

**ORAL ARGUMENT SCHEDULED FOR OCTOBER 9, 2012**

**DOCKET No. 11-1449**

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**UNITED STATES COURT OF APPEALS**  
**FOR THE DISTRICT OF COLUMBIA CIRCUIT**

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**SHIELDALLOY METALLURGICAL CORPORATION**

*Petitioner,*

**v.**

**UNITED STATES NUCLEAR REGULATORY COMMISSION AND**  
**THE UNITED STATES OF AMERICA,**

*Respondents.*

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**ON PETITION FOR REVIEW OF A FINAL ORDER BY**  
**THE UNITED STATES NUCLEAR REGULATORY COMMISSION**

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**SUPPLEMENTAL ADDENDUM TO FINAL REPLY BRIEF OF**  
**PETITIONER SHIELDALLOY METALLURGICAL CORPORATION**

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July 27, 2012

**REPLY BRIEF SUPPLEMENTAL ADDENDUM**  
**REFERENCED STATUTES AND REGULATIONS**

10 C.F.R. § 20.1401(d) (2012).....	1
N.J. Admin. Code § 7:26C-1.4 (2012).....	2
N.J. Admin. Code § 7:26E-5.2(a)(5) (2012).....	6
N.J. Admin. Code § 7:28-12.1 <i>et seq.</i> (2012) .....	8
N.J. Admin. Code § 7:28-12.4(a) (2012).....	45
N.J. Admin. Code § 7:28-12.12(b)2 (2012).....	47

(ii) If an individual were continuously present in an unrestricted area, the dose from external sources would not exceed 0.002 rem (0.02 mSv) in an hour and 0.05 rem (0.5 mSv) in a year.

(c) Upon approval from the Commission, the licensee may adjust the effluent concentration values in appendix B to part 20, table 2, for members of the public, to take into account the actual physical and chemical characteristics of the effluents (e.g., aerosol size distribution, solubility, density, radioactive decay equilibrium, chemical form).

[56 FR 23398, May 21, 1991; 56 FR 61352, Dec. 3, 1991, as amended at 57 FR 57878, Dec. 8, 1992; 60 FR 20185, Apr. 25, 1995]

### **Subpart E—Radiological Criteria for License Termination**

SOURCE: 62 FR 39088, July 21, 1997, unless otherwise noted.

#### **§ 20.1401 General provisions and scope.**

(a) The criteria in this subpart apply to the decommissioning of facilities licensed under parts 30, 40, 50, 52, 60, 61, 63, 70, and 72 of this chapter, and release of part of a facility or site for unrestricted use in accordance with § 50.83 of this chapter, as well as other facilities subject to the Commission's jurisdiction under the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended. For high-level and low-level waste disposal facilities (10 CFR parts 60, 61, and 63), the criteria apply only to ancillary surface facilities that support radioactive waste disposal activities. The criteria do not apply to uranium and thorium recovery facilities already subject to appendix A to 10 CFR part 40 or the uranium solution extraction facilities.

(b) The criteria in this subpart do not apply to sites which:

(1) Have been decommissioned prior to the effective date of the rule in accordance with criteria identified in the Site Decommissioning Management Plan (SDMP) Action Plan of April 16, 1992 (57 FR 13389);

(2) Have previously submitted and received Commission approval on a license termination plan (LTP) or de-

commissioning plan that is compatible with the SDMP Action Plan criteria; or

(3) Submit a sufficient LTP or decommissioning plan before August 20, 1998 and such LTP or decommissioning plan is approved by the Commission before August 20, 1999 and in accordance with the criteria identified in the SDMP Action Plan, except that if an EIS is required in the submittal, there will be a provision for day-for-day extension.

(c) After a site has been decommissioned and the license terminated in accordance with the criteria in this subpart, or after part of a facility or site has been released for unrestricted use in accordance with § 50.83 of this chapter and in accordance with the criteria in this subpart, the Commission will require additional cleanup only, if based on new information, it determines that the criteria of this subpart were not met and residual radioactivity remaining at the site could result in significant threat to public health and safety.

(d) When calculating TEDE to the average member of the critical group the licensee shall determine the peak annual TEDE dose expected within the first 1000 years after decommissioning.

[62 FR 39088, July 21, 1997, as amended at 66 FR 55789, Nov. 2, 2001; 68 FR 19726, Apr. 22, 2003; 72 FR 49485, Aug. 28, 2007]

#### **§ 20.1402 Radiological criteria for unrestricted use.**

A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels which are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal.

N.J. Admin. Code tit. 7, 7:26C-1.4

## C

New Jersey Administrative Code [Currentness](#)

Title 7. Department of Environmental Protection

Chapter 26C. Administrative Requirements for the Remediation of Contaminated Sites (Arrcs) Rules ([Refs & Annos](#))

 [Subchapter 1](#). General Information

→→ **7:26C-1.4 Applicability and exemptions**

(a) Except as provided in (c) and (d) below, each of the following persons shall comply with this chapter:

1. Each person who has executed or is otherwise subject to a judicial or administrative order, a judicial consent judgment, an administrative consent order, a memorandum of understanding, a remediation agreement, or any other legally binding document with the Department for the remediation of a contaminated site;
2. Each owner and operator of a regulated underground storage tank who is liable for the remediation pursuant to the Underground Storage of Hazardous Substances Act, [N.J.S.A. 58:10A-21 et seq.](#);
3. Each owner and operator of an industrial establishment who is liable for the remediation of that industrial establishment pursuant to Industrial Site Recovery Act, [N.J.S.A. 13:1K-6 et seq.](#);
4. Each person in any way responsible, pursuant to the Spill Compensation and Control Act, [N.J.S.A. 58:10-23.11](#), for any hazardous substance that was discharged, including, without limitation:
  - i. Each owner of the real property where the discharge occurred at the time of the discharge;
  - ii. Each subsequent owner of the real property where the discharge occurred prior to the filing of a final remediation document with the Department;
  - iii. A holder of a security interest in the site, who actively participated in the management of the site or regulated underground storage tank that was the subject of a remedial action that includes an engineering and/or institutional control;
  - iv. A holder of a security interest in the site, who negligently caused a new discharge at the site after the date of foreclosure on a security interest in the site or the regulated underground storage tank that was the subject of the remedial action that includes an engineering and/or institutional control; or

v. A statutory permittee during that person's ownership, tenancy, or operation, depending on that person's continuing liability for the remediation pursuant to the Spill Compensation and Control Act, [N.J.S.A. 58:10-23.11g](#);

5. The person responsible for conducting the remediation when:

i. The Department rescinds a no further action letter or invalidates a response action outcome; or

ii. The licensed site remediation professional rescinds his or her own response action outcome; and

6. Any other person who is responsible for remediating a site pursuant to [N.J.S.A. 58:10-23.11g](#).

(b) If more than one person is responsible for conducting the remediation of a contaminated site, each such person is jointly and severally liable for compliance with this chapter.

(c) The requirements of this chapter do not apply to any person who is:

1. Not listed in (a) above, and who is conducting due diligence in accordance with [N.J.S.A. 58:10B-1.3d\(2\)](#);

2. Remediating a landfill, unless:

i. The landfill or any portion thereof is slated for redevelopment that includes structures intended for human occupancy;

ii. When landfill remediation activities are funded, in whole or part, by the Hazardous Discharge Site Remediation Fund pursuant to the Brownfield and Contaminated Site Remediation Act at [N.J.S.A. 58:10B-4](#) through 9, a Brownfield Redevelopment agreement pursuant to the Brownfield and Contaminated Site Remediation Act at [N.J.S.A. 58:10B-27](#) through 31, or the Municipal Landfill Closure and Remediation Reimbursement Program pursuant to the Solid Waste Management Act at [N.J.S.A. 13:1E-116.1](#) through 116.7; or

iii. The person conducting the remediation wants a final remediation document; or

3. Remediating a discharge pursuant to a New Jersey Pollutant Discharge Elimination System Underground Injection Control permit issued pursuant to [N.J.A.C. 7:14A](#).

(d) The person responsible for conducting the remediation of a discharge from an unregulated heating oil tank , is only required to comply with the requirements of [N.J.A.C. 7:26C-4](#) and 13.

(e) Unless notified in writing by the Department that additional remediation is necessary, the person responsible for conducting the remediation of any of the following types of discharges is exempt from the requirements at [N.J.A.C. 7:26C-2.3](#) to use the services of a licensed site remediation professional or to submit documents to the Department:

1. A petroleum surface spill of less than 100 gallons that does not reach the waters of the State of New Jersey provided that:

i. Any contamination is remediated within 90 days after the occurrence of the spill; and

ii. The person responsible for conducting the remediation documents, at the time of the spill, his or her specific knowledge of the date and volume of the spill;

2. A discharge that results from a passenger motor vehicle accident; or

3. A discharge that the Department refers to its Bureau of Emergency Response, to the New Jersey Office of Emergency Management, or to a County Environmental Health Agency.

(f) Any governmental entity that is not liable under N.J.S.A. 58:10- 23.11g.d(4) shall be exempt from paying the initial annual remediation fee and subsequent annual remediation fees as required by [N.J.A.C. 7:26C-4.3\(a\)3](#) through [5](#), and, instead, shall pay annual remediation fees pursuant to [N.J.A.C. 7:26C-4.3\(a\)7](#).

Adopted by R.1997 d.499, effective November 17, 1997. Amended by R.2003 d.198, effective May 19, 2003. Adopted by R.2009 d.361, effective November 4, 2009. Amended by R.2012 d.095, effective May 7, 2012.

