

TITLE 32: ENERGY

CHAPTER II: ILLINOIS EMERGENCY MANAGEMENT AGENCY
SUBCHAPTER d: LOW LEVEL RADIOACTIVE WASTE/TRANSPORTATION

PART 622
HANDLING AND DISPOSAL OF WATER TREATMENT RESIDUALS

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23 AUTHORITY: Implementing and authorized by Sections 10, 11, and 12 of the Radiation
24 Protection Act of 1990 [420 ILCS 40].

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26 SOURCE: Adopted at 48 Ill. Reg. _____, effective _____.

27
28 **Section 622.10 Purpose and Scope**

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30 This Part establishes requirements for the possession and disposal of water treatment residuals
31 including requirements for worker protection and training. This Part applies to all entities that
32 produce or possess water treatment residuals.

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34 **Section 622.20 Definitions**

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36 The following terms found in this Part have the definitions set forth in this Section:

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38 "Agency" means the Illinois Emergency Management Agency and Office of
39 Homeland Security.

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41 "As low as is reasonably achievable" or "ALARA" means making every
42 reasonable effort to maintain exposures to radiation as far below the dose limits of
43 Sections 622.30 and 622.40 as is practical, consistent with the purpose for which

44 the registered activity is undertaken, taking into account the state of technology
45 and the economics of improvements in relation to the state of technology, the
46 economics of improvements in relation to benefits to public health and safety and
47 other societal and socioeconomic considerations, and to the use of nuclear energy
48 and licensed or registered sources of radiation in the public interest.
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50 "Combined Radium" means the sum of the results of the analysis for radium-226
51 and the analysis for radium-228.
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53 "Curie" or "Ci" is as defined in 32 Ill. Adm. Code 310.20.
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55 "Dry weight basis" is as defined in 32 Ill. Adm. Code 310.20.
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57 "*Groundwater*" means underground water which occurs within the saturated zone
58 and geologic materials where the fluid pressure in the pore space is equal to or
59 greater than atmospheric pressure. [415 ILCS 5/3.210]
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61 "IEPA" means the Illinois Environmental Protection Agency.
62

63 "*Low-level radioactive waste*" means the definition contained in Section 3 of the
64 *Low Level Radioactive Waste Management Act*, 420 ILCS 20.
65

66 "Naturally occurring radioactive material" or "NORM" means materials that are
67 undisturbed as a result of human activities and that contain any of the primordial
68 radionuclides or radioactive elements as they occur in nature, such as radium,
69 uranium, thorium, potassium, and their radioactive decay products. NORM does
70 not include accelerator-produced, byproduct, source, or special nuclear material.
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72 "Occupied" means any frequently occupied areas, including but not limited to
73 offices, conference rooms, and breakrooms, as well as restricted areas when
74 entered by workers. "Occupied" does not include infrequently used areas such as
75 storage rooms, stairwells, restrooms, utility closets, elevator shafts, or hallways
76 unless posted as a restricted area.
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78 "Picocurie" or "pCi" means the quantity of radioactive material producing 2.22
79 nuclear transformations per minute.
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81 "*Person*" means any individual, corporation, partnership, firm, association, trust,
82 estate, public or private institution, group, agency, political subdivision of this
83 State, any other State or political subdivision or agency thereof, and any legal
84 successor, representative, agent, or agency of the foregoing, other than the
85 United States Nuclear Regulatory Commission, or any successor thereto, and
86 other than federal government agencies licensed by the United States Nuclear

87 *Regulatory Commission, or any successor thereto. "Person" also includes a*
88 *federal entity (and its contractors) if the federal entity agrees to be regulated by*
89 *the State or as otherwise allowed under federal law. [420 ILCS 40/4(e)]*
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91 "Publicly regulated treatment works" means private companies that the Illinois
92 Commerce Commission regulates as public utilities engaged in the disposal of
93 domestic and industrial wastes.

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95 "Publicly owned treatment works" or "POTW" is as defined in Subpart A of 35
96 Ill. Adm. Code 310.

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98 "Registrant" means persons who, due to the nature of the water treatment
99 residuals they produce or possess, have additional regulatory requirements under
100 this Part.

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102 "Rem" means the special unit of any of the quantities expressed as dose
103 equivalent. The dose equivalent in rem is equal to the absorbed dose in rad
104 multiplied by the quality factor (1 rem = 0.01 Sv).

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106 *"Sludge" means any solid, semisolid, or liquid waste generated from a municipal,*
107 *commercial, or industrial wastewater treatment plant, water supply treatment*
108 *plant, or air pollution control facility or any other such waste having similar*
109 *characteristics and effects. [415 ILCS 5/3.465]*
110

111 "Technologically enhanced naturally occurring radioactive material" or
112 "TENORM" means naturally occurring radioactive material whose radionuclide
113 concentrations are increased by or as a result of past or present human practices.
114 TENORM does not include background radiation or the natural radioactivity of
115 rocks or soils. TENORM does not include "source material" and "by-product
116 material" as both are defined in the Atomic Energy Act of 1954 (42 U.S.C. 2011
117 et seq.), as amended, and relevant regulations implemented by the NRC.

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119 "Total effective dose equivalent" or "TEDE" means the sum of the deep dose
120 equivalent for external exposures and the committed effective dose equivalent for
121 internal exposures.

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123 "Treatment" means, for purposes of water treatment residuals only, any process
124 that changes the physical, chemical, microbiological, or radiological properties of
125 water, is under the control of the supplier, and is not a point-of-use treatment
126 device or a point-of-entry treatment device as defined in 35 Ill. Adm. Code
127 611.101. Treatment includes, but is not limited to, aeration, coagulation,
128 sedimentation, filtration, activated carbon treatment, disinfection, and
129 fluoridation.

