in Section 11e(2) of the federal Atomic Energy Act of 1954 (42 USC 2014)* [420 ILCS 20/3(k)].

"Monitoring" means observing and making measurements to provide data to evaluate the performance and characteristics of the disposal facility.

"Post-closure care" means *the continued monitoring of the regional disposal facility after closure for the purposes of detecting a need for maintenance, ensuring environmental safety, and determining compliance with applicable licensure and regulatory requirements, and includes undertaking any remedial actions necessary to protect public health and the environment from radioactive releases from the facility* [420 ILCS 20/3(n)].

"Release" means *any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment of low-level radioactive waste* [420 ILCS 20/3(p)].

"Remedial action" means *those actions taken in the event of a release or threatened release of low-level radioactive waste into the environment, to prevent or minimize the release of the waste so that it does not migrate to cause substantial danger to present or future public health or welfare or the environment. The term includes, but is not limited to, actions at the location of the release such as storage, confinement, perimeter protection using dikes, trenches or ditches, clay cover, neutralization, cleanup of released low-level radioactive wastes, recycling or reuse, dredging or excavations, repair or replacement of leaking containers, collection of leachate and runoff, provision of alternative water supplies and any monitoring reasonably required to assure that these actions protect human health and the environment.* [420 ILCS 20/3(q)]

"Shallow land burial" means *a land disposal facility in which radioactive waste is disposed of in or within the upper 30 meters of the earth's surface. However, this definition shall not include an enclosed, engineered, structurally re-enforced and solidified bunker that extends below the earth's surface.* [420 ILCS 20/3(r)]

"Site closure and stabilization" means those actions that are taken upon completion of operations that prepare the disposal site for institutional control and that assure that the disposal site will remain stable and will not need ongoing active maintenance.

Section 601.30 Performance Objectives

Disposal facilities shall be sited, designed, constructed, operated, closed and controlled after closure to provide reasonable assurance that:

- a) Concentrations of radioactive material that may be released to the general environment in groundwater, surface water, air, soil, plants or animals do not result in an annual dose exceeding an equivalent of 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid, and 0.25

mSv (25 mrem) to any other organ of any member of the public. The licensee shall assume initiatives necessary to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable.

- b) Operations at the disposal facility are conducted in compliance with the standards for radiation protection set out in 32 Ill. Adm. Code 340, except for releases of radioactivity in effluents from the disposal facility, which shall be governed by subsection (a). The licensee shall assume initiatives necessary to maintain radiation exposures as low as is reasonably achievable.
- c) The disposal facility protects any individual inadvertently intruding into the disposal site and occupying the site at any time after the institutional control period.
- d) Following closure, the disposal site achieves long-term stability and eliminates, to the extent practicable, the need for active maintenance.

Section 601.40 License Required

- a) Each applicant shall file an application with the Agency pursuant to 32 Ill. Adm. Code 330.240 and obtain a license as provided in this Part before commencing construction of a disposal facility.
- b) Prior to submitting a license application, the applicant shall have conducted a monitoring program to obtain basic environmental data on the site characteristics. The applicant shall obtain information about the ecology, meteorology, climate, hydrology, geology, geochemistry and seismology of the disposal site. For those characteristics that are subject to seasonal variation, data must cover at least a 12 month period. The monitoring program shall be conducted under a quality assurance program.
- c) No person may receive, possess and dispose of waste at a disposal facility unless authorized by a license issued by the Agency pursuant to this Part and 32 Ill. Adm. Code 330.

Section 601.50 Content of an Application

An application for a license to commence construction of, or to operate, a disposal facility shall be filed in accordance with 32 Ill. Adm. Code 330.240. Each application shall meet the general requirements set forth in 32 Ill. Adm. Code 330.250 and the additional general, technical, institutional and financial requirements specified in this Part. General information to be included in an application is described in Subpart A.

Information specific to design, construction and operation is described in Subpart B. Information regarding site closure and license termination is described in Subpart C.