#### CHAPTER EXPIRATION DATE

<Chapter 26C, Administrative Requirements for the Remediation of Contaminated Sites (ARRCS) Rules, expires on September 8, 2018.>

#### HISTORICAL NOTES

##### Source:

**1997.** See: 29 N.J.R. 46(a), 29 N.J.R. 4957(a).

**2003.** See: 34 N.J.R. 3703(a), 35 N.J.R. 2319(a).

**2009.** See: 41 N.J.R. 4467(a).

N.J. Admin. Code tit. 7, 7:26C-1.4

**2012.** See: 43 N.J.R. 1935(a), 44 N.J.R. 1339(b).

**Administrative Changes and Corrections:**

**2010.** See: 42 N.J.R. 778(a).

Editor's Note

R.2012, d.095, rewrote the section.

7:26C-1.4, NJ ADC 7:26C-1.4

May 7, 2012; 44 N.J. Reg. No. 9

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N.J.A.C. 7:26E-5.2

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N.J. Admin. Code tit. 7, 7:26E-5.2

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Title 7. Department of Environmental Protection

Chapter 26E. Technical Requirements for Site Remediation ([Refs & Annos](#))▢ [Subchapter 5. Remedial Action](#)→→ **7:26E-5.2 Specific remedial action requirements**

(a) The person responsible for conducting the remediation shall:

1. Select a remedial action that will prevent further exposure of any receptor to any residual contamination;
2. Develop and implement a monitoring program that will effectively monitor the performance of the remedial action;
3. Demonstrate compliance with the remediation standard or ecological risk-based remediation goal established pursuant to [N.J.A.C. 7:26E-4.8](#) by:
  - i. Collecting a sufficient number of samples in appropriate locations to confirm the effectiveness of the remedial action;
  - ii. Collecting samples using appropriate sampling methods; and
  - iii. Analyzing samples for the contaminants of concern using appropriate analytical methods;
4. File a deed notice pursuant to [N.J.A.C. 7:26C-7.2](#) when implementing a soil remedial action where the residual contaminant concentrations remaining will exceed the residential direct contact soil remediation standards; and
5. Obtain and comply with a remedial action permit pursuant to N.J.A.C. 7:26C-7 for a restricted use or limited restricted use remedial action.

(b) The person responsible for conducting the remediation may incorporate alternative fill from an off-site source into a remedial action at an area of concern provided that:

1. The contaminants present in the alternative fill are also present at the receiving area of concern;



2. The maximum contaminant concentration in the alternative fill imported is less than the 75th percentile of the contaminant concentrations at the receiving area of concern; and

3. No alternative fill is imported in excess of the volume required for the remedial action without the prior written approval of the Department.

(c) The person responsible for conducting the remediation may use alternative fill from an on-site source as part of a remedial action at an area of concern provided that the contaminants present in the alternative fill are also present at the receiving area of concern.

(d) The person responsible for conducting the remediation shall ensure that all clean fill material meets the definition of clean fill pursuant to [N.J.A.C. 7:26E-1.8](#).

(e) The person responsible for conducting the remediation shall not import hazardous waste as fill material.

(f) The person responsible for conducting the remediation shall not use any fill containing free liquid.

(g) The person responsible for conducting the remediation shall prepare a fill use plan whenever alternative fill or clean fill is proposed as part of a remedial action and shall submit the fill use plan to the Department as part of the remedial action workplan required pursuant to [N.J.A.C. 7:26E-5.5](#).

Adopted by R.2012 d.95, effective May 7, 2012.

#### CHAPTER EXPIRATION DATE

<Chapter 26E, Technical Requirements for Site Remediation, expires on May 7, 2019.>

#### HISTORICAL NOTES

##### Source:

**2012.** See: 43 N.J.R. 1935(a), 44 N.J.R. 1339(b).

7:26E-5.2, NJ ADC 7:26E-5.2

May 7, 2012; 44 N.J. Reg. No. 9

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## Title 7. Department of Environmental Protection

☞ [Chapter 28. Radiation Protection Programs \(Refs & Annos\)](#)→ [Subchapter 12. Remediation Standards for Radioactive Materials](#)→ [7:28-12.1 Purpose and scope](#)

The purpose of this subchapter is to establish minimum standards for the remediation of real property contaminated by radioactive materials. This subchapter also provides direction on remediating a site contaminated with radioactive materials with regard to sampling, surveying, and laboratory requirements, remedial action selection, and remedial action requirements.

→ [7:28-12.2 Applicability](#)

(a) The standards and/or dose criteria in this subchapter are applicable to:

1. Remediation of radioactive contamination of real property by any technologically enhanced naturally occurring radioactive materials, source, by-product, certain special nuclear material, and diffuse NARM; and
2. Any other remediation of radioactive contamination including, without limitation, any remediation pursuant to: the Spill Compensation and Control Act, [N.J.S.A. 58:10-23.11 et seq.](#); the Water Pollution Control Act, [N.J.S.A. 58:10A-1 et seq.](#); the Industrial Site Recovery Act, [N.J.S.A. 13:1K-6 et seq.](#); the Solid Waste Management Act, [N.J.S.A. 13:1E-1 et seq.](#); the Comprehensive Regulated Medical Waste Management Act, [N.J.S.A. 13:1E-48.1 et seq.](#); the Major Hazardous Waste Facilities Siting Act, [N.J.S.A. 13:1E-49 et seq.](#); the Sanitary Landfill Facility Closure and Contingency Fund Act, [N.J.S.A. 13:1E-100 et seq.](#); the Regional Low Level Radioactive Waste Disposal Facility Siting Act, [N.J.S.A. 13:1E-177 et seq.](#); any law or regulation by which the State may compel a person or licensee to perform remediation activities; or N.J.A.C. 7:26C.

(b) The standards in this subchapter are not applicable to:

1. Materials containing naturally occurring radionuclides whose concentrations have not been technologically enhanced; or
2. Coal ash that has been or is being used in:
  - i. The manufacture of construction materials including, but not limited to, cinder blocks, concrete products and roofing materials;

ii. Road construction materials including, but not limited to, asphalt filler or road base material; or

iii. Landfill cover.

(c) The Department shall apply the radiation remediation standards and dose criteria in this chapter at applicable sites as “Applicable or Relevant and Appropriate Requirements” as defined in the Comprehensive Environmental Response, Compensation and Liability Act, [42 U.S.C. §§9601 et seq.](#)

### → 7:28-12.3 Definitions

The following words and terms, when used in this subchapter, shall have the following meanings, unless the context clearly indicates otherwise:

“Appropriate period of time” means the length of time determined by the Department, taking into consideration the radioactive half-life, total activity, concentration, and physical condition of the residual radioactivity, geologic stability of the area, and current and projected future demographics.

“Committed dose equivalent” means the total dose equivalent averaged throughout any body tissue in the 50 years after intake of a radionuclide into the body.

“Committed effective dose equivalent” means the sum of the products of the committed dose equivalents to individual tissues resulting from an intake of a radionuclide multiplied by the appropriate weighting factor ( $W_T$ ) indicated below:

Organ or Tissue	$W_T$
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone Surfaces	0.03
Remainder	0.30*
Whole Body (external)	1.00

\*0.30 results from 0.06 for each of five “remainder” organs (excluding the skin and the lens of the eye) that receive the highest doses.

“Contaminated site” means a site as defined pursuant to the Technical Requirements for Site Remediation rules at [N.J.A.C. 7:26E-1.8.](#)

“Deep-dose equivalent” means, applied to external whole-body exposure, the dose equivalent at a tissue depth of one centimeter.

“Derived concentration guideline level” means the radionuclide-specific activity concentration corresponding to the release criterion.

“Design features” means those features of a remediation that do not rely on additional expenditures after installation to achieve their intended purpose.

“Dose equivalent” means the product of the absorbed dose (D), the quality factor (Q), and other modifying factors (N). For purposes of this definition,  $N = 1$ .

“Engineering controls” means any physical mechanism to contain or stabilize contamination or ensure the effectiveness of a remedial action. Engineering controls under this subchapter may include, without limitation, caps, covers, dikes, trenches, leachate collection systems, radon remediation systems, signs, fences, physical access controls, ground water monitoring systems and ground water containment systems including, without limitation, slurry walls and ground water pumping systems.

“Final status survey” is a survey or analysis, performed after remediation, which provides data that demonstrates that all radiological parameters satisfy the remediation standards.

“Institutional controls” means a mechanism used to limit human activities at or near a contaminated site, or to ensure the effectiveness of the remedial action over time, when contaminants remain at a site in levels or concentrations above the applicable remediation standard that would allow unrestricted use of that property. Institutional controls under this subchapter may include, without limitation, structure, land and natural resource use restrictions, well restriction areas, classification exception areas, deed notices, and declarations of environmental restrictions.

“Intake dose” means the annual radiation dose to a person from all potential intake pathways (exclusive of radon inhalation), including the ingestion of water, direct ingestion of soil, intake of foods, and the inhalation of resuspended particulate matter (in committed effective dose equivalent).

“Limited restricted-use remedial action” means any remedial action that requires the continued use of institutional controls but does not require the use of an engineering control.

“Natural background radionuclide concentration” means the average value of a particular radionuclide concentration in soils measured in areas in the vicinity of the site, in an area that has not been influenced by localized human activities, including the site's prior or current operations.

“Quality factor” means the factor by which absorbed doses are multiplied to obtain a quantity that expresses the effectiveness of the absorbed dose on a common scale for all types of ionizing radiation.

“Radioactive contamination or radioactive contaminant” means the collective amount of radiation emitted from one or more radionuclides in the soil, and on/in building materials and/or equipment at concentrations above natural back-

ground levels.