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"USEPA" means the United States Environmental Protection Agency.

"Wastewater" means sewage, industrial waste, or other waste, or any combination of these, whether treated or untreated, plus any admixed land runoff.

"Wastewater treatment facility" means a treatment works owned by a municipality, sanitary district, county, or State agency that treats domestic and industrial wastes collected by a publicly owned or regulated sewer system. For the purposes of this Part, "wastewater treatment facility" encompasses both publicly owned treatment works and publicly regulated treatment works.

"Water treatment facility" means a plant or facility whose primary function is to treat raw water and to produce potable water for distribution, together with all the other real and personal property reasonably necessary to collect, treat, or distribute the water.

"Water treatment residuals" or "WRS" means biosolids, sludge, filter media, anthracite, scales, or other solids, either alone or as a component of liquid mixtures or solutions, that are technologically enhanced in combined radium concentration (radium-226, radium-228 or associated progeny) as a result of the treatment of water or sewage containing naturally occurring radium from groundwater.

"Working level" or "WL" means any combination of short-lived radon daughters in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha particle energy. The short-lived radon daughters are for:

radon-222: polonium-218, lead-214, bismuth-214 and polonium-214; and

radon-220: polonium-216, lead-212, bismuth-212 and polonium-212.

"Working level month" or "WLM" means an exposure to 1 working level (WL) for 170 hours. (2,000 working hours per year divided by 12 months per year is approximately equal to 170 hours per month.)

Section 622.30 Persons in Possession of Water Treatment Residuals

- a) The following persons shall register with the Agency within 60 days of producing or possessing water treatment residuals:
 - 1) Water treatment facilities permitted by the IEPA that treat groundwater with a treatment technology identified in subsection (a)(2)(B).

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AGENCY NOTE: Persons who possess groundwater wells only as an emergency or backup source (i.e., a primary source of purchased or surface water) do not meet the registration requirements in subsection (a)(1) or (a)(2).

2) Water treatment facilities permitted by IEPA whose groundwater sources and utilized treatment technologies are identified in subsections (a)(2)(A) and (B):

A) Table 1. Aquifers designated to contribute elevated concentrations of radium to groundwater:

- i) Cambrian
- ii) Ordovician
- iii) Devonian
- iv) Silurian
- v) Any other aquifer that gives rise to a maximum contaminant level for combined radium as specified in 35 Ill. Adm. Code 611.330.

B) Table 2. Treatment Technologies Capable of Concentrating Radium:

- i) Ion exchange
- ii) Reverse osmosis
- iii) Lime softening
- iv) Green sand filtration
- v) Co-precipitation with Barium sulfate
- vi) Electrodialysis/electrodialysis reversal
- vii) Pre-formed hydrous manganese oxide filtration
- viii) Activated alumina

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- ix) Enhanced coagulation filtration
 - x) Any other treatment technology that increases the combined radium concentration in the media or resulting water treatment residuals beyond that which is naturally present.
 - 3) Wastewater treatment facilities permitted by IEPA and receiving treatment process backwash from a water treatment facility described in subsection (a)(2).
 - 4) IEPA-permitted municipal solid waste landfills if the water treatment residuals generated by a registrant identified in subsections (a)(1), (a)(2), or (a)(3) are disposed of in those landfills;
 - 5) Land applicators permitted by IEPA who apply water treatment residuals generated by a registrant identified in subsections (a)(2) or (a)(3); and
 - 6) Any other person that the Agency determines is required to register.
- b) Registrants in compliance with Section 622.30 who elect to dispose of water treatment residuals at a licensed low-level radioactive waste disposal facility will be exempted by the addition of Section 622.30(m).
- c) Registrants may dispose or repurpose water treatment residuals under the provisions of this subsection (c) and the requirements of Title 35 of the Illinois Administrative Code, Subtitles C and G, as implemented by IEPA:
- 1) If the concentration of combined radium in the water treatment residuals is greater than 3.1 pCi/g and less than or equal to 100 pCi/g (dry weight basis), water treatment residuals may be:

AGENCY NOTE: Water treatment residuals with a combined radium concentration less than or equal to 3.1 pCi/g (dry weight basis) are not subject to the disposal requirements in this Section. However, registrants must maintain records of the combined radium concentration and the location where the material was disposed of.
 - A) Disposed at a facility authorized to receive such material under any federal or State solid or hazardous waste laws provided:

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- i) Combined radium concentration in pCi/g (dry weight basis) has been determined by a laboratory meeting the accreditation requirements in subsection (e)(1) with methods approved by the Agency or by a screening method approved by the Agency;
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- ii) A registrant may apply to the Agency for approval to use a screening method instead of laboratory analysis to determine the combined radium concentration of water treatment residuals. Each application shall include: a description of the water treatment residuals being screened, including the physical and chemical properties of the material; a description of the proposed screening method including instruments or equipment to be used, calculations performed, and procedures for how a representative combined radium concentration can be obtained; and analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in this Section;
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- iii) Water treatment residuals transported in compliance with the Illinois Vehicle Code [625 ILCS 5/15-109];
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- iv) Water treatment residuals that are easily dispersible are packaged or stabilized to prevent dispersion during transportation and/or landfill placement;
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- v) There is at least 10 feet of non-contaminated overburden between the water treatment residuals and grade level (at the time of landfill closure); and
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- B) Used for soil conditioning purposes on agricultural cropland (e.g., corn, soybeans) provided:
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- i) Land application is performed in accordance with and under the authorization of a current IEPA land application permit;
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- ii) Water treatment residuals are transported in compliance with the Illinois Vehicle Code [625 ILCS 5/15-109] covered during transportation;
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- iii) The combined radium concentration of the water treatment residuals (in pCi/g, dry weight basis) has been determined