Section 601.60 Application Information – General

The license application shall include, but not be limited to, the following information:

- a) Identity of the applicant, including:
 - 1) If the applicant is a partnership, the name and address of each partner and the principal location where the partnership does business;
 - 2) If the applicant is a corporation or an unincorporated association:
 - A) the state where it is incorporated or organized and the principal location where it does business; and
 - B) the names and addresses of its directors and principal officers;
 - 3) If the applicant is a limited liability company:
 - A) the state where it is organized and the principal location where it does business; and
 - B) the names and addresses of its members and managers;
- b) The organizational structure of the applicant, both offsite and onsite, including a description of lines of authority and assignments of responsibilities, whether in the form of administrative directives, contract provisions, or otherwise;
- c) A description of the applicant's quality assurance program;
- d) The technical qualifications and experience of the applicant;
- e) The technical qualifications, including training and experience, of personnel;
- f) A description of the applicant's personnel training program;
- g) A description of:
 - 1) The location of the proposed disposal site;

- 2) The general character of the proposed handling, storage, treatment and disposal activities;
 - 3) The wastes to be received, possessed and disposed of, including, but not limited to, a description of the waste types, classifications and physical forms; the types, volumes and quantities of containers; an identification and estimate of the radionuclides contained in the various waste types, including concentration and total activity; and identification of stabilization media and chelating agents;
 - 4) Plans for use of the disposal facility for purposes other than disposal of radioactive wastes; and
 - 5) The proposed facilities and equipment;
- h) Proposed schedules for construction, receipt of waste, and first emplacement of waste at the proposed disposal facility.

Section 601.70 Application Information – Land Ownership

- a) Identity of Owner. Disposal of radioactive waste in a facility licensed under this Part may be permitted only on land owned in fee simple absolute by the State.
- b) Where the proposed disposal site is on land not owned by the State, the applicant shall submit evidence that arrangements have been made for assumption of ownership in fee simple absolute by the State before the Agency issues a license.

Section 601.80 Application Information – Financial

The applicant shall demonstrate that it either possesses the necessary funds, or has reasonable assurance of obtaining the necessary funds, to cover the estimated costs of conducting all activities over the planned operating life of the project, including costs of construction, operation, closure, post-closure and institutional control.

- a) Operation. The applicant shall *post a performance bond with the Department or show evidence of liability insurance or other means of establishing financial responsibility in an amount sufficient to adequately provide for any necessary remedial actions or liabilities that might be incurred by the operation of the disposal facility during the operating period and during a reasonable period of post-closure care* [420 ILCS 20/6(b)].

AGENCY NOTE: This may include costs associated with failure of the operator or failure to fulfill terms of the contract and costs associated with transferring operation and ownership. The italicized text is a direct quotation from the Illinois Low-Level Radioactive Waste Management Act, which has not been updated to reflect Illinois Executive Order 2003-12, effective July 1, 2003, which transferred the responsibilities of the Illinois Department of Nuclear Safety to the Agency. In this case, the Department means the Illinois Emergency Management Agency.

- b) Closure and Post-Closure.
 - 1) In addition to complying with the requirements of 32 Ill. Adm. Code 326, the applicant shall provide assurances that sufficient funds will be available to carry out disposal facility closure and post-closure. These assurances shall be based on Agency-approved cost estimates reflecting the Agency-approved plan for disposal facility closure and post-closure. The applicant's cost estimates must take into account total costs that would be incurred if an independent contractor were hired to perform the closure and post-closure work. The assurances shall establish that there will be sufficient funds for:
 - A) Decontamination or dismantlement of disposal facility structures; and
 - B) Closure and post-closure of the disposal facility so that, following termination of the license and transfer of custody of the disposal site to the State, the need for active maintenance is eliminated to the extent possible.
 - 2) Liability under the financial assurance mechanism shall remain in effect until the license has been terminated.
- c) Institutional Control Period Funding.
 - 1) Prior to the issuance of the license, the applicant shall provide for Agency approval a copy of a binding arrangement, such as a lease or contract, between the applicant and the State that ensures that sufficient funds will be collected and available to cover the costs of monitoring and projected maintenance during the institutional control period.
 - 2) The binding arrangement will be reviewed periodically by the Agency to ensure that changes in inflation, technology and disposal facility operations are reflected in the arrangements.

Subsequent changes to the binding arrangement shall be submitted to the Agency for approval.

Section 601.90 Application Information – Closure, Post-Closure and Institutional Control Plans

- a) Closure Plan. The application for a facility license shall contain a closure plan, which shall be consistent with the performance objectives of this Part, and shall include, but need not be limited to, the following:
 - 1) A procedure for disposal of all waste and contaminated equipment remaining at the facility at the time of closure, removal of structures and equipment, and installation of permanent monuments or markers warning against intrusion;
 - 2) An estimate of the funds needed to close the facility and provisions for assuring the availability of those funds;
 - 3) A description of how the facility closure will satisfy the performance objectives of this Part;
 - 4) A description of the permissible uses of the facility and buffer zone following closure; and
 - 5) A description of the monitoring systems to be implemented during the closure, post-closure and institutional control periods.