“Radioactive materials” means any material, solid, liquid, or gas, that emits radiation spontaneously.

“Radionuclide” means a type of atom that spontaneously undergoes radioactive decay.

“Regional natural background variation” means the best Department estimate, based on available data, of a region's naturally experienced variation in radiation dose from mean levels that are commonly and consistently experienced by persons in the State.

“Remedial action” means those actions taken at a site, or offsite if a radioactive contaminant has migrated or is migrating there from a radioactively contaminated site as may be required by the Department, including, without limitation, removal, treatment, containment, transportation, securing, or other engineering or treatment measures, whether to an unrestricted use or otherwise, designed to ensure that any discharged radioactive contaminant at the site, or that has migrated or is migrating from the site, is remediated in compliance with the applicable remediation standards in this subchapter.

“Remediation” or “remediate” means all necessary actions to investigate and cleanup or respond to any known, suspected, or threatened discharge of radioactive contaminants, including, as necessary, the preliminary assessment, site investigation, remedial investigation, and remedial action.

“Remediation standards” means the combination of numeric standards that establish a level or concentration, and narrative standards, to which radioactive contaminants must be treated, removed or otherwise cleaned for soil, ground water or surface water, as established by the Department pursuant to [N.J.S.A. 58:10B-12](#) and this chapter, in order to meet the health risk or environmental standards.

“Residual radioactivity” means radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's or person responsible for the remediation's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee or person responsible for the remediation, but excludes background radiation. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the site, even if those burials were made in accordance with the provisions of U.S. NRC regulations at 10 CFR Part 20 or the provisions of [N.J.A.C. 7:28-12.15](#).

“Restricted use remedial action” means any remedial action that requires the continued use of engineering and institutional controls in order to meet the established health risk or environmental standards.

“Technologically enhanced naturally occurring radioactive materials” means any naturally occurring radioactive materials whose radionuclide concentrations or potential for human exposure have been increased by any human activities.

“Total effective dose equivalent” means the sum of the deep-dose equivalent (for external exposures) and the commit-

ted effective dose equivalent (for internal exposures).

“Uncontaminated surface soil” means soil whose average natural background radionuclide total concentrations are less than the remediation standards for radionuclides, and cannot exceed the background established for the site by more than two standard deviations.

“Unrestricted use remedial action” means any remedial action that does not require the continued use of engineering or institutional controls in order to meet the established standards.

“Vertical extent” means the average depth, measured in feet, of the post-remediation radioactive contamination over an affected area.

#### → 7:28-12.4 General requirements

(a) Any person or licensee conducting remediation pursuant to this subchapter shall comply with the requirements of N.J.A.C. 7:26E, Technical Requirements for Site Remediation, excluding those sections related to sampling, surveying, and background investigations. Sampling, surveying and laboratory requirements shall be in accordance with [N.J.A.C. 7:28-12.5](#).

(b) The Department shall require a licensee to provide a decommissioning plan that addresses historical site assessment, scoping, characterization, remedial action options and selection, and a final status survey report when, based on the types, quantities, and half-lives of the licensed material, such elements of the decommissioning plan are appropriate.

(c) Compliance with this subchapter shall not relieve any person or licensee from complying with more stringent cleanup standards or provisions imposed by any other applicable statute, rule or regulation.

(d) Upon Departmental approval of the remedial action workplan or similar plan, the Department may not subsequently require a change to that workplan or similar plan in order to compel a different remediation standard due to the fact that the established remediation standards have changed; however, the Department may compel a different remediation standard if the difference between the new remediation standard and the remediation standard approved by the Department in the workplan or similar plan differs by an order of magnitude.

#### → 7:28-12.5 Sampling, surveying and laboratory requirements

(a) Facilities licensed under 10 CFR Part 50 that have Nuclear Regulatory Commission-approved quality assurance plans are exempt from the requirements of this section. Otherwise, in addition to the requirements in N.J.A.C. 7:26E Appendix A IV.1, persons responsible for conducting remediations or licensees shall include the following in the radionuclide analysis reports:

1. Report final results as a value plus or minus the associated error for each sample;
2. Report data as calculated, and not report "less than" values for any sample;
3. Report minimum detectable activities;
4. Calculate results for single sample and composites to the sample collection period mid point;
5. Provide a quantitation report; and
6. Provide copies of the instrument run logs.

(b) If available, persons responsible for conducting remediations or licensees shall provide:

1. The Gamma Spectroscopy Report which includes sample specific header information, peak search, peak identification, background subtraction, activity, and minimum detectable activity;
2. The Gross Beta calculation worksheets and computer generated result forms;
3. Radiochemical Iodine calculation worksheets and computer generated result forms;
4. Liquid Scintillation calculation worksheets and computer-generated result forms; and
5. Gross Alpha and Gross Beta, radium-226, uranium, and strontium-89 and 90 calculation worksheets and computer-generated result forms.

(c) Any laboratory providing radiological analysis for soil or water shall be certified pursuant to N.J.A.C. 7:18.

(d) Sampling and surveying for radioactive contamination shall be done in accordance with the protocol specified in that version of the Department of Environmental Protection's Field Sampling Procedure Manual's section on Radiological Assessment, incorporated herein by reference, in effect at the time of sampling and surveying which may be obtained by calling the Bureau of Environmental Radiation at (609) 984-5400 or from the Radiation Protection Program's web site at <http://www.state.nj.us/dep/rpp/index.htm>.

#### → 7:28-12.6 Remedial action selection

Remedial action selection for all sites contaminated with radioactive material shall be in accordance with N.J.A.C.

7:26E-5.

→ **7:28-12.7 Remedial action requirements**

The remedial action requirements for all sites contaminated with radioactive material shall be in accordance with N.J.A.C. 7:26E-6, with the exception of N.J.A.C. 7:26E-6.4, Post-remedial action requirements. Post-remedial sampling shall be conducted in accordance with the guidance provided in that version of the Department of Environmental Protection's Field Sampling Procedure Manual's section on Radiological Assessment, in effect at the time of the post-remedial sampling.

→ **7:28-12.8 Radiation dose standards applicable to remediation of radioactive contamination of all real property**

(a) Sites shall be remediated so that the incremental radiation dose to any person from any residual radioactive contamination at the site above that due to natural background radionuclide concentration, under either an unrestricted use remedial action, limited restricted use remedial action, or a restricted use remedial action, shall be as specified below:

1. For the sum of annual external gamma radiation dose (in effective dose equivalent) and intake dose (in committed effective dose equivalent), including the groundwater pathway: 15 millirem (0.15 milliSievert) total annual effective dose equivalent (15 mrem/yr TEDE).

2. For radon-222: three picocuries per liter (pCi/L) of radon gas (111 Bq/m<sup>3</sup>).

(b) Radioactively contaminated ground water shall be remediated to comply with the New Jersey Groundwater Quality Standards rules, N.J.A.C. 7:9C.

(c) Radioactively contaminated surface water shall be remediated to comply with the New Jersey Surface Water Quality Standards, N.J.A.C. 7:9B-1.14(c)6.

→ **7:28-12.9 Minimum remediation standards for TENORM and source material contamination**

(a) For radioactive contamination, the requirements of N.J.A.C. 7:28-12.8 shall be considered to be met for a specific radionuclide if:

1. Where only one radionuclide adds to the radioactive contamination of the site, the incremental concentration of the radionuclide above the natural background radionuclide concentration does not exceed the value in Table 1A, 1B (for unrestricted use), 2A, 2B (for limited restricted use), 3A, or 3B (for restricted use) below;

Table 1A Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Unrestricted Use Standards for Radioactive Contamination (pCi/g) <sup>[FN(1)]</sup>



Radionuclide	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
U238 [FN(2)]	54	35	26	20	17	14	12	11	10
U234 [FN(2)]	62	37	26	21	17	14	12	11	10
Ra226 [FN(3)]	3	2	2	2	2	2	2	2	2
U235 [FN(2)]	29	22	17	14	12	10	9	8	7
Ac227	3	2	2	2	2	2	2	2	2
Th232	2	2	2	2	2	2	1	1	1

Table 1B Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Unrestricted Use Standards for Radioactive Contamination (Bq/g) [FN(1)]

Radionuclide	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
U238 [FN(2)]	2.02	1.29	0.94	0.75	0.62	0.53	0.46	0.41	0.36
U234 [FN(2)]	2.29	1.36	0.98	0.76	0.62	0.53	0.46	0.41	0.36
Ra226 [FN(3)]	0.10	0.08	0.08	0.08	0.07	0.07	0.07	0.06	0.06
U235 [FN(2)]	1.07	0.08	0.63	0.52	0.44	0.38	0.34	0.30	0.27
Ac227	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07
Th232	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05

Table 2A Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Limited Restricted Use Standards for Radioactive Contamination (pCi/g) [FN(1)]

Radionuclide	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
U238 [FN(2)]	64	41	30	24	20	17	15	13	12
U234 [FN(2)]	69	42	30	24	19	16	14	13	11
Ra226 [FN(3)]	5	4	3	3	2	2	2	2	2
U235 [FN(2)]	37	27	22	18	15	13	11	10	9
Ac227	5	5	5	5	5	5	5	4	4
Th232	3	3	3	3	3	3	3	3	3

Table 2B Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Limited Restricted Use Standards for Radioactive Contamination (Bq/g) [FN(1)]

Radionuclide	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
U238 [FN(2)]	2.37	1.52	1.12	0.88	0.73	0.62	0.54	0.48	0.43
U234 [FN(2)]	2.56	1.56	1.12	0.88	0.72	0.61	0.53	0.47	0.42
Ra226 [FN(3)]	0.19	0.13	0.11	0.10	0.09	0.09	0.08	0.08	0.08
U235 [FN(2)]	1.38	1.01	0.80	0.65	0.55	0.48	0.42	0.38	0.34
Ac227	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Th232	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.10	0.10