- 301 by a laboratory meeting the accreditation standards in
302 subsection (e)(1) with methods approved by the Agency or
303 by a screening method approved by the Agency;
304
- 305 iv) A registrant may apply to the Agency for approval to use a
306 screening method instead of laboratory analysis to
307 determine the combined radium concentration of water
308 treatment residuals. Each application shall include: a
309 description of the water treatment residuals being screened,
310 including the physical and chemical properties of the
311 material; a description of the proposed screening method
312 including instruments or equipment to be used, calculations
313 performed, and procedures for how a representative
314 combined radium concentration can be obtained; and
315 analyses and procedures to ensure that doses are maintained
316 ALARA and within the dose limits in Section 622.30.
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- 318 v) Water treatment residuals shall be incorporated in
319 accordance with the registrant's land application permit.
320 All water treatment residuals applied to land for soil
321 conditioning purposes under this subsection (c)(1)(B)(v)
322 shall be mixed with soil such that the limits specified in
323 items (vi) and (viii) are not exceeded;
324
- 325 vi) The concentration of combined radium in the water
326 treatment residuals and the application rate is such that,
327 after the water treatment residuals are mixed with soil, the
328 cumulative increase of the combined radium concentration
329 in the soil does not exceed 1.0 pCi/g (compliance with this
330 Section shall be calculated as an addition of 1778
331 microcuries per acre, dry weight basis);
332
- 333 vii) This increased limit applies to the sum of all land
334 applications of water treatment residuals on a specific tax
335 parcel of land;
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- 337 viii) At no time shall the application of water treatment residuals
338 result in the combined radium concentration in the soil
339 exceeding 3.1 pCi/g (the mean natural background as
340 determined by the Agency of 2.1 pCi/g and the soil
341 concentration increase limit of 1.0 pCi/g due to water
342 treatment residuals application);
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- ix) The landowner or an authorized agent of the landowner must acknowledge awareness that water treatment residuals are being applied to the land (this acknowledgement must be updated as landownership changes). The acknowledgement shall contain, at a minimum, the language provided in 622.APPENDIX A;
 - x) Before using a parcel of land for the application of water treatment residuals for the first time, the registrant must determine the combined radium concentration in the soil;
 - xi) Soil sample collection shall be conducted to be representative of the entire water treatment residual application site at a depth of 12 inches and may be submitted for analysis as a single composite sample;
 - xii) Land receiving application of water treatment residuals shall not be used for the cultivation of tobacco; and
 - xiii) When calculating the increase in combined radium concentration, a soil density value of 90 pounds/cubic foot and a mixing depth of 1 foot shall be used unless the registrant is utilizing site-specific soil density values. Corrections to the cumulative increase of combined radium may be adjusted for the decay of radium-228.
- C) Disposed by release into sanitary sewerage.
- D) Disposed using an alternative method approved by the Agency before disposal, under 32 Ill. Adm. Code 340.1020.
- 2) If the concentration of combined radium in the water treatment residuals is greater than 100 pCi/g (dry weight basis) and less than or equal to 200 pCi/g (dry weight basis), water treatment residuals may be disposed of:
- A) Using an alternative method approved by the Agency before disposal, under 32 Ill. Adm. Code 340.1020;
 - B) In an IEPA-permitted facility authorized to receive such material. Disposals shall:
 - i) Be reviewed and approved by the Agency in advance.