- b) Post-Closure Plan. The application for a facility license must contain a post-closure plan under which the licensee will observe, monitor and carry out necessary maintenance and repairs at the disposal facility for a period of 10 years after facility closure. The plan shall be consistent with the performance objectives of this Part and shall include, but need not be limited to:
 - 1) A procedure for evaluating the performance of both engineered and natural barriers to radionuclide release or migration at the disposal site;
 - 2) A procedure for monitoring the air, soil, surface water and groundwater at the disposal site;
 - 3) A procedure for confirming that the disposal site will meet the long term performance objectives and requirements of this Part;
 - 4) A procedure for identifying potential failure to meet the performance objectives or requirements of this Part;

- 5) A procedure for correcting any condition that would result in failure to meet the performance objectives of this Part; and
 - 6) An estimate of the funds needed to implement the plan and provisions for assuring the availability of those funds.
- c) Institutional Control Plan. The application must contain an institutional control plan for the long term care, maintenance and monitoring of the disposal site. The plan shall describe the activities to be taken by the site owner following the 10 year post-closure period, as described in subsection (b), and after transfer of title and custody and termination of the facility license. The plan shall be consistent with the performance objectives of this Part and shall include, but need not be limited to, the following:
- 1) A procedure for monitoring the air, soil, surface and groundwater at the disposal site; and
 - 2) An estimate of the costs necessary to carry out the institutional control plan for a period of 300 years and provisions for assuring the availability of those funds.

Section 601.100 Application Information – Technical

The license application shall include, but not be limited to, the following technical information:

- a) A description of the natural and demographic disposal site characteristics as determined by disposal site selection and characterization activities. The description shall include geologic, geotechnical, hydrologic, meteorologic, climatologic and biotic features of the disposal site and vicinity.
- b) A description of the pre-operational monitoring program and the associated quality assurance plan, and results of the pre-operational monitoring program specified in Section 601.40(b).
- c) An environmental report required by 32 Ill. Adm. Code 330.250(b).
- d) A description of the design basis natural events or phenomena and their relationship to the principal design criteria.
- e) A description of the principal design criteria and their relationship to the performance objectives described in Section 601.30.

- f) A description of the design features of the disposal facility and the disposal units. The description shall include design features related to infiltration of water; integrity of covers for disposal units; structural stability of filling material, wastes and covers; contact of wastes with standing water; disposal site drainage; disposal site closure and stabilization; elimination, to the extent possible, of long-term disposal site maintenance; inadvertent intrusion; occupational exposures; disposal site monitoring; and adequacy of the size of the buffer zone for monitoring and potential mitigative measures.
- g) Analyses of pathways evaluated in demonstrating protection of the general population from releases of radioactivity shall include air, soil, groundwater, surface water, plant uptake and exhumation by burrowing animals. The analyses shall clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses must clearly demonstrate that there is reasonable assurance that the exposures to humans from the release of radioactivity will not exceed the limits set forth in Section 601.30(a).
- h) A description of the environmental monitoring program required by Section 601.240 to be followed during construction, operation, closure and post-closure that includes, but is not limited to, the frequency, type and method of analysis to provide data to evaluate potential health and environmental impacts, and the plan for taking corrective measures if migration of radionuclides is indicated.
- i) A description of codes and standards that the applicant has applied to the design and that will apply to construction of the disposal facilities. The standards shall meet local, State and national building code standards.
- j) A description of the construction and general operation of the disposal facility. The description shall include, as a minimum, the methods of construction of disposal units, waste emplacement, the procedures for and areas of waste segregation, types of intruder barriers, onsite traffic and drainage systems, survey control program, methods and areas of waste storage, and methods to control surface water and groundwater access to the wastes. The description shall also include a description of the methods to be employed in the handling and disposal of wastes containing chelating agents or other nonradiological substances that might affect meeting the performance objectives of this Part.
- k) A description of the quality assurance program applied during the determination of natural disposal site characteristics and during the design, construction and operation of the disposal facility.

- l) Analyses of the long-term stability of the disposal site and the need for active maintenance after closure shall be based upon analyses of active natural processes such as erosion, seismic activity, mass wasting, slope failure, settlement of wastes and backfill, infiltration through covers over disposal areas and adjacent soils, and surface drainage of the disposal site. The analyses must provide reasonable assurance that there will not be a need for active maintenance of the disposal site following closure.
- m) An identification of the known natural resources at the disposal site whose exploitation could result in inadvertent intrusion into the low-level radioactive wastes.
- n) A description of the radiation safety program for control and monitoring of radioactive effluents to ensure compliance with this Part and for occupational radiation exposure to ensure compliance with the requirements of 32 Ill. Adm. Code 340 and to control contamination. Both routine operations and accidents shall be addressed. The program description shall include procedures, instrumentation, facilities and equipment.
- o) Analyses of the protection of individuals during operations, including assessments of expected exposures due to routine operations and potential accidents during handling, storage, treatment and disposal of waste. The analyses must provide reasonable assurance that exposures will be controlled to meet the requirements of 32 Ill. Adm. Code 340.
- p) A description of the administrative and operating procedures that the applicant will apply to control activities at the facility.
- q) A description of the contingency plan required by Section 601.260.
- r) A description of the electronic recordkeeping system required in Section 601.140.