Table 3A Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Restricted Use Standards for Radioactive Contamination (pCi/g) [FN(1)]

Feet of Uncontaminated Surface Soil (USS)	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	U238 [FN(2)]	USS 1	82	46	32	24	20	17	15	13
2		USS 2	83	46	32	25	20	17	15	13
3		USS 3	83	46	33	25	20	17	15	13
4		USS 4	83	47	33	25	20	17	15	13
5		USS 5	85	47	33	25	21	18	15	13
6	U234 [FN(2)]	USS 1	81	45	31	24	19	16	14	13
7		USS 2	81	45	31	24	20	17	14	13
8		USS 3	81	45	32	24	20	17	14	13
9		USS 4	81	46	32	24	20	17	15	13
10		USS 5	83	46	32	25	20	17	15	13
11	Ra226 [FN(3)]	USS 1	7	4	3	3	2	2	2	2
12		USS 2	7	4	3	3	2	2	2	2

13		USS 3	7	4	3	3	2	2	2	2
14		USS 4	7	4	3	3	2	2	2	2
15		USS 5	7	4	3	3	2	2	2	2
16	U235 [FN(2)]	USS 1	62	35	25	19	16	13	11	10
17		USS 2	67	37	25	20	16	13	12	10
18		USS 3	67	37	26	20	16	14	12	11
19		USS 4	67	37	26	20	16	14	12	11
20		USS 5	68	37	26	20	17	14	13	11
21	Ac227	USS 1	17	9	6	5	5	5	5	4
22		USS 2	17	10	7	7	6	5	5	5
23		USS 3	17	10	10	8	6	6	6	6
24		USS 4	17	15	10	8	8	8	8	8
25		USS 5	17	15	10	10	10	10	10	10
26	Th232	USS 1	13	9	7	5	4	2	3	3
27		USS 2	13	10	7	5	4	3	3	3
28		USS 3	13	10	7	5	4	4	4	4
29		USS 4	13	10	7	5	5	5	5	5
30		USS 5	13	10	7	6	6	6	6	6
31										

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1	12
2	12
3	12
4	12
5	12
6	11
7	11
8	11
9	11
10	12
11	2
12	2

13	2
14	2
15	2
16	9
17	9
18	10
19	10
20	10
21	4
22	5
23	6
24	8
25	10
26	3
27	3
28	4
29	5
30	6
31	

Table 3B Allowed Incremental Derived Concentration Guidance Level of Individual Radionuclides in Soils; Restricted Use Standards for Radioactive Contamination (Bq/g)(<sup>1</sup>)

Feet of Uncontaminated Surface Soil (USS)	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	U238 [FN(2)]	USS 1	3.03	1.70	1.18	0.90	0.74	0.63	0.54	0.48
2		USS 2	3.08	1.71	1.18	0.92	0.75	0.63	0.55	0.48

3		USS 3	3.09	1.71	1.21	0.92	0.75	0.63	0.55	0.49
4		USS 4	3.09	1.74	1.21	0.92	0.75	0.64	0.56	0.49
5		USS 5	3.14	1.74	1.21	0.93	0.77	0.65	0.56	0.50
6	U234 [FN(2)]	USS 1	2.98	1.66	1.15	0.88	0.72	0.61	0.53	0.47
7		USS 2	2.98	1.66	1.15	0.89	0.73	0.61	0.53	0.47
8		USS 3	2.98	1.66	1.17	0.90	0.73	0.62	0.54	0.47
9		USS 4	2.98	1.70	1.18	0.90	0.74	0.62	0.54	0.47
10		USS 5	3.05	1.70	1.18	0.91	0.74	0.63	0.54	0.48
11	Ra226 [FN(3)]	USS 1	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
12		USS 2	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
13		USS 3	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
14		USS 4	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
15		USS 5	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
16	U235 [FN(2)]	USS 1	2.30	1.30	0.91	0.70	0.59	0.49	0.42	0.38
17		USS 2	2.47	1.36	0.94	0.73	0.59	0.49	0.43	0.39
18		USS 3	2.48	1.36	0.95	0.73	0.59	0.50	0.44	0.40
19		USS 4	2.49	1.38	0.95	0.73	0.60	0.52	0.45	0.41
20		USS 5	2.51	1.38	0.95	0.74	0.62	0.53	0.47	0.42
21	Ac227	USS 1	0.62	0.34	0.24	0.18	0.18	0.18	0.17	0.17
22		USS 2	0.63	0.36	0.24	0.24	0.23	0.20	0.19	0.19
23		USS 3	0.63	0.36	0.36	0.29	0.23	0.23	0.23	0.23
24		USS 4	0.63	0.54	0.37	0.29	0.28	0.28	0.28	0.28
25		USS 5	0.63	0.54	0.37	0.36	0.36	0.36	0.36	0.36
26	Th232	USS 1	0.48	0.35	0.25	0.19	0.15	0.13	0.11	0.10
27		USS2	0.48	0.39	0.26	0.19	0.15	0.13	0.12	0.12
28		USS3	0.48	0.39	0.26	0.19	0.15	0.14	0.14	0.14
29		USS4	0.48	0.39	0.26	0.19	0.17	0.17	0.17	0.17
30		USS 5	0.48	0.39	0.26	0.22	0.22	0.22	0.22	0.22
31										

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1	0.43
2	0.43
3	0.44
4	0.44
5	0.44
6	0.42
7	0.42
8	0.42
9	0.42
10	0.43
11	0.08
12	0.08
13	0.08
14	0.08
15	0.08
16	0.34
17	0.35
18	0.36
19	0.37
20	0.37
21	0.17
22	0.19
23	0.23
24	0.28
25	0.36
26	0.10
27	0.12
28	0.14
29	0.17
30	0.22
31	

[FN(1)] The allowed Incremental Concentrations are added to the natural background radionuclide concentration to obtain the absolute value of the allowed radionuclide concentration following site remediation.

[FN(2)] These allowable concentrations may however, further be limited by the chemical toxicity of uranium.

Applicants should inquire with NJDEP's Site Remediation Program for the additional applicable chemical cleanup standards for uranium.

[FN(3)] When more than one nuclide is present, use the Radium-226 Table in Appendix A, incorporated herein by reference, for applying the sum of the fractions rule. Then use whatever number is more restrictive for radium-226, the value in Tables 1A through 3B or the value derived by using the sum of the fractions rule.

2. Where more than one radionuclide contaminant is present at the site, their concentrations meet the sum of the fractions as described below:

$$\text{Sum of } \frac{CA_i}{C_i} < 1$$

where:

$CA_i$  = the incremental concentration of radionuclide i at the site, and

$C_i$  = the incremental allowed concentration of radionuclide i from Table 1A, 1B, 2A, 2B, 3A, or 3B above, if it were the only remaining radionuclide at the site; and

3. Natural background radionuclide concentration shall be established by the methods presented in the Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, EPA 402 R-97-018, and any subsequent revisions thereto, or as discussed in Chapter 12 of the Department's Field Sampling Procedures Manual.

(b) As an alternate, the requirements of [N.J.A.C. 7:28-12.8](#) shall be considered to be met for a specific radionuclide if:

1. Where only one radionuclide adds to the radioactive contamination of the site, the incremental concentration of the radionuclide above the natural background radionuclide concentration and the amount of uncontaminated surface soil meet the pre-mixing values in Table 4A, 4B (for unrestricted use), 5A, or 5B (for limited restricted use) below;

Table 4A Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Required Depth of USS; Pre-Mixing Values--Unrestricted Use (pCi/g) [FN(1)]

Feet of Uncontaminated	Feet of Vertical Extent of Residual Radionuclides (VE)								
Surface Soil (USS)	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	U238 [FN(2)]	USS 1	70*	39	27	21	17	14	12	11
2		USS 2	76	40	28	21	17	14	13	11
3		USS 3	76	41	28	22	17	15	13	11
4		USS 4	77	42	28	22	18	15	13	11
5		USS 5	78	42	28	22	18	15	13	12
6	U234 [FN(2)]	USS 1	74	40	27	21	17	14	12	11
7		USS 2	74	40	27	21	17	14	13	11
8		USS 3	74	40	28	21	17	15	13	11
9		USS 4	76	42	28	22	18	15	13	11
10		USS 5	78	42	28	22	18	15	13	11
11	Ra226 [FN(3)]	USS 1	5*	3*	3	3	3	2	2	2
12		USS 2	7	4	3	3	2	2	2	2
13		USS 3	7	4	3	3	2	2	2	2
14		USS 4	7	4	3	3	2	2	2	2
15		USS 5	7	4	3	3	2	2	2	2
16	U235 [FN(2)]	USS 1	43*	26*	19*	15	13	11	9	8
17		USS 2	51*	29*	21	15*	13	11	9	8
18		USS 3	58*	31*	21	16	13	11	10	9
19		USS 4	62*	31*	21	16	13	11	10	9
20		USS 5	62*	32*	21	16	14	12	10	9
21	Ac227	USS 1	5*	3*	3	2	2	2	2	2
22		USS 2	6*	4	3	3	3	3	3*	3*
23		USS 3	8	5	4	3	4	3	3*	3*
24		USS 4	11*	6*	5*	4*	3*	3*	3*	3*
25		USS 5	13*	8*	5*	5*	4*	4*	4*	3*
26	Th232	USS 1	4*	3*	2*	2	2	2	1	1
27		USS 2	6*	4*	3	3	2	2	2	2
28		USS 3	8*	5	4	2*	2	2	2	2
29		USS 4	10*	6	3*	2*	2	2	2	2
30		USS 5	11	5*	3*	3	3	2*	2*	2*
31										