- 387 ii) Comply with all requirements in subsection (c)(1)(A).
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389 C) By release into sanitary sewerage.
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391 D) At a facility authorized to dispose of such material under any
392 federal or State solid or hazardous waste laws as long as the
393 registrant ensures compliance with 32 Ill. Adm. Code 340.1060, as
394 applicable.
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396 d) Registrants identified in subsection (a)(2), which requires workers, contractors, or
397 other persons to come into contact with water treatment residuals during routine
398 and maintenance work shall sample the residuals and receive results before the
399 next scheduled service, or as soon as practicable for emergency work, to
400 determine compliance under this Section and Section 622.40 and to identify
401 potential worker exposure concerns.
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403 e) All analysis of water treatment residuals shall be conducted:
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405 1) By a laboratory certified to perform radiological analysis by the U.S.
406 Environmental Protection Agency, the International Organization of
407 Standardization (ISO 17025- general requirements for the competence of
408 testing and calibration laboratories), or the National Environmental
409 Laboratory Accreditation Conference (NELAC). The combined radium
410 concentration will be determined by a method approved by the Agency.
411
412 2) At a frequency specified in the registrant's IEPA land application permit.
413 If an IEPA permit does not specify a radium sampling frequency, or for
414 landfill or alternative disposals approved by the Agency, sample frequency
415 shall be no less than one representative sample per year.
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417 3) Utilizing a sampling methodology that ensures analyses are representative
418 of the water treatment residuals being disposed of or repurposed. The
419 registrant shall:
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421 A) Utilize applicable guidance, such as EPA SW-846, American
422 Water Works Association B100, or USEPA's RCRA Waste
423 Sampling Guidance, where procedures for representative sampling
424 are absent (i.e., those for disposal of water treatment resins or
425 filters);
426
427 B) To the extent practicable, collect samples before removing the
428 water treatment residuals from the treatment system; and
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- 430 C) Ensure composite samples comply with the following
431 requirements:
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433 i) Sub-samples comprising a composite shall be drawn from
434 homogenous waste (i.e., process waste that has been shown
435 to be homogenous);
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437 ii) If homogeneity cannot be confirmed, then a representative
438 composite sample comprised of six sub-samples shall be
439 taken to determine the average concentration;
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441 iii) No single measurement used to calculate an average shall
442 exceed five times the exemption criteria (i.e., 1000 pCi/g);
443 and
444
445 iv) Each waste container is considered a separate waste volume
446 (i.e., two waste volumes cannot be averaged).
447
- 448 f) Nothing in this Section relieves the registrant from complying with all other
449 applicable federal, State and local government regulations governing toxic or
450 hazardous properties of water treatment residuals that are disposed of or
451 repurposed under this Section.
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- 453 g) No person producing or possessing water treatment residuals shall cause
454 violations of the requirements of Title 35 of the Illinois Administrative Code,
455 Subtitles C and G, as implemented by the IEPA.
456
- 457 h) The total effective dose equivalent to workers or individual members of the public
458 from the registrant's operation shall not exceed 1 millisievert (0.1 rem) in any
459 year, exclusive of the dose contribution from:
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- 461 1) Background radiation;
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 - 463 2) Any medical administration the individual has received;
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 - 465 3) Exposure to individuals administered radioactive material and released in
466 accordance with 32 Ill. Adm. Code 335;
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 - 468 4) Voluntary participation in medical research programs;
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 - 470 5) A radioactive material licensee's disposal of radioactive material into
471 sanitary sewerage under 32 Ill. Adm. Code 340.1030; and
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- 6) Radon and its progeny.
 - i) Registrants shall limit radon exposure to workers.
 - 1) Registrants identified in subsections (a)(1), (a)(2), and (a)(3) shall conduct radon measurements in accordance with 32 Ill. Adm. Code 422 by [date certain], and at least once every five calendar years following the initial testing.
 - A) Measurements shall be conducted immediately before exchanging of exhausted filter media, or if the media is not scheduled to be exchanged during the measurement window, as close to the end of the measurement window as practical to allow for maximum loading of radium onto the filter media.
 - B) Radon concentrations shall be retested following the guidance outlined above within a year of any of the following circumstances occurring:
 - i) A new addition is constructed or alterations for building reconfiguration or rehabilitation occur;
 - ii) A ground contact area not previously tested is occupied;
 - iii) Treatment technologies capable of concentrating radium are newly installed or altered. Altering treatment technologies does not include activities such as replacing worn-out equipment or filter media while leaving the remainder of the system unchanged;
 - iv) A facility begins receiving treatment process backwash from a new (additional) water treatment facility or alterations are made to the treatment technologies at existing facilities that supply treatment process backwash. Alterations to treatment technologies do not include activities such as replacing worn-out equipment or filter media while leaving the remainder of the system unchanged;
 - v) The use of a new or different primary water source drawn from an aquifer designated to contribute elevated concentrations of radium to groundwater;

- 516 vi) Heating or cooling systems are altered with changes to air
517 distribution or pressure relationships;
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- 519 vii) Ventilation is altered by extensive weatherization, changes
520 to mechanical systems, or comparable procedures;
- 521
- 522 viii) Alterations or renovations resulting in sizable openings are
523 made to the facility's foundation, or flooring or natural
524 settlement occurs causing major cracks to develop; or
- 525
- 526 ix) An installed mitigation system is altered or repaired.
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528 AGENCY NOTE: Agency recommends radon mitigation when radon
529 concentrations in routinely occupied areas are found to be greater than 4.0
530 pCi/L, and recommends considering mitigation for concentrations between
531 2.0 and 4.0 pCi/L.

- 532
- 533 2) Registrants shall ensure that worker exposure from radon within all
534 occupied areas does not exceed 30 pCi/L or 0.3 WL, based on continuous
535 workplace exposure for 40 hours per week, 52 weeks per year, and shall
536 not exceed 4 WLM over a 12-month period, using an equilibrium ratio of
537 50 percent to convert radon exposure to WLM.
- 538

- 539 j) Persons producing or possessing water treatment residuals shall not cause
540 contamination of any area exceeding the values specified in Appendix A of 32 Ill.
541 Adm. Code 340.
- 542

- 543 k) For fixed facilities, registrants shall comply with 32 Ill. Adm. Code 340.920(e)
544 and post each area, tank, basin, or room in which an amount of material exceeding
545 ten times the quantity of radium-226 and radium-228 specified in Appendix C to
546 10 CFR 20, effective January 1, 2004, is used or stored with a conspicuous sign or
547 signs bearing the radiation symbol and the words "CAUTION RADIOACTIVE
548 MATERIALS" or "DANGER RADIOACTIVE MATERIALS". Areas visible to
549 the public may be posted within the confines of the barrier (fencing, hatch, etc.)
550 but must remain visible to workers entering the restricted area;
- 551

552 AGENCY NOTE: The referenced value is 1.0 microcurie. This equates to 5 kg
553 at 200 pCi/g.

- 554
- 555 l) Registrants shall comply with 32 Ill. Adm. Code 310.60 through 310.90, the
556 Radon Industry Licensing Act [420 ILCS 44] and 32 Ill. Adm. Code 422.
- 557

- 558 m) Registrants in compliance with 622.30 are exempted from the requirements of 32
559 Ill. Adm. Code 340.1060(e).

560

561 **Section 622.40 Worker Protection and Disposal Requirements for Water Treatment**
562 **Residuals Greater than 200 pCi/g**

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- 564 a) This Section only applies to persons producing or possessing water treatment
565 residuals with concentrations of combined radium greater than 200 pCi/g (dry
566 weight basis).

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- 568 b) Persons producing or in possession of water treatment residuals identified in
569 subsection (a) shall:

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- 571 1) Register with the Agency within 60 days of becoming subject to
572 subsection (a) in a format specified by the Agency;

573

- 574 2) Limit Dose to Workers and Members of the Public. Registrants shall
575 conduct operations so that:

576

- 577 A) The dose in any unrestricted area from external sources, exclusive
578 of the dose contributions from patients administered radioactive
579 material and released in accordance with 32 Ill. Adm. Code 335,
580 does not exceed 0.02 millisievert (0.002 rem) in any single hour.