Section 601.110 Issuance of a License

The Agency shall review license applications filed in accordance with Section 601.50. *If the Department determines that the license should be issued, the Department shall publish in the State newspaper a notice of intent to issue the license. Objections to issuance of the license may be filed within 90 days after publication of the notice. Upon receipt of objections, the Director shall appoint a hearing officer who shall conduct an adjudicatory hearing on the objections. The burden of proof at the hearing shall be on the person filing the objections. Upon completion of the hearing, the hearing officer shall recommend to the Director whether the license should be issued. The decision of the Director to issue or deny the license may be appealed under Section 18 of the Illinois Low-Level Radioactive Waste Management Act [420 ILCS 20/10.3(c)].*

AGENCY NOTE: The italicized text is a direct quotation from the Illinois Low-Level Radioactive Waste Management Act, which has not been updated to reflect Illinois Executive Order 2003-12, effective July 1, 2003. In this case, the Department means the Illinois Emergency Management Agency.

Section 601.120 Conditions of Licenses

- a) A license issued under this Part, or any right under that license, may not be transferred, assigned or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of the license to any person, unless the Agency finds, after securing full information, that the transfer is in accordance with the provisions of the Radiation Protection Act of 1990 [420 ILCS 40], the Illinois Low-Level Radioactive Waste Management Act [420 ILCS 20] and this Part and gives its consent in writing in the form of a license amendment.
- b) The licensee shall not receive waste until the licensee has received written notification from the Agency that the Agency has inspected the disposal facility and has found it to be in conformance with the description, design and construction described in the application for a license.
- c) Failure to renew the license shall not relieve the licensee of responsibility for carrying out site closure and post-closure, and obtaining a license amendment terminating the license.
- d) The terms and conditions of the license are subject to amendment, revision or modification, by reason of amendments to, or by reason of rules, regulations and orders issued in accordance with, the terms of the Radiation Protection Act of 1990 and the Illinois Low-Level Radioactive Waste Management Act.
- e) The Agency shall, upon request or on its own initiative, authorize provisions other than those set forth in this Part for the classification and characteristics of waste, disposal of waste, or design and operation of a disposal facility on a specific basis only if the Agency establishes that performance objectives of this Part will be met.

Section 601.130 Application for Renewal

- a) An application for renewal must be filed at least 90 days prior to license expiration. Applications for renewal of a license must be filed in accordance with 32 Ill. Adm. Code 330.240 and this Part.

- b) In any case in which a licensee has filed an application in proper form for renewal of a license, the license does not expire until the Agency has taken final action on the application for renewal.

Section 601.140 Recordkeeping Requirements

- a) The licensee shall maintain any records and make any reports in connection with the licensed activities as are required by the conditions of the license, this Part or 32 Ill. Adm. Code 340.
- b) Records required by this Part or by license conditions shall be maintained until the termination of the license or as specified by a license condition. If a retention period is not otherwise specified, these records shall be maintained and transferred to the officials specified in subsection (e) as a condition of license termination, unless the Agency authorizes their disposition because of inaccuracies or obsolescence.
- c) Records that must be maintained pursuant to this Part may be the original or a reproduced copy or microfilm if the reproduced copy or microfilm is capable of producing a copy that is clear and legible at the end of the required retention period. Records may also be stored in electronic media with the capability for reproducing legible, accurate and complete records during the required retention period. Records such as letters, drawings or specifications shall include all pertinent information such as stamps, initials and signatures. The licensee shall maintain safeguards against tampering with and loss of records.

AGENCY NOTE: Safeguards may include such actions as storing a duplicate copy in an offsite location and maintaining suitable software for viewing computer images.