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1	10
2	10
3	10
4	10
5	10
6	10
7	10
8	10
9	10
10	10
11	2
12	2
13	2
14	2
15	2
16	7
17	8
18	8
19	8
20	8
21	2
22	3*
23	3*
24	3*
25	3*
26	1
27	2
28	2
29	2
30	2*
31	

Table 4B Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;

Required Depth of USS; Pre-Mixing Values--Unrestricted Use (Bq/g) <sup>[FN(1)]</sup>

Feet of Uncontam- inated Surface Soil (USS)	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	U238 [FN(2)]	USS 1	2.60*	1.46	1.00	0.77	0.64	0.53	0.46	0.41
2		USS 2	2.80	1.49	1.03	0.79	0.64	0.54	0.46	0.41
3		USS 3	2.81	1.51	1.05	0.80	0.64	0.54	0.47	0.42
4		USS 4	2.86	1.54	1.05	0.80	0.65	0.55	0.48	0.42
5		USS 5	2.88	1.54	1.05	0.81	0.66	0.56	0.49	0.43
6	U234 [FN(2)]	USS 1	2.75	1.46	1.00	0.76	0.62	0.53	0.46	0.41
7		USS 2	2.75	1.47	1.01	0.78	0.64	0.53	0.46	0.41
8		USS 3	2.75	1.48	1.04	0.80	0.64	0.54	0.47	0.41
9		USS 4	2.80	1.54	1.05	0.80	0.65	0.55	0.47	0.41
10		USS 5	2.88	1.54	1.05	0.81	0.65	0.55	0.47	0.42
11	Ra226 [FN(3)]	USS 1	0.18*	0.11*	0.11	0.10	0.09	0.08	0.07	0.06
12		USS 2	0.28	0.13	0.11	0.10	0.09	0.08	0.07	0.07
13		USS 3	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
14		USS 4	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
15		USS 5	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
16	U235 [FN(2)]	USS 1	1.59*	0.96*	0.70*	0.57	0.47	0.39	0.34	0.30
17		USS 2	1.89*	1.07*	0.78	0.55*	0.47	0.39	0.34	0.31
18		USS 3	2.15*	1.15*	0.78	0.59	0.47	0.40	0.35	0.32
19		USS 4	2.30*	1.15*	0.79	0.59	0.48	0.41	0.37	0.33
20		USS 5	2.30*	1.17	0.79	0.59	0.50	0.43	0.38	0.34

21	Ac227	USS 1	0.18*	0.10*	0.10	0.08	0.08	0.08	0.08	0.07
22		USS 2	0.21*	0.14	0.11	0.11	0.11*	0.10	0.09	0.09
23		USS 3	0.28	0.18	0.14*	0.11*	0.13	0.13	0.09*	0.09*
24		USS 4	0.41*	0.22*	0.18*	0.14*	0.11*	0.11*	0.11*	0.09*
25		USS 5	0.48*	0.30*	0.18*	0.18*	0.14*	0.14*	0.14*	0.11*
26	Th232	USS 1	0.15*	0.11*	0.09*	0.09	0.07	0.06	0.06	0.05
27		USS 2	0.22*	0.15*	0.13	0.10	0.08	0.07	0.06	0.06
28		USS 3	0.30*	0.20	0.14	0.08*	0.08	0.07	0.07	0.07
29		USS 4	0.37*	0.21	0.11*	0.08*	0.09	0.09	0.09	0.09
30		USS 5	0.42	0.20*	0.11*	0.11	0.11	0.09*	0.09*	0.09*
31										

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1	0.36
2	0.37
3	0.37
4	0.38
5	0.38
6	0.36
7	0.37
8	0.37
9	0.37
10	0.37
11	0.06
12	0.07
13	0.08
14	0.08
15	0.08
16	0.27
17	0.28
18	0.29
19	0.30
20	0.31
21	0.07

22	0.09
23	0.09*
24	0.09*
25	0.11*
26	0.05
27	0.06
28	0.07
29	0.09
30	0.09*
31	

Table 5A Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Required Depth of USS; Pre-Mixing Values--Limited Restricted Use (pCi/g) <sup>[FN(1)]</sup>

Feet of Uncontam- inated	Feet of Vertical Extent of Residual Radionuclides (VE)								
Surface Soil (USS)	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE 9

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	U238 [FN(2)]	USS 1	82	45	32	24	20	17	15	13
2		USS 2	83	46	32	25	20	17	15	13
3		USS 3	83	46	33	25	20	17	15	13
4		USS 4	83	47	33	25	20	17	15	13
5		USS 5	85	47	33	25	21	18	15	13
6	U234 [FN(2)]	USS 1	81	45	31	24	19	16	14	13
7		USS 2	81	45	31	24	20	17	14	13
8		USS 3	81	45	32	24	20	17	14	13
9		USS 4	81	46	32	24	20	17	15	13
10		USS 5	83	46	32	25	20	17	15	13

11	Ra226 [FN(3)]	USS 1	7	4	3	3	2	2	2	2
12		USS 2	7	4	3	3	2	2	2	2
13		USS 3	7	4	3	3	2	2	2	2
14		USS 4	7	4	3	3	2	2	2	2
15		USS 5	7	4	3	3	2	2	2	2
16	U235 [FN(2)]	USS 1	62	32*	24*	19	16	13	11	10
17		USS 2	67	37	25	20	16	13	12	10
18		USS 3	67	37	26	20	16	14	12	11
19		USS 4	67	37	26	20	16	14	12	11
20		USS 5	68	37	26	20	17	14	13	11
21	Ac227	USS 1	9*	7*	6	5	5	5	5	4
22		USS 2	14*	10	7	7	6	5	5	5
23		USS 3	18	10	10	8	6	6	6	6
24		USS 4	18	15	10	8	8	7*	7*	7*
25		USS 5	26	15	10	10	9*	8*	8*	7*
26	Th232	USS 1	7*	5*	5*	4*	4	3	3	3
27		USS 2	10*	7*	6*	5	4	3	3	3
28		USS 3	14*	8*	7	5	4	4	4	4
29		USS 4	17*	10	7	5	5	5	5	5
30		USS 5	20*	10	7	6	6	6	6	5*
31										

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1	12
2	12
3	12
4	12
5	12
6	11
7	11
8	11
9	11

10	11
11	2
12	2
13	2
14	2
15	2
16	9
17	9
18	10
19	10
20	10
21	4
22	5
23	6
24	7*
25	7*
26	3
27	3
28	4
29	5
30	5*
31	

Table 5B Allowed Incremental Derived Concentration Guideline Level of Individual Radionuclides in Soils;  
Required Depth of USS; Pre-Mixing Values--Limited Restricted Use (Bq/g) <sup>[FN(1)]</sup>

Feet of Uncontam-  
inated

Feet of Vertical Extent of Residual Radionuclides (VE)

Surface Soil (USS)	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
--------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	U238 [FN(2)]	USS 1	3.03	1.67	1.18	0.90	0.74	0.63	0.54	0.48
2		USS 2	3.08	1.71	1.18	0.92	0.75	0.63	0.55	0.48
3		USS 3	3.09	1.71	1.21	0.92	0.75	0.63	0.55	0.49
4		USS 4	3.09	1.74	1.21	0.92	0.75	0.64	0.56	0.49
5		USS 5	3.14	1.74	1.21	0.93	0.77	0.65	0.56	0.50
6	U234 [FN(2)]	USS 1	2.98	1.66	1.15	0.88	0.72	0.61	0.53	0.47
7		USS 2	2.98	1.66	1.15	0.89	0.73	0.61	0.53	0.47
8		USS 3	2.98	1.66	1.17	0.90	0.73	0.62	0.54	0.47
9		USS 4	2.98	1.70	1.18	0.90	0.74	0.62	0.54	0.47
10		USS 5	3.05	1.70	1.18	0.91	0.74	0.63	0.54	0.48
11	Ra226 [FN(3)]	USS 1	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
12		USS 2	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
13		USS 3	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
14		USS 4	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
15		USS 5	0.28	0.13	0.11	0.10	0.09	0.09	0.08	0.08
16	U235 [FN(2)]	USS 1	2.30	1.18*	0.89*	0.70	0.59	0.49	0.42	0.38
17		USS 2	2.47	1.36	0.94	0.73	0.59	0.49	0.43	0.39
18		USS 3	2.48	1.36	0.95	0.73	0.59	0.50	0.44	0.40
19		USS 4	2.49	1.38	0.95	0.73	0.60	0.52	0.45	0.41
20		USS 5	2.51	1.38	0.95	0.74	0.62	0.53	0.47	0.42
21	Ac227	USS 1	0.33	0.26*	0.24	0.18	0.18	0.18	0.17	0.17
22		USS 2	0.52*	0.36	0.24	0.24	0.23	0.20	0.19	0.19
23		USS 3	0.66	0.36	0.36	0.29	0.23	0.23	0.23	0.23
24		USS 4	0.66	0.54	0.37	0.29	0.28	0.26*	0.26*	0.26*
25		USS 5	0.97	0.54	0.37	0.36	0.33*	0.28*	0.28*	0.26*
26	Th232	USS 1	0.26*	0.18*	0.18*	0.15*	0.15	0.13	0.11	0.10
27		USS 2	0.37*	0.26*	0.22*	0.19	0.15	0.13	0.12	0.12
28		USS 3	0.52*	0.30*	0.26	0.19	0.15	0.14	0.14	0.14
29		USS 4	0.63*	0.39	0.26	0.19	0.17	0.17	0.17	0.17
30		USS 5	0.74*	0.39	0.26	0.22	0.22	0.22	0.22	0.17
31										

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1	0.43
2	0.43
3	0.44
4	0.44
5	0.44
6	0.42
7	0.42
8	0.42
9	0.42
10	0.43
11	0.08
12	0.08
13	0.08
14	0.08
15	0.08
16	0.34
17	0.35
18	0.36
19	0.37
20	0.37
21	0.17
22	0.19
23	0.23
24	0.26*
25	0.26*
26	0.10
27	0.12
28	0.14
29	0.17
30	0.17
31	

\* Values were back-calculated to ensure 15 mrem/yr TEDE after mixing.