581

- 582 B) Before allowing a worker or a member of the public to enter a
583 restricted area, instructions are given on radiation hazards and
584 protective measures to that individual. These instructions must
585 comply with subsection (b)(11).

586

- 587 C) Persons entering restricted areas or performing work in contact
588 with water treatment residuals identified in subsection (a) are
589 supplied with appropriate personal protective equipment (PPE).
590 PPE shall include, at a minimum, protective barriers to prevent
591 inadvertent ingestion or inhalation of airborne particles of
592 radioactive material as well as to limit the spread of contamination
593 from the work area.

594

- 595 E) Procedures are in place to ensure doses to workers are kept as low
596 as reasonably achievable and in compliance with this Part.
597 Emergency work that results in work duties or exposures outside
598 the scope of TENORM awareness training provided for workers as
599 outlined in Section 622.50(a) shall be reported to the Agency
600 within 45 days. The report shall include proposed revisions to the

601 registrant's training agenda or operating procedures necessary to
602 maintain compliance with this Part.

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604 AGENCY NOTE: Calculation of doses for compliance with this
605 subsection may be based upon calibrated radiation meter survey data and
606 worker occupancy times, or work area monitoring, rather than an
607 individual worker dosimetry program.
608

- 609 3) Employ institutional and engineered controls to limit exposure of water
610 treatment residuals to personnel and the environment.
- 611
- 612 A) If, during the course of operation, noncompliance with the limits
613 specified in subsection (b)(2) is discovered, the registrant shall
614 submit alternative procedures to the Agency within 45 days after
615 discovery.
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- 617 B) Continued inability to comply with the protective limits specified
618 in subsection (b)(2) may result in the Agency requiring the
619 registrant to comply with the specific license requirements in 32
620 Ill. Adm. Code 330 and additional training required for workers.
621
- 622 4) Afford the Agency, at all reasonable times, the opportunity to inspect
623 sources of radiation and the premises and facilities in which those sources
624 of radiation are used or stored, and records maintained under this Section.
625
- 626 5) Perform radiation surveys to demonstrate compliance with this Section.
627 Surveys shall be done to evaluate:
- 628
- 629 A) Gamma radiation exposure rate in all occupied areas, at a
630 minimum, of once per year;
- 631
- 632 B) Gamma radiation exposure rate in restricted areas before, during,
633 and after work requiring entry; and
634
- 635 C) Potential contamination of workers and the work area immediately
636 following work in restricted areas.
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- 638 6) Ensure use of calibrated radiation detection instruments. Instruments and
639 equipment used for quantitative radiation measurements (e.g., exposure
640 rate and contamination monitoring) shall be calibrated at intervals not to
641 exceed 12 months for the radiation measured. To satisfy this requirement,
642 the registrant shall:
643

- 644 A) Post a legible note on the instrument showing the date of
645 calibration; and
646
647 B) Ensure that instrument calibrations are performed by persons
648 specifically licensed by the Agency, the U.S. Nuclear Regulatory
649 Commission, an Agreement State, or a Licensing State to perform
650 such calibrations.
651
- 652 7) Provide notices and instructions to workers.
653
- 654 A) Each registrant shall post, in conspicuous places easily visible to
655 workers, current copies of the following documents:
656
- 657 i) This Part;
 - 658 ii) Agency Form KLA.001 "Notice to Employees";
 - 659 iii) The operating procedures applicable to activities under the
660 registration;
 - 661 iv) Any notice of violation or administrative order involving
662 radiological working conditions and any response from the
663 registrant; and
 - 664 v) All radiological surveys, analytical media analysis results,
665 and radon testing results.
666
667
- 668 B) If the posting of a document specified in subsection (b)(7)(A) is
669 not practicable, the registrant may post a notice summarizing the
670 documents and the location where the documents may be
671 examined.
672
- 673 C) The registrant shall post Agency notices of violation or
674 administrative orders involving radiological working conditions,
675 along with any responses from the registrant, within 5 working
676 days after receipt of the notice or order. The registrant's response,
677 if any, shall be posted within 5 working days after the registrant
678 sends it to the Agency. The documents shall remain posted for a at
679 least 5 working days or until action correcting the violation has
680 been completed, whichever is later.
681
682
- 683 D) All individuals whose job duties do not require entry into restricted
684 areas or contact with material identified in subsection (a) shall be
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686

687 provided instruction which includes, at a minimum, the material
688 identified in Section 622.50(a), (b), and (c). The initial instruction
689 and annual refreshers must last at least one hour.

690
691 E) All individuals working in, or the performance of whose duties
692 requires access to any portion of a restricted area or who frequent
693 areas where radioactive material is used or stored shall be
694 instructed, at a minimum, in all content described in Section
695 622.50.

696
697 F) The registrant shall maintain records of initial and annual
698 employee training for five years after the date of the training.

699
700 8) Shall identify a responsible individual with sufficient knowledge and
701 authority to prevent unsafe practices, approve radiation safety-related
702 issues and communicate promptly to an appropriate level of management.
703 The designated official shall be responsible for ensuring the requirements
704 specified in this Part are adequately implemented.

705
706 c) Any person who receives, possesses, uses, or transfers water treatment residuals
707 with concentrations of combined radium greater than 200 pCi/g (dry weight
708 basis), and is not otherwise a registrant under Section 622.30 (including, but not
709 limited to, vendors, contractors, service providers, consultants, low-level
710 radioactive waste brokers, or persons performing decommissioning work) shall
711 obtain a radioactive material license 32 Ill. Adm. Code 330.

712
713 AGENCY NOTE: The requirement to obtain a license does not apply to the
714 transportation of water treatment residuals. However, persons transporting water
715 treatment residuals must comply with all other applicable federal, State and local
716 government regulations.