- d) If there is a conflict between this Part and other Agency Parts or a license condition pertaining to the retention period for the same type of record, the longest retention period specified takes precedence.
- e) Following receipt and acceptance of a shipment of radioactive waste, the licensee shall:
 - 1) Record the date that the shipment is received at the low-level radioactive waste disposal facility, the date of disposal of the waste, a traceable shipment manifest number, a description of any engineered barrier or structural overpack provided for disposal of the waste, the location of disposal at the disposal site, the containment integrity of the waste disposal containers received, any discrepancies between materials listed on the manifest and those received, the volume of any pallets, bracing or other shipping

or onsite generated materials that are contaminated and are disposed of as contaminated or suspect materials, and any evidence of leaking or damaged disposal containers or radiation or contamination levels in excess of limits specified in regulations of the U.S. Department of Transportation and the Agency (see 32 Ill. Adm. Code 341);

- 2) Describe any repackaging operations of any of the disposal containers included in the shipment, plus any other information required by the Agency as a license condition.
- f) The licensee shall store, or have stored, manifest and other information pertaining to receipt and disposal of radioactive waste in an electronic recordkeeping system that includes:
 - 1) Information required under 32 Ill. Adm. Code 340.1060, with the exception of shipper and carrier telephone numbers and shipper and consignee certifications; and
 - 2) Information required under subsection (e).
- g) Notwithstanding subsections (a) through (f), copies of records of the location and the quantity of radioactive wastes contained in the disposal site shall be transferred to the Agency, or other agency designated by the Agency, at the time of license termination.

SUBPART B: DESIGN, CONSTRUCTION AND OPERATION

Section 601.200 Disposal Site Suitability Requirements

The following minimum characteristics shall be used in determining a site acceptable for disposal of low-level radioactive waste:

- a) The primary emphasis in disposal site suitability is isolation of waste and disposal site features that ensure that the long-term performance objectives are met.
- b) The disposal site shall be capable of being characterized, modeled, analyzed and monitored.
- c) Within the region where the facility is to be located, a disposal site shall be selected so that projected population growth and future developments are not likely to affect the ability of the disposal facility to meet the performance objectives of this Part.

- d) Areas shall be avoided having known natural resources that, if exploited, would result in failure to meet the performance objectives of this Part.
- e) The disposal site shall be generally well drained and free of areas of standing water or flooding or frequent ponding. Waste disposal shall not take place in a regulatory flood plain, as provided in the rules of the Illinois Department of Natural Resources (see 17 Ill. Adm. Code 3706).
- f) Upstream drainage areas shall be minimized to decrease the amount of runoff that could erode or inundate waste disposal units.
- g) The disposal site shall provide sufficient depth to the water table that groundwater intrusion, perennial or otherwise, into the waste will not occur.
- h) Areas shall be avoided where tectonic processes such as faulting, folding, seismic activity or vulcanism occur with such frequency and to such an extent that they would affect the ability of the disposal site to meet the performance objectives of this Part or would preclude defensible modeling and prediction of long-term impacts.
- i) Areas shall be avoided where surface geologic processes such as mass wasting, erosion, slumping, landsliding or weathering occur with such frequency and to such an extent that they would affect the ability of the disposal site to meet the performance objectives of this Part, or would preclude defensible modeling and prediction of long-term impacts.
- j) The disposal site must not be located where nearby facilities or activities could adversely impact the ability of the site to meet the performance objectives of this Part or significantly mask the environmental monitoring program.

Section 601.210 Disposal Facility Design and Construction

The disposal facility shall be designed and constructed, based on accepted engineering principles and practices, to further the following:

- a) The design and construction of the disposal facility shall utilize the best available technology that is economically reasonable, technologically feasible and environmentally sound for the receipt, handling and disposal of waste.
- b) The design of the disposal facility shall be compatible with the expected waste characteristics, methods of operation and proposed methods of handling, closure and stabilization and shall demonstrate that the requirements of this Part will be met.

- c) Buildings shall be designed, constructed and maintained in accordance with all applicable codes and standards. In the event that two or more building codes or standards conflict or apply, the most stringent shall be met.
- d) The disposal facility shall be designed to minimize, to the extent practicable, the contact of water with waste following receipt and prior to disposal.

Section 601.220 Disposal Site Design and Construction

The disposal site shall be designed and constructed, based on accepted engineering principles and practices, to further the following:

- a) Site design features shall be directed toward long-term isolation and avoidance of the need for continuing active maintenance after site closure.
- b) Site design and operation shall be compatible with the closure and post-closure plans and lead to disposal site closure that provides reasonable assurance that the performance objectives will be met.
- c) The disposal site shall be designed to complement and improve, where appropriate, the ability of the disposal site's natural characteristics to assure that the performance objectives will be met.
- d) Surface features shall direct surface water drainage away from disposal units at velocities and gradients that will not result in erosion that will require active maintenance in the future.
- e) The site design shall allow closure in a manner that isolates the wastes and waste constituents and that requires only minor custodial care to assure long-term performance.
- f) The site shall be designed and constructed to allow remedial action, if necessary. Achievement of this objective shall not be accomplished by compromising, or in any way lessening, the ability of the site to satisfy the performance objectives and requirements of this Part.
- g) The site shall be designed to accept waste for disposal for a period of at least 50 years. The site shall be designed to accommodate waste generated during the decommissioning of nuclear power stations in Illinois.