[FN(1)] The allowed Incremental Concentrations are added to the natural background radionuclide concentration to obtain the absolute value of the allowed radionuclide concentration before mixing.

[FN(2)] These allowable concentrations may however, further be limited by the chemical toxicity of uranium. Applicants should inquire with NJDEP's Site Remediation Program for the additional applicable chemical cleanup standards for uranium.

[FN(3)] When more than one nuclide is present, use the Radium-226 Table in Appendix B, incorporated herein by reference, for applying the sum of the fractions rule. Then use whatever number is more restrictive for radium-226, the value in Tables 4A through 5B or the value derived using the sum of the fractions rule.

2. After it is established that the concentrations in Table 4A, 4B, 5A, or 5B above are met, the layer of residual radionuclides shall be mixed thoroughly with the layer of uncontaminated surface soil to achieve a uniform concentration, as outlined in Chapter 12 of the Department's Field Sampling Procedures Manual, throughout the soil column;

3. Where more than one radionuclide contaminant is present at the site, their concentrations meet the sum of the fractions as described below:

$$\text{Sum of } \frac{CA_i}{C_i} \leq 1$$

where:

$CA_i$  = the incremental concentration of radionuclide  $i$  at the site, and

$C_i$  = the incremental allowed concentration of radionuclide  $i$  from Table 4A, 4B, 5A, or 5B above, if it were the only remaining radionuclide at the site; and

4. The requirements in (a)3 above shall be met.

#### → 7:28-12.10 Minimum remediation standards for accelerator-produced, by-product, and certain special nuclear materials

(a) Remediation standards shall meet the requirements at [N.J.A.C. 7:28-12.8](#).

(b) Computer models acceptable to the Department shall be used to determine the remediation standards.

(c) Modeling parameters used in developing unrestricted and restricted use standards shall be equivalent to those used in the NJDEP's model, RaSoRS, as supplemented or amended, and incorporated herein by reference, which is available on the Radiation Protection Program's website at <http://www.state.nj.us/dep/rpp/index.htm>.

(d) Dose calculations shall be performed out to the time of peak dose or 1,000 years, whichever is longer.

(e) Restricted use remediation standards shall meet requirements at [N.J.A.C. 7:28-12.11\(e\)](#) and [12.12](#).

→ **7:28-12.11 Petition for alternative remediation standards for radioactive contamination**

(a) In lieu of using the minimum remediation standards for radioactive contamination found at [N.J.A.C. 7:28-12.9](#) or developed under [N.J.A.C. 7:28-12.10](#), a person or licensee may petition the Department for an alternative remediation standard for radioactive contamination. Such an alternate remediation standard:

1. Shall not result in incremental doses, for sum of annual external radiation dose and intake dose, exceeding 15 mrem/yr (0.15 mSv/yr) total effective dose equivalent;
2. Shall not result in incremental concentrations exceeding three pCi/L (111 Bq/m<sup>3</sup>) of radon in indoor air in the lowest level of the building;
3. Shall not result in radionuclide in groundwater levels exceeding those in the New Jersey Groundwater Quality Standards in [N.J.A.C. 7:9C](#); and
4. Shall not result in radionuclide in surface water levels exceeding those in the New Jersey Surface Quality Standards in [N.J.A.C. 7:9B-1.14\(c\)6](#).

(b) The Department shall not consider a petition for an alternative remediation standard for radionuclides that is supported by increasing, in any manner, the allowed incremental dose criterion of 15 mrem/yr (0.15 mSv/yr) or the allowed incremental radon in air concentration of three pCi/L (111 Bq/m<sup>3</sup>), or varying the parameters listed in Tables 6 or 7 below.

Table 6

<u>Parameter</u>	<u>Unrestricted</u>	Limited or <u>Restricted</u>
Indoor onsite breathing rate (m <sup>3</sup> /hr)	0.63	1.4
Outdoor onsite breathing rate (m <sup>3</sup> /hr)	1.40	1.4
Soil ingestion rate (g/yr)	70	12.5
Homegrown crop ingestion rate (g/yr)	17,136	0
Drinking water consumption rate (l/yr)	700	700
Shielding factor through basement or slab	0.20	0.20
Shielding factor through wall	0.80	0.80
Shielding factor outside	1.00	1.00

Table 7 Soil to Vegetation Transfer Factors

<u>Element</u>	pCi/g plant (wet) to <u>pCi/g soil (dry)</u>
Th	1E-3
Ra	4E-2

Pb	1E-2
Po	1E-3
U	2.5E-3
Ac	2.5E-3
Pa	1E-2
Bi	1E-1

(c) The Department shall consider petitions only in cases where site-specific or waste specific factors, and/or site design features are used in performing the dose assessment, which are different than those used by the Department in establishing the remediation standards in [N.J.A.C. 7:28-12.9](#) or [12.10](#). Factors which the Department shall consider in a petition for an alternate remediation standard include, but are not limited to:

1. The chemical or physical state of the radioactive material;
2. Site-specific soil characteristics, depth to groundwater and other geological and hydrogeological characteristics which may substantially change the potential dose from radionuclides, as compared to the values listed in Tables 8 and 9 below.

Table 8 Generic Site Input Parameters for Groundwater Pathway Analysis

Dimensions of contaminated zone, LxW (m)	100 x 100
Percolation rate (vertical Darcy velocity, m/yr)	0.5
Volumetric water content in contaminated zone ( $\text{m}^3/\text{m}^3$ )	0.35
Volumetric water content in unsaturated zone ( $\text{m}^3/\text{m}^3$ )	0.2
Bulk density of contaminated zone ( $\text{g}/\text{m}^3$ )	1.6
Bulk density of saturated zone ( $\text{g}/\text{m}^3$ )	1.6
Unsaturated zone thickness (distance from bottom of source to aquifer, m)	0.5
Porosity of aquifer	0.45
Longitudinal dispersivity in aquifer (m)	9
Transverse dispersivity in aquifer (m)	4
Pore velocity in aquifer (m/yr)	4
Well screen thickness (mixing depth, m)	10

Table 9 Sorption Coefficients used for Groundwater Pathway Analysis

<u>Isotopes</u>	<u>Kd (mg/L)</u>
uranium	35
thorium	3,200
radium	500
lead	270

proactinium 550

actinium 450

3. Use of caps, covers, sealants, geotextile membranes, limits on the vertical extent of radioactive contamination remaining on site and/or other engineering or institutional controls that reduce potential exposures to radioactive materials; and

4. Changes in indoor and outdoor occupancy times, which are justified by land uses other than residential or commercial.

(d) A petition for an alternate remediation standard shall include an analysis demonstrating how and why the difference in factors such as those in Tables 8 and 9 above and/or indoor and outdoor occupancy times will result in substantially different remediation standards than those in [N.J.A.C. 7:28-12.9](#).

(e) Regardless of the factors used by the petitioner or licensee, the Department shall not approve alternative standard petitions that include institutional and engineering controls where failure of those controls, not including the failure of a radon remediation system, would result in more than 100 mrem (one mSv) total annual effective dose equivalent.

(f) In the event the Department determines that sufficient evidence exists to support consideration of an alternative remediation standard, the petitioner or licensee shall submit a written analysis which demonstrates compliance with the dose limits in [N.J.A.C. 7:28-12.9](#) or [12.10](#) including:

1. The remedial action informational requirements of N.J.A.C. 7:26E-6; and

2. A dose assessment analysis, including:

i. An estimate of the radiation doses received by a post-remediation on-site resident for an unrestricted use remedial action, or by an employee (of a proposed commercial use facility) for a limited restricted use or restricted use remedial action;

ii. A presentation of all equations or other mathematical techniques used, either directly or embodied in a computer model, to predict the movement of radionuclides and/or their resulting radiation dose;

iii. Dose calculations which shall be extended for a period of 1,000 years or to the time of peak dose, whichever is longer;

iv. A presentation of all numerical input parameters to equations or computer models, the range of values for those parameters, including reference sources, the value selected for use and the basis for that selection;

v. A presentation of other relevant factors and assumptions used in the analyses, such as site-specific geology,

land use, etc.;

vi. An analysis of which input parameters, when varied, would most significantly affect radiation dose results, commonly referred to as a sensitivity analysis; and

vii. An analysis of both continued use of existing structures and future use scenarios. Future use scenarios shall include, if applicable, the construction of buildings for either unrestricted use remedial actions or limited restricted use remedial actions, including excavations for basements and/or footings.

(g) Engineering controls or institutional controls may be incorporated as part of a petition for an alternative remediation standard provided that these controls will be durable and implemented for an appropriate period of time to achieve their intended purpose.

(h) Computer models acceptable to the Department may be used by the petitioner or licensee for an alternative remediation standard to confirm that the requirements of [N.J.A.C. 7:28-12.9](#) or [12.10](#) have been and will continue to be met.