717
718 d) The registrant shall notify the Agency before removing material identified in
719 subsection (a) from the facility for disposal, treatment, or transport. Such
720 notification shall include the location, quantity, proposed dates, and proposed
721 method for disposal.

722
723 AGENCY NOTE: For the purposes of this subsection, “disposal, treatment, or
724 transport” does not apply to discharge to a sanitary sewer.

725
726 1) Unless specifically authorized by a radioactive material license or
727 elsewhere in this Section, registrants are not authorized to transport
728 material identified in subsection (a) outside the site where the registrant is
729 authorized to produce and possess the material.

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2) Before releasing, repurposing, or repair of equipment (piping, pumps, tanks, etc.) that has been contaminated with material identified in subsection (a), the registrant shall remove or provide for the removal of such contaminants and ensure that:

A) The equipment is decontaminated to the lowest practicable level before release. Unless the Agency specifies another value, the values specified in Appendix A of 32 Ill. Adm. Code 340 shall serve as guidelines for this purpose.

B) The total amount of contamination does not exceed the quantities listed in Appendix C to 10 CFR 20.

AGENCY NOTE: Notification to the Agency is not required when transport is incidental to shipment for analytical services.

e) Registrants may dispose of material by:

1) Disposal by Release into Sanitary Sewerage. A registrant may discharge material into the sanitary sewer if each of the following conditions is satisfied:

A) The registrant provides information on the nature of the discharge to the water treatment facility and receives written authorization from that facility before discharge;

B) Wastewater treatment facilities receiving discharges authorized this subsection are registered and in compliance with the provisions of Section 622.30; and

AGENCY NOTE: Discharges of material identified in subsection (a) to a wastewater treatment facility will require that facility to register under Section 622.30 due to the unquantified impact the material will have on the facility's water treatment residuals. Receiving wastewater treatment plants may have local pretreatment standards restricting such discharges.

C) The total quantity of material identified in subsection (a) that the registrant releases into the sanitary sewer in a year does not exceed 1.0 Ci.

- 772 2) An alternative disposal method may be used if the Agency reviews and
773 approves it beforehand under 32 Ill. Adm. Code 340.1020; or
774
775 3) The material may be disposed of at a facility authorized to dispose of such
776 material in accordance with any federal or State solid or hazardous waste
777 laws as long as the following conditions are satisfied:
778
779 A) Packaging, decommissioning, preparation of manifests, and
780 shipment of material is performed by persons with a specific
781 radioactive material license from the Agency, authorized
782 Agreement State or the NRC to perform such work; and
783
784 B) The registrant ensures compliance with 32 Ill. Adm. Code
785 340.1060, as applicable.
786
787 f) Persons producing or possessing water treatment residuals shall not cause
788 contamination of any area exceeding the values specified in Appendix A of 32 Ill.
789 Adm. Code 340.
790

791 **Section 622.50 TENORM Awareness Training for Registrants**
792

- 793 a) For those registrants identified in Section 622.40, TENORM awareness training
794 (1-2 hours at a minimum) shall be included as part of the facility's health and
795 safety training program and conducted before starting of any job duties associated
796 with a radiological hazard.
797
798 b) TENORM Awareness Training shall contain, at a minimum, policies and
799 procedures for each facility, including the management policy to maintain all
800 personnel exposure as low as reasonably achievable. Additionally, workers shall
801 be:
802
803 1) Kept informed of the storage, transfer, or use of sources of radiation and
804 the identity of restricted areas;
805
806 2) Instructed, at appropriate levels of detail, in the health protection problems
807 associated with exposure to radiation or radioactive material, in the risks
808 of radiation exposure to the embryo and fetus, in precautions or
809 procedures to minimize exposure, and in the purposes and functions of
810 protective devices employed;
811
812 3) Instructed in, and instructed to observe to the extent within the worker's
813 control, the requirements in Section 622.40 for the protection of personnel
814 from exposure to radiation or radioactive material;

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- 4) Instructed to report promptly to the licensee or registrant any condition that may constitute, lead to, or cause a violation of the Radiation Protection Act of 1990 [420 ILCS 40], the requirements of Section 622.40 or unnecessary exposure (i.e., exposure that results when prescribed safety measures are not followed) to radiation or radioactive material;
 - 5) Advised of the mechanisms in place to ensure workers' exposures within the limits established in Section 622.30(i)(2) and 622.40(b)(2).
- c) These instructions shall be of sufficient detail to avoid radiological hazards and shall be given directly to each worker either in writing or in an orientation course, with the workers signing a statement that they have received the information listed in subsection (b) and understand it. Refresher training that covers all of the required topics shall be provided at intervals not to exceed 12 months.
- d) In addition to TENORM Awareness Training, training for workers whose job duties may involve entering restricted areas or contact with material identified in Section 622.40(a) shall include the following:
- 1) Fundamentals of Radiation Safety:
 - A) Introduction to NORM and TENORM;
 - B) Characteristics of alpha, beta, and gamma radiation;
 - C) Units of radiation dose and quantity of radioactivity associated with TENORM;
 - D) Hazards of exposure to different kinds of radiation;
 - E) Levels of radiation from TENORM sources of radiation;
 - F) Methods of controlling radiation dose through time, distance and shielding, ventilation, decontamination, and source reduction to reduce doses as low as practicable; and
 - G) Methods of avoiding intake or exposure to radiation through the use of personal protective equipment, proper working procedures, and decontamination.
 - 2) Radiation Detection Instruments, including:

- 858 A) Use, operation, and limitations of radiation survey instruments for
859 alpha, beta and gamma radiation;
860
861 B) Survey techniques, including ambient and frisking methods;
862
863 C) Surveying and sampling for NORM and TENORM; and
864
865 D) Monitoring equipment and action levels for radon.
866
- 867 3) Proper Use of Personnel Protective Equipment (PPE), including:
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869 A) Different types of PPE;
870
871 B) Donning of PPE;
872
873 C) Removal of PPE;
874
875 D) Decontamination techniques; and
876
877 E) Use of respiratory protection equipment and radon mitigation as
878 needed.
879
- 880 4) Identification of areas requiring posting and labeling, including
881 identification of known and potential TENORM-containing areas. This
882 includes pumps and piping where mineral scale accumulates; lagoons,
883 flocculation tanks, and sedimentation tanks where residual sludge
884 accumulates; filters, pumping stations, and storage tanks where scales and
885 sludge accumulate; facilities where filter backwash, brines, or other
886 contaminated water accumulates; facilities that are enclosed (radon); and
887 residuals processing or handling areas.
888
- 889 5) Containerization, storage, and disposal of TENORM wastes.
890
- 891 6) Requirements of pertinent federal and State of Illinois regulations.
892
- 893 7) Topics and discussions of assigned activities during normal and abnormal
894 situations involving exposure to TENORM that can reasonably be
895 expected to occur during work activities.
896
- 897 e) Recommended Training for Instructors. Instructors of TENORM courses should
898 have adequate and commensurate experience in field operations associated with
899 TENORM activities at water and wastewater facilities. The field experience work

900 needs to include sufficient time in radiation protection and the use of radiation
901 detection equipment.

902

903 **Section 622.60 General Variance**

904

905 A variance is a temporary exemption from this Part, that the Agency may grant with or without
906 conditions for a period of up to five years upon the presentation of adequate proof by the
907 petitioner that compliance with a requirement would impose an undue hardship. A person filing
908 a petition for a variance shall provide the information in subsections (a) through (h) to the
909 Agency. If the petitioner believes that any of the required information does not apply to the
910 specific variance requested, the petitioner shall include an explanation.

911

912 AGENCY NOTE: The filing of a petition for a variance does not stay enforcement of a
913 requirement of this Part.

914

915 a) A statement describing the requirement from which the petitioner seeks a
916 variance. The statement must include the citation to that requirement;

917

918 b) A complete and concise description of the nature of the petitioner's activity that is
919 the subject of the proposed variance, including:

920

921 1) Location of, and area affected by, the petitioner's activity;

922

923 2) Location of points of disposal or repurposing, and, as applicable, the
924 identification of the receiving waterway or land;

925

926 3) Identification of any prior variance issued to the petitioner and, if known,
927 the petitioner's predecessors, concerning similar relief;

928

929 4) An explanation of other permits or licenses held by any other federal,
930 state, or local agency that is affected by this variance request;

931

932 5) Nature and amount of the materials used in the process or activity for
933 which the petitioner seeks a variance, and a full description of the
934 particular process or activity in which the materials are used;

935

936 6) Description of the relevant measures to mitigate the accumulation of
937 TENORM already in use; and

938

939 7) Nature and amount of disposal, discharges, or releases of the material in
940 question currently generated by the petitioner's activity.

941

- 942 c) A description of the efforts that would be necessary for the petitioner to achieve
 943 immediate compliance with the requirement at issue. All possible compliance
 944 alternatives, with the corresponding costs for each alternative, shall be identified.
 945 The description of compliance alternatives shall include the availability of
 946 alternate methods of compliance, the extent that the methods were studied, and
 947 the comparative factors leading to the selection of the proposed alternative for
 948 compliance. The description of the costs of immediate compliance should include
 949 the overall capital costs and the annualized capital and operating costs, if
 950 applicable;
 951
- 952 d) Facts setting forth the reasons the petitioner believes immediate compliance with
 953 the requirement would impose an arbitrary or unreasonable hardship;
 954
- 955 e) A detailed description of the compliance plan, including:
 956
- 957 1) Discussion of the proposed equipment or proposed alternative measures to
 958 mitigate TENORM accumulation to be undertaken to achieve full
 959 compliance with the requirement;
 960
 - 961 2) Schedule for the implementation of all phases of the proposed alternative
 962 compliance measures from initiation of design to program completion; and
 963
 - 964 3) The estimated costs involved for each phase and the total cost to achieve
 965 compliance.
 966
- 967 f) A description of the environmental impact of the petitioner's activity, including:
 968
- 969 1) Nature and amount of disposals, discharges, or releases of the material in
 970 question if the Agency grants the requested variance, compared to that
 971 identified in subsection (b)(7);
 972
 - 973 2) Quantitative demonstration that actions undertaken during the period of
 974 variance will not result in any individual members of the public receiving
 975 more than 1 millisievert (0.1 rem) TEDE annually (excluding the
 976 contribution from radon) from all licensed or registered sources of
 977 radiation, including water treatment residuals; and
 978
 - 979 3) A statement of the measures to be undertaken during the period of the
 980 variance to minimize the impact of the discharge of contaminants on
 981 human, plant, and animal life in the affected area, including the numerical
 982 interim discharge limitations that can be achieved during the period of the
 983 variance.
 984

- 985 g) A proposed beginning and ending date for the variance. If the petitioner requests
- 986 that the term of the variance begin on any date other than the date on which the
- 987 Agency takes final action on the petition, a detailed explanation and justification
- 988 for the alternative beginning date; and
- 989
- 990 h) Any other information the Agency deems necessary.
- 991