Section 601.230 Disposal Unit Design and Construction

- a) Disposal units shall be designed and constructed, based on accepted engineering principles and practices, to:
- 1) Minimize, to the extent practicable, the contact of standing water with waste during disposal and the contact of percolating or standing water with wastes after disposal.
 - 2) Be compatible with the expected waste characteristics, methods of operation, and proposed methods of closure and stabilization.
 - 3) Withstand all natural phenomena, such as precipitation, earthquakes and tornadoes, that are expected to occur for 500 years.
 - 4) Incorporate multiple engineered safety features, such as, but not limited to, placing a cover over disposal units, using backfill that adds structural strength and reinforcing units with manufactured materials that provide structural support, prevent the release of waste and waste constituents and prevent inadvertent intrusion.
 - 5) Incorporate design elements that will allow operation of the units in such a manner that the amount of waste on site that is not yet permanently disposed of, as well as the time that waste is held on site prior to disposal, will be minimized.
 - 6) Accommodate waste that cannot be packaged in standard containers, e.g., reactor components, contaminated steel.
 - 7) Maintain their structural integrity regardless of the physical form of the waste.
 - 8) Allow characterization, modeling, analysis and evaluation of the unit's ability to contain waste.
- b) Disposal unit covers shall be designed to minimize water infiltration to the extent practicable, to direct percolating or surface water away from the disposed waste, and to resist degradation by surface geologic processes and biotic activity.
- c) Disposal unit design shall not incorporate the use of shallow land burial or underground injection wells and shall provide for the use of above-ground units or other designs to provide greater and safer confinement of low-level radioactive waste.
- d) Disposal units made of manufactured materials shall be designed and constructed, using accepted engineering principles and practices, to ensure

that the tensile stress in the manufactured materials never exceeds the level that will cause the materials to fail.

- e) Disposal units shall be constructed of materials that will not interact with each other, any surrounding earth, backfill, cover material or base grade material in such a manner as to compromise the ability of the materials to perform their intended function.
- f) If intruder barriers are required by Section 601.250(b), disposal units shall be designed and constructed with intruder barriers designed to last at least 500 years.

Section 601.240 Environmental Monitoring

- a) During construction, operation, closure and post-closure, the licensee shall maintain an environmental monitoring program. Measurements and observations shall be made and recorded to provide data to evaluate the potential health and environmental impacts during the construction and operation of the facility and to enable the evaluation of long-term effects and the need for mitigative measures. The monitoring system shall be capable of providing early warning of releases of radionuclides from the disposal unit before they leave the site boundary.
- b) The licensee shall have plans for taking corrective measures if the environmental monitoring program detects migration of radionuclides, which would indicate that the performance objectives may not be met.

Section 601.250 Technical Requirements – Facility Operation

- a) Wastes designated as Class A pursuant to 32 Ill. Adm. Code 340.1052(b) shall be segregated from other wastes by placement in disposal units that are sufficiently separated from disposal units for the other waste classes so that any interaction between Class A wastes and other wastes will not result in failure to meet the performance objectives of this Part. This segregation is not necessary for Class A wastes if they meet the stability requirements in 32 Ill. Adm. Code 340.1055(b).
- b) Wastes designated as Class C pursuant to 32 Ill. Adm. Code 340.1052(b) shall be disposed of so that the waste is protected by a barrier of a minimum of 5 meters between the top of the Class C waste and the top surface of the cover, or with intruder barriers that are designed to protect against an inadvertent intrusion for at least 500 years.
- c) Except as allowed by the Agency in Section 601.120(e), only waste classified as Class A, B or C shall be acceptable for disposal.

- d) Wastes shall be emplaced in a manner that maintains the package integrity during emplacement and minimizes the void spaces between packages to ensure structural stability.
- e) The boundaries and locations of each disposal unit shall be accurately located and mapped by means of a land survey. Disposal units shall be marked in such a way that the boundaries of each unit can be easily defined. Three permanent survey marker control points, referenced to United States Geological Survey (USGS) or National Geodetic Survey (NGS) survey control stations, shall be established on the site to facilitate surveys. The USGS or NGS control stations shall provide horizontal and vertical controls as checked against USGS or NGS record files.
- f) A buffer zone of land shall be maintained between disposed waste and the disposal site boundary. The buffer zone shall be of adequate dimensions to carry out environmental monitoring activities and take mitigative measures if needed.
- g) Closure and stabilization measures set forth in the approved site closure plan shall be carried out as each disposal unit is filled and enclosed.
- h) Active waste disposal operations shall not have an adverse effect on completed closure and stabilization measures.
- i) Only wastes containing or contaminated with radioactive materials shall be disposed of at the disposal site.