#### → [7:28-12.12 Requirements pertaining to engineering or institutional controls](#)

(a) All remediation proposals shall designate the intended use(s) of the property. Such intended use(s) shall be restricted as necessary to prevent future exposure, and shall otherwise be consistent with current and projected State and local zoning designations or land uses. For sites not remediated to the unrestricted use standards in [N.J.A.C. 7:28-12.9](#) or [12.10](#), the Department shall define the nature and duration of all appropriate engineering or institutional controls necessary to meet the standards in [N.J.A.C. 7:28-12.9](#), [12.10](#), or [12.11\(a\)](#), based upon the particular conditions of the site.

(b) In order for any remediation under this subchapter requiring engineering controls or institutional controls to meet the standards in [N.J.A.C. 7:28-12.9](#), [12.10](#), or [12.11\(a\)](#), the person responsible for conducting the remediation, or licensee, shall, in addition to meeting the provisions of [N.J.S.A. 58:10B-13](#):

1. Implement all necessary actions, as determined by the Department, to assure that such engineering or institutional controls are being implemented and maintained for an appropriate period of time; and

2. Provide sufficient financial assurance for the costs of implementing and maintaining the requisite active engineered or institutional controls for an appropriate period of time. Acceptable financial assurance mechanisms are set forth at [10 CFR 20.1403\(c\)](#), incorporated herein by reference.

(c) A person responsible for conducting the remediation, or the licensee, shall conduct public outreach if the Department determines that outreach is needed, or when the Department determines that there is substantial public interest in activities concerning restricted release license termination.

1. The Department may determine that there is substantial public interest when it receives:

- i. A petition containing the signatures of 25 or more people that live or work within 200 feet of the site, if contamination has not migrated from the site boundary;
- ii. A petition containing the signatures of 25 or more people that live or work within 200 feet of the extent of contamination, if contamination has migrated from the site boundary; or
- iii. A written request by a municipal official, such as a mayor or chairperson of an environmental commission, or a designated local health official.

2. When the Department determines that there is substantial public interest, the Department shall notify the person responsible for conducting the remediation or the licensee and post a summary of findings on the Department's web site at [www.state.nj.us/dep](http://www.state.nj.us/dep); and

3. The person responsible for conducting the remediation or the licensee shall develop and implement enhanced public notice based on the expressed needs of the community and may include the following:

- i. Publicizing and hosting an information session or public meeting;
- ii. Publishing a notice containing basic information about the site in the local paper of record; or
- iii. Establishing a local information repository.

4. The notifications required pursuant to this section are not intended to satisfy the public participation requirements applicable to sites subject to the Comprehensive Environmental Response, Compensation and Liability Act, [42 U.S.C. §§9601 et seq.](#) and the National Contingency Plan, 40 CFR Part 300.

→ **7:28-12.13 Requirements pertaining to a change in land use**

(a) Any subsequent proposed use of a property that is different from the intended use (other than unrestricted use remedial actions) described in the original remediation proposal shall require a prior review and prior approval by the Department. To initiate this review, 90 calendar days prior to a proposed change in land use, the person or licensee proposing such use shall prepare and submit to the Department, at the Bureau of Environmental Radiation, PO Box 415, Trenton, NJ 08625-0415, and to each affected municipality, a brief written description of the new proposed use as compared to the intended use upon which the original remediation was based including all planned soil excavations, and any additional remedial actions to be implemented.

(b) If the Department determines that the proposed new use may cause the dose limitations of [N.J.A.C. 7:28-12.8](#) to be

exceeded, the person or licensee requesting the use change shall be required to prepare and submit to the Department's Bureau of Environmental Radiation, PO Box 415, Trenton, NJ 08625-0415, a dose assessment analysis, containing the information required under [N.J.A.C. 7:28-12.11](#)(f)2, (g), and (h), to ascertain whether the dose limitation requirements of [N.J.A.C. 7:28-12.8](#) will be met for the proposed new use.

(c) In preparing the dose assessment analysis, the person or licensee may incorporate into the new use plan new remedial measures such as different radionuclide in soil concentrations, or radioactive contamination vertical extents, and/or new engineering or institutional controls, provided that for engineering or institutional controls, the person responsible for conducting the remediation or licensee provides for the cost of implementing and maintaining them as specified in [N.J.A.C. 7:28-12.12](#)(c)3.

#### → [7:28-12.14 Requirements pertaining to the final status survey](#)

The final status survey is performed to demonstrate that a site meets the remediation standards. It shall be done in accordance with that version of the Department of Environmental Protection's Field Sampling Manual's section on Radiological Assessment, which is incorporated herein by reference, in effect at the time of the survey which may be obtained by calling the Bureau of Environmental Radiation at (609) 984-5400 or from the Radiation Protection Program's web site at <http://www.state.nj.us/dep/rpp/index.htm>. Chapter 12 of the Department's Field Sampling Procedures Manual follows the methodology provided in MARSSIM with some modifications.

#### → [7:28-12.15 Requirements pertaining to onsite burial or capping](#)

(a) No owner or licensee shall bury or construct an engineered barrier (cap) over radioactive material onsite unless the requirements of [N.J.A.C. 7:28-12.8](#) and [12.11](#) are met.

(b) Owners or licensees with sites that have been used for burial of radioactive materials or where radioactive material has been capped, shall not be allowed to convert these sites to other uses unless the requirements of [N.J.A.C. 7:28-12.8](#) and [12.11](#) are met.

(c) The owner or licensee of any burial ground or capped material shall notify the Department in writing not less than 30 days in advance of any transfer of title to the property involved.

## Appendix A

Allowed Incremental Derived Concentration Guideline Levels (pCi/g) for the Gamma and Intake Pathways <sup>[FN(1)]</sup>

Nuclide	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
Ra226									

## Unrestricted Use

Standards	3	2	2	2	2	2	2	2	2
-----------	---	---	---	---	---	---	---	---	---

## Ra226

## Limited Restricted

Use Standards	5	5	5	5	5	5	5	4	4
---------------	---	---	---	---	---	---	---	---	---

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	Allowed Incremental Derived Concentration Guideline Levels (pCi/g) for the Gamma and Intake Pathways [FN(1)]								
2									

\*\*\*\*\*

\*\*\*\*\* This is piece: 2

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1									
2									

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	Feet of Uncontaminated	Feet of Vertical Extent of Residual Radionuclides (VE)							
2	Surface Soil (USS)	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8
3	Ra22								
4	Restricted								



	Use									
5	Stand-ards	USS 1	18	15	10	8	6	5	5	4
6		USS 2	18	15	10	8	6	5	5	5
7		USS 3	18	15	10	8	6	6	6	6
8		USS 4	18	15	10	8	7	7	7	7
9		USS 5	18	15	10	9	9	9	9	9

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\*\*\*\*\* This is piece: 2

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1	
2	VE9
3	
4	
5	4
6	5
7	6
8	7
9	9

Allowed Incremental Derived Concentration Guideline Levels (Bq/g) for the Gamma and Intake Pathways <sup>[FN(1)]</sup>

Nuclide	Feet of Vertical Extent of Residual Radionuclides (VE)								
	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
Ra226									
Unrestricted Use									
Standards	0.13	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08
Ra226									
Limited Restricted Use									
Standards	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.15	0.15

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	Allowed Incremental Derived Concentration Guideline Levels (Bq/g) for the Gamma and Intake Pathways [FN(1)]
2	

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\*\*\*\*\* This is piece: 2

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1	
2	

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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1	Feet of Uncontaminated	Feet of Vertical Extent of Residual Radionuclides (VE)								
2	Surface Soil (USS)	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	
3	Ra226									
4	Restricted Use									
5	Standards	USS 1	0.67	0.55	0.37	0.30	0.22	0.18	0.18	0.15
6		USS 2	0.67	0.56	0.37	0.30	0.22	0.18	0.18	0.18
7		USS 3	0.67	0.56	0.37	0.30	0.22	0.22	0.22	0.22
8		USS 4	0.67	0.56	0.37	0.30	0.23	0.23	0.26	0.26
9		USS 5	0.67	0.56	0.37	0.33	0.33	0.33	0.33	0.33

10

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\*\*\*\*\* This is piece: 2

\*\*\*\*\*

1

2

VE9

3

4

5

0.15

6

0.18

7

0.22

8

0.26

9

0.33

10

[FN(1)] These Ra226 concentration numbers may be used only when more than one radionuclide is present for the sum of the fractions rule at N.J.A.C. 7:28-12.9(b).

## Appendix B

Allowed Incremental Derived Concentration Guideline Levels (pCi/g) for the Gamma and Intake Pathways [FN(1)]

Feet of Uncontam-  
inated

Feet of Vertical Extent of Residual Radionuclide (VE)

Surface Soil (USS)

VE1

VE2

VE3

VE4

VE5

VE6

VE7

VE8

VE  
9

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

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\*\*\*\*\* This is piece: 1

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1

Ra226

2

Unres-  
tricted

USS 1

5\*

3\*

3

3

3

3

2

2

3	Use	USS 2	7*	4*	4*	3*	3	3	2	2
4	Pre-mixing	USS 3	7	5*	4*	4	3	3	3	3
5	Values	USS 4	11	7*	5*	4	3	3	3	3
6		USS 5	13*	8	6	4	4	4	4	4
7	Ra226									
8	Limited	USS 1	11*	8*	7*	7*	6*	6*	5*	5*
9	Re-streic- ted	USS 2	16*	11*	9*	8*	7*	6*	6*	5*
10	Use	USS 3	21*	13*	10*	9*	7*	6*	6*	6*
11	Pre-mixing	USS 4	26*	16*	12*	9*	8*	7*	7*	6*
12	Values	USS 5	31*	18*	11*	10*	9*	8*	7*	7*
13										

\*\*\*\*\*

\*\*\*\*\* This is piece: 2

\*\*\*\*\*

1	
2	2
3	2
4	3
5	3
6	4
7	
8	5*
9	5*
10	6*
11	6*
12	7*
13	

\* Back-calculated to ensure 15 mrem/yr TEDE after mixing

Allowed Incremental Derived Concentration Guideline Levels (Bq/g) for the Gamma and Intake Pathways <sup>[FN(1)]</sup>

Feet of Uncontam-

Feet of Vertical Extent of Residual Radionuclide (VE)

inated

Surface Soil (USS)	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VE9
--------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----

[Note: The following table/form is too wide to be printed on a single page. For meaningful review of its contents the table must be assembled with part numbers in ascending order from left to right. Row numbers, which are not part of the original data, have been added in the margins and can be used to align rows across the parts.]