992 **Section 622.70 Maintenance of Records & Inspections**

- 993
- 994 a) Maintain records. Each registrant shall maintain records showing compliance with
- 995 this Part for five years. Records may be stored in electronic media with the
- 996 capability to produce legible, accurate, and complete records during the required
- 997 retention period. Records such as letters, drawings, and specifications shall
- 998 include all pertinent information such as stamps, initials, and signatures.
- 999
- 1000 1) Each registrant with a combined radium concentration greater than 3.1
- 1001 pCi/g (dry weight basis) shall maintain records of the following:
- 1002
- 1003 A) Registrants who dispose of water treatment residuals in an IEPA-
- 1004 permitted municipal solid waste landfill or a facility authorized to
- 1005 dispose of that material in accordance with any federal or State
- 1006 solid or hazardous waste laws:
- 1007
- 1008 i) Quantity of water treatment residuals disposed of;
- 1009
- 1010 ii) Concentration of combined radium in pCi/g (dry weight
- 1011 basis) contained in the water treatment residuals;
- 1012
- 1013 iii) Dates the water treatment residuals were disposed of in a
- 1014 landfill;
- 1015
- 1016 iv) Name and location of the landfill receiving the water
- 1017 treatment residuals; and
- 1018
- 1019 v) Any additional records showing compliance with this Part
- 1020 requested by the Agency.
- 1021
- 1022 B) Registrants who land apply water treatment residuals:
- 1023
- 1024 i) Tax parcel identification number of lands utilized for
- 1025 application of water treatment residuals;
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- ii) County, township, section, and range in which the tax parcel lies;
 - iii) Tillable acres for the tax parcel;
 - iv) A signed landowner acknowledgement form for the tax parcel;
 - v) Total dry tons of water treatment residuals applied to the tax parcel;
 - vi) For each application, the concentration of radium-226 and radium-228 in pCi/g (dry weight basis) contained in the water treatment residuals;
 - vii) Dates the water treatment residuals were land applied;
 - viii) The cumulative increase and total combined radium concentration in the soil for each tax parcel having received application of water treatment residuals; and
 - ix) Any additional records showing compliance with this Part requested by the Agency.
- 2) Registrants identified in Section 622.40 who dispose of residuals via release into sanitary sewerage shall maintain documentation demonstrating that the total quantity of material released in a year does not exceed 1.0 Ci.
- 3) Registrants who dispose or repurpose water treatment residuals approved by the Agency under 32 Ill. Adm. Code 340.1020 shall maintain documentation in accordance with this Section.
- 4) All Registrants shall maintain documentation pertaining to radon measurements.
- b) Registrants shall make records available for Agency inspection in accordance with Section 27 of the Radiation Protection Act of 1990 [420 ILCS 40/27]. In addition, the registrant shall afford the Agency, at all reasonable times, an opportunity to inspect sources of radiation, and the premises and facilities in which those sources of radiation are used or stored, and records maintained under this Section.

- 1070 c) Registrants shall post or make available to employees all records of radiation
1071 survey measurements, water treatment residuals analysis results, and radon
1072 measurements.
1073

1074 **Section 622.80 Noncompliance and Reporting of Incidents**
1075

- 1076 a) Each registrant shall report to the Agency any noncompliance with this Part
1077 within 30 days after the noncompliance is discovered.
1078
1079 b) Each registrant shall, within 30 days of discovery of the event, report to the
1080 Agency each event involving loss of control of water treatment residuals
1081 possessed by the registrant that may have caused, or threatens to cause, an
1082 unplanned contamination event outside of a restricted area exceeding the values
1083 specified in Appendix A of 32 Ill. Adm. Code 340.
1084

1085 AGENCY NOTE: Reports can be made to EMA.RadiumResiduals@illinois.gov
1086 or the 24-hour IEMA-OHS Communications Center (217-782-7860).
1087

- 1088 c) Persons found to have caused or contributed to violations of the requirements of
1089 this Part may be required to:
1090
1091 1) Remediate under the Agency's rules in Title 32 of the Illinois
1092 Administrative Code;
1093
1094 2) Reimburse for remediation efforts initiated on the persons behalf under 32
1095 Ill. Adm. Code 310; and
1096
1097 3) Obtain a radioactive material license in accordance with 32 Ill. Adm. Code
1098 330.
1099

1100 **Section 622.90 Notifications to the Agency**
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1102 All notifications to the Agency concerning the requirements of this Part shall be sent to
1103 EMA.RadiumResiduals@illinois.gov.
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Section 622.APPENDIX A Landowner Acknowledgement Form

At a minimum, the following language shall be included in the landowner acknowledgement form required in Section 622.30(c)(1)(B)(ix). Failure to include this language and to have the landowner sign and date shall invalidate the acknowledgement.

The Illinois Environmental Protection Agency, as well as the U.S. Environmental Protection Agency, requires the water treatment residuals you are receiving to be monitored for trace metals, organic and inorganic chemicals, and pathogens. In addition, the Illinois Emergency Management Agency and Office of Homeland Security (IEMA-OHS) requires the monitoring of radium under 32 Ill. Adm. Code 622 (Part 622). Radium is naturally present in soil and groundwater. When removed from water and land-applied, these water treatment residuals could elevate the radium content in the soil above natural levels.

IEMA-OHS, as the regulatory agency for ionizing radiation, requires that land-applied water treatment residuals be monitored for radium, including the cumulative amount of radium, deposited on agricultural fields. Fields that approach the regulatory limit of 3.1 pCi/g are required to utilize alternative sources of fertilizer (i.e., water treatment residuals without elevated radium from water). The additional monitoring and land application provisions of Part 622 ensure that the public is protected from significant health, environmental, and agricultural impacts.

This form serves as an acknowledgement of awareness by the landowner, or authorized agent of the landowner, that biosolids applied to fields for beneficial nutrient purposes contain radium. For further information, you may contact IEMA-OHS at EMA.RadiumResiduals@illinois.gov.

I hereby acknowledge my awareness of the above conditions resulting from application of treatment residuals to my property.

SIGNATURE OF LANDOWNER OR LANDOWNER'S DESIGNEE

PRINTED NAME

DATE