Section 601.260 Contingency Plan and Emergency Procedures

- a) The licensee shall develop and implement a contingency plan for responding to risks to human health and the environment from fires, explosions or any unplanned release, sudden or gradual, of waste or waste constituents to air, soil, surface water and groundwater. The plan shall address response actions to be taken in the event there is a temporary inability to dispose of wastes at the facility (e.g., because the facility has been closed temporarily) or the facility is permanently closed.
- b) Notwithstanding the requirements of 32 Ill. Adm. Code 330.250(e)(2), the licensee shall meet all contingency plan requirements specified in 32 Ill. Adm. Code 330.290, in addition to other additional requirements specified in this Section.
- c) The provisions of the contingency plan shall be carried out immediately whenever there is a fire, explosion, release of waste or waste constituents to the environment, or an unscheduled closure of the facility, either temporary or permanent.

- d) The plan shall contain provisions for conducting on-site drills prior to initial receipt of waste for disposal.

Section 601.270 Reporting Requirements

- a) **Unmanifested Waste Report.** The licensee shall notify the Agency immediately of any waste received at the facility that is unaccompanied by a proper manifest.
- b) **Accident Report.** The licensee shall provide a written report to the Agency within 7 days after any event resulting in either a release of radioactive material from a disposal unit or a radiation dose to any person outside the facility in excess of the limits specified in Section 601.30 for releases and 32 Ill. Adm. Code 340.310 for exposures. The report shall include:
 - 1) A description of the events causing the releases or exposures;
 - 2) A description of the release, resulting exposures and impacts;
 - 3) A description of the remedial action taken; and
 - 4) A description of actions that will be taken to prevent such events from occurring in the future.
- c) **Annual Report.** By the end of the first calendar quarter of each year, the licensee shall submit an annual report to the Agency summarizing facility operations for the preceding year. A copy of the report shall be available for public inspection. This report shall contain, but need not be limited to, the following:
 - 1) A summary of the sources, volumes, Curie content and types of low-level radioactive waste received at the facility in the previous year and an inventory of the total volume and Curie content of wastes disposed of at the facility since it commenced operation;
 - 2) Specification of the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in airborne effluents during the preceding year;
 - 3) A description of any incidents or accidents in which radioactive materials were released, or occupational exposures in excess of the limits set by 32 Ill. Adm. Code 340 occurred;

- 4) A description of the environmental and personnel monitoring programs and the results of those programs;
- 5) The results of the testing and evaluation of disposal unit design and construction, and recommendations;
- 6) A description of the status and adequacy of plans for closure and post-closure of the facility, specifying and considering information learned as a result of the testing and monitoring program and other facility operations during the previous year; and
- 7) An accounting of the fees collected by the facility operator for deposit by the Agency into the Low-Level Radioactive Waste Facility Closure, Post-Closure Care and Compensation Fund established by 420 ILCS 20/14. The accounting shall be performed using generally accepted accounting principles.

Section 601.280 Tests at Waste Disposal Facilities

The licensee shall perform, or permit the Agency to perform, any tests the Agency deems appropriate or necessary for the administration of the requirements in this Part, including, but not limited to, tests of:

- a) Wastes and facilities used for the receipt, storage, treatment, handling and disposal of radioactive wastes;
- b) Radiation detection and monitoring instruments; and
- c) Other equipment and devices used in connection with the receipt, possession, handling, treatment, storage or disposal of waste.

SUBPART C: FACILITY CLOSURE AND LICENSE TERMINATION

Section 601.300 Closure Application

- a) An application to amend the license for closure shall include a final revision and specific details of the disposal facility final closure plan that had been included as part of the license application submitted under Section 601.90. The application shall include, but not be limited to, the following:
 - 1) Any additional geologic, hydrologic or other data pertinent to the long-term containment of emplaced wastes obtained during the operational period.