\*\*\*\*\*

\*\*\*\*\* This is piece: 1

\*\*\*\*\*

1	Ra226									
2	Unres- tricted	USS 1	0.18*	0.12*	0.12*	0.12*	0.12	0.10	0.09	0.08
3	Use	USS 2	0.25*	0.15*	0.15*	0.15*	0.12*	0.11	0.09	0.09
4	Pre- mixing	USS 3	0.25*	0.18*	0.17*	0.17	0.14	0.11	0.11	0.11
5	Values	USS 4	0.40*	0.25*	0.18*	0.17	0.13	0.13	0.13	0.13
6		USS 5	0.48*	0.32	0.22	0.16	0.16	0.16	0.16	0.16
7	Ra226									
8	Limited	USS 1	0.40*	0.30*	0.26*	0.26*	0.22*	0.22*	0.18*	0.18*
9	Re- stricted	USS 2	0.59*	0.40*	0.33*	0.30*	0.26*	0.22*	0.22*	0.18*
10	Use	USS 3	0.77*	0.48*	0.37*	0.33*	0.26*	0.22*	0.22*	0.22*
11	Pre- mixing	USS 4	0.96*	0.59*	0.44*	0.33*	0.30*	0.26*	0.26*	0.22*
12	Values	USS 5	1.15*	0.67*	0.41*	0.37*	0.33*	0.30*	0.26*	0.26*
13										

\*\*\*\*\*

\*\*\*\*\* This is piece: 2

\*\*\*\*\*

1	
2	0.08
3	0.09
4	0.11
5	0.13
6	0.16
7	

8	0.18*
9	0.18*
10	0.22*
11	0.22*
12	0.26*
13	

\* Back-calculated to ensure 15 mrem/yr TEDE after mixing

[FN(1)] These Ra226 concentration numbers may be used only when more than one radionuclide is present for the sum of the fractions rule at N.J.A.C. 7:28-12.9(b).

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N.J.A.C. 7:28-12.4

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**C**New Jersey Administrative Code [Currentness](#)

Title 7. Department of Environmental Protection

Chapter 28. Radiation Protection Programs ([Refs & Annos](#)) [Subchapter 12](#). Remediation Standards for Radioactive Materials**→→ 7:28-12.4 General requirements**

(a) Any person or licensee conducting remediation pursuant to this subchapter shall comply with the requirements of N.J.A.C. 7:26E, Technical Requirements for Site Remediation, excluding those sections related to sampling, surveying, and background investigations. Sampling, surveying and laboratory requirements shall be in accordance with [N.J.A.C. 7:28-12.5](#).

(b) The Department shall require a licensee to provide a decommissioning plan that addresses historical site assessment, scoping, characterization, remedial action options and selection, and a final status survey report when, based on the types, quantities, and half-lives of the licensed material, such elements of the decommissioning plan are appropriate.

(c) Compliance with this subchapter shall not relieve any person or licensee from complying with more stringent cleanup standards or provisions imposed by any other applicable statute, rule or regulation.

(d) Upon Departmental approval of the remedial action workplan or similar plan, the Department may not subsequently require a change to that workplan or similar plan in order to compel a different remediation standard due to the fact that the established remediation standards have changed; however, the Department may compel a different remediation standard if the difference between the new remediation standard and the remediation standard approved by the Department in the workplan or similar plan differs by an order of magnitude.

Amended by R.2008 d.281, effective September 15, 2008 (operative September 30, 2009).

**CHAPTER EXPIRATION DATE**

<In accordance with N.J.S.A. 52:14B-5.1d, Chapter 28, Radiation Protection Programs, was extended by gubernatorial directive from June 21, 2010 to June 21, 2011. See: 42 N.J.R. 468(a).>

**HISTORICAL NOTES****Source:**

**2008.** See: 40 N.J.R. 2309(a), 40 N.J.R. 5196(b).

N.J. Admin. Code tit. 7, 7:28-12.4

**Public Notices:**

**2009.** See: 41 N.J.R. 3415(a).

Editor's Note

R.2008, d.281, rewrote the section.

7:28-12.4, NJ ADC 7:28-12.4

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**C**New Jersey Administrative Code [Currentness](#)

Title 7. Department of Environmental Protection

Chapter 28. Radiation Protection Programs ([Refs & Annos](#))[↗](#) [Subchapter 12](#). Remediation Standards for Radioactive Materials**→→ 7:28-12.12 Requirements pertaining to engineering or institutional controls**

(a) All remediation proposals shall designate the intended use(s) of the property. Such intended use(s) shall be restricted as necessary to prevent future exposure, and shall otherwise be consistent with current and projected State and local zoning designations or land uses. For sites not remediated to the unrestricted use standards in [N.J.A.C. 7:28-12.9](#) or [12.10](#), the Department shall define the nature and duration of all appropriate engineering or institutional controls necessary to meet the standards in [N.J.A.C. 7:28-12.9](#), [12.10](#), or [12.11\(a\)](#), based upon the particular conditions of the site.

(b) In order for any remediation under this subchapter requiring engineering controls or institutional controls to meet the standards in [N.J.A.C. 7:28-12.9](#), [12.10](#), or [12.11\(a\)](#), the person responsible for conducting the remediation, or licensee, shall, in addition to meeting the provisions of [N.J.S.A. 58:10B-13](#):

1. Implement all necessary actions, as determined by the Department, to assure that such engineering or institutional controls are being implemented and maintained for an appropriate period of time; and
2. Provide sufficient financial assurance for the costs of implementing and maintaining the requisite active engineered or institutional controls for an appropriate period of time. Acceptable financial assurance mechanisms are set forth at [10 CFR 20.1403\(c\)](#), incorporated herein by reference.

(c) A person responsible for conducting the remediation, or the licensee, shall conduct public outreach if the Department determines that outreach is needed, or when the Department determines that there is substantial public interest in activities concerning restricted release license termination.

1. The Department may determine that there is substantial public interest when it receives:
  - i. A petition containing the signatures of 25 or more people that live or work within 200 feet of the site, if contamination has not migrated from the site boundary;
  - ii. A petition containing the signatures of 25 or more people that live or work within 200 feet of the extent of contamination, if contamination has migrated from the site boundary; or

N.J. Admin. Code tit. 7, 7:28-12.12

iii. A written request by a municipal official, such as a mayor or chairperson of an environmental commission, or a designated local health official.

2. When the Department determines that there is substantial public interest, the Department shall notify the person responsible for conducting the remediation or the licensee and post a summary of findings on the Department's web site at [www.state.nj.us/dep](http://www.state.nj.us/dep); and

3. The person responsible for conducting the remediation or the licensee shall develop and implement enhanced public notice based on the expressed needs of the community and may include the following:

i. Publicizing and hosting an information session or public meeting;

ii. Publishing a notice containing basic information about the site in the local paper of record; or

iii. Establishing a local information repository.

4. The notifications required pursuant to this section are not intended to satisfy the public participation requirements applicable to sites subject to the Comprehensive Environmental Response, Compensation and Liability Act, [42 U.S.C. §§9601 et seq.](#) and the National Contingency Plan, 40 CFR Part 300.

Recodified from [N.J.A.C. 7:28-12.11](#) and amended by R.2008 d.281, effective September 15, 2008 (operative September 30, 2009).

#### CHAPTER EXPIRATION DATE

<In accordance with N.J.S.A. 52:14B-5.1d, Chapter 28, Radiation Protection Programs, was extended by gubernatorial directive from June 21, 2010 to June 21, 2011. See: 42 N.J.R. 468(a).>

#### HISTORICAL NOTES

##### Source.

**2008.** See: 40 N.J.R. 2309(a), 40 N.J.R. 5196(b).

##### Public Notices:

**2009.** See: 41 N.J.R. 3415(a).

Editor's Note

N.J. Admin. Code tit. 7, 7:28-12.12

R.2008, d.281, amended the N.J.A.C. references in (a) and (b); in (b), inserted “or licensee” following “remediation” in the introductory paragraph, and rewrote (2); added (c). Former N.J.A.C. 7:28-12.12, Requirements pertaining to engineering or institutional controls, recodified to [N.J.A.C. 7:28-12.13](#).

7:28-12.12, NJ ADC 7:28-12.12

May 7, 2012; 44 N.J. Reg. No. 9

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**CERTIFICATE OF SERVICE**

I hereby certify, in accordance with Circuit Rule 31, that eight paper copies of the Supplemental Addendum to the Final Reply Brief of Petitioner Shieldalloy Metallurgical Corporation (the “Supplemental Addendum”) were filed with the Clerk of the Court this 30<sup>th</sup> day of July 2012. In addition, on this 30<sup>th</sup> day of July 2012, paper copies of the Supplemental Addendum were served on the following participants in the case by United States first class mail, postage prepaid:

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