- 2) The results of tests, experiments or any other analyses relating to filling material or excavated areas, closure and sealing, waste migration and interaction with emplacement media, or any other tests, experiments or analysis pertinent to the long-term containment of emplaced waste within the disposal site.
 - 3) Any proposed revision of plans for:
 - A) Decontamination and/or dismantlement of buildings, structures, equipments and improvements;
 - B) Backfilling of excavated areas; or
 - C) Site closure and stabilization.
 - 4) Any new information regarding the environmental impact of closure activities and long-term performance of the disposal site.
- b) Upon review and consideration of an application to amend the license for closure, the Agency shall issue an amendment authorizing closure if the licensee provides reasonable assurance that the long-term performance objectives of this Part will be met.

Section 601.310 Closure – Technical Requirements

- a) The licensee shall close the facility at the end of its operating lifetime.
- b) Not more than 2 years nor less than one year prior to anticipated facility closure, the licensee shall submit an application to the Agency in accordance with Section 601.300(a) for a license amendment to close the facility.
- c) Upon granting of the license amendment, the licensee shall close the facility in accordance with the closure plan and the license conditions imposed.
- d) Within 6 months after completing facility closure, the licensee shall certify in writing to the Agency that the facility has been closed in accordance with the requirements of this Part.

Section 601.320 Emergency Closure

- a) Upon finding that immediate closure of the facility is necessary to avoid an imminent threat to the public health or safety or to the environment, the Director of the Agency shall issue an emergency closure order to the

licensee. An emergency closure order may be issued by the Director in the event of either:

- 1) A finding of non-compliance with any applicable regulation of the Agency or provision of the license, if the non-compliance is determined by the Director to pose a risk of a release of radioactive material beyond the site boundary in excess of any applicable limit imposed by 32 Ill. Adm. Code 340; or
 - 2) A finding that continued operation of the facility represents a significant and immediate threat to the public health or safety, as evidenced by a violation of any provision of the Radiation Protection Act of 1990, the Low-Level Radioactive Waste Management Act or any rule, regulation or order promulgated under these Acts, and that requires immediate action to protect the public welfare.
- b) Upon receipt of a written order requiring immediate closure, the licensee shall immediately take the following actions:
- 1) Implement the contingency plan required by Section 601.260;
 - 2) Notify all persons holding a site use permit or similar evidence of permission to use the facility; and
 - 3) Notify the Central Midwest Interstate Low-Level Radioactive Waste Commission.

Section 601.330 Post-Closure Observation and Maintenance

The licensee shall observe, monitor, carry out maintenance and repairs, and maintain security at the disposal site for a minimum period of 10 years following site closure and until the license is terminated by the Agency. The licensee shall maintain a monitoring system based on past monitoring performance and the closure and stabilization of the disposal site. The monitoring system must be capable of providing early warning of releases of radionuclides from disposal units before they leave the site boundary. A longer time period for post-closure observation and maintenance may be required as part of the site closure plan, based upon site-specific conditions.

Section 601.340 Termination of License and Site Transfer

- a) Following the period of post-closure care specified in Section 601.330, the licensee shall submit a report to the Agency regarding the projected long term performance of the disposal site and shall apply for an amendment to terminate the license and transfer the title and custody of the facility to the State.

- b) This application will be reviewed in accordance with the provisions of this Part and 32 Ill. Adm. Code 330.
- c) A license will be terminated only if the Agency finds that:
 - 1) The requirements of 32 Ill. Adm. Code 330 and this Part have been met;
 - 2) The closure of the disposal facility has been made in conformance with the licensee's closure plan, as amended and approved as part of the license;
 - 3) The performance objectives of this Part are met;
 - 4) Any additional requirements resulting from new information developed during the post-closure period have been met and permanent monuments or markers warning against intrusion have been installed;
 - 5) The licensee has met all contractual requirements;
 - 6) Facility records and any funds held by the licensee for the institutional control plan have been transferred to the State;
 - 7) The post-closure monitoring program is operational for implementation by the State agency that will assume responsibility for institutional control of the disposal site; and
 - 8) The State agency that will assume responsibility for institutional control of the disposal site is prepared to assume responsibility and ensure that the institutional control requirements found necessary under Section 601.90 will be met.

AGENCY NOTE: The State will implement the institutional control plan, that will physically control access to the disposal site following transfer of control of the disposal site from the licensee and termination of the license. The institutional control program shall include, but not be limited to, carrying out an environmental monitoring program at the disposal site, periodic surveillance, minor custodial care, other requirements as determined by the State, and administration of funds to cover the costs for these activities. Under 10 CFR 61.59, controls may not be relied upon for more than 100 years following transfer of control of the disposal site by the licensee. It is the Agency's intention that controls will remain as long as they are necessary to protect the public health and safety and the environment.

601.APPENDIX A Diagram of Terms and General Locations

