

**APPENDIX B
CURRENT NRC APPROACH**

Currently NRC generally addresses the release of solid material on a case-by-case basis using license conditions and existing regulatory guidance. In each case, material may be released from a licensed operation with the understanding and specific acknowledgment that the material may contain very low amounts of radioactivity, but that the concentration of radioactive material is so small that its control through licensing is no longer necessary.

The case-by-case approach includes guidance that is applicable to equipment and material with radioactivity located on the surface or within the material or equipment itself. However, there are differences in the application of this guidance between reactor licensees and materials licensees, which is explained below.

1. Release of Solid Materials with Surface Residual Radioactivity

1.1 All Licensees

Criteria which licensees must use in determining whether the material may be released are approved for use by the NRC during the initial licensing or license renewal of a facility, as part of the facility's license conditions or radiation safety program. The licensees' actions must be consistent with the requirements of 10 CFR Part 20 (see e.g., Subpart F of Part 20 (10 CFR 20.1501)). Thus, the licensee performs a survey of the material prior to its release.

1.2 Reactor Licensees

Reactor licensees typically follow a policy that was established by Office of Inspection and Enforcement Circular 81-07 and Information Notice 85-92. Under this approach, reactor licensees must survey equipment and material before its release. If the surveys indicate the presence of AEA material above natural background levels, then no release may occur. If the appropriate surveys have not detected licensable material above natural background levels, the solid material in question does not have to be treated as waste under the requirements of Part 20. The fact that no radioactive material above background is detected does not mean that none is present; there are limitations on detection capability. In practice, the actual detection capability of survey instruments are typically consistent with those contained in Regulatory Guide 1.86.

1.3 Materials Licensees

In the non-reactor materials license context, NRC usually authorizes the release of solid material through specific license conditions. One set of criteria that is used to evaluate solid materials before they are released is contained in Regulatory Guide 1.86, entitled "Termination of Operating Licenses for Nuclear Reactors." A similar guidance document is Fuel Cycle Policy and Guidance Directive FC 83-23, entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Byproduct, Source or Special Nuclear Materials Licenses." Both documents contain a table of surface contamination criteria

1 which may be applied by licensees for use in demonstrating that solid material with surface
2 contamination can be safely released with no further regulatory control.
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4 Although Regulatory Guide 1.86 was originally developed for nuclear power plant licensees, the
5 surface contamination criteria have been used in other contexts for all types of licensees for many
6 years. By setting maximum allowable limits for surface contamination, Regulatory Guide 1.86
7 implicitly reflects the fact that materials with surface contamination below those limits may be
8 released without adverse effects on the public health and safety.
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10 **2. Release of Solid Materials with Volumetric Residual Radioactivity**

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12 In the case of volumetrically contaminated materials, NRC has not provided guidance like that
13 found in Reg Guide 1.86 for surface contamination. Instead, NRC has treated these situations on
14 an individual basis, typically seeking to assure, by an evaluation of doses associated with the
15 proposed release of the material, that maximum doses are a small percentage of the Part 20 dose
16 limit for members of the public. Thus, the NRC practice over the years has been to allow the
17 release of material with slight levels of volumetric contamination based on a case-by-case
18 evaluation. These evaluations follow guidance discussed in the June 1999 Issues Paper (NRC
19 1999b) and in three All-Agreement States letters (STP-00-070, STP-01-081, STP-03-003), dated
20 August 22, 2000, November 28, 2001, and January 15, 2003, respectively.
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22 **2.1 All Licensees**

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24 Licensees have used the specific process set out in 10 CFR 20.2002 to seek approval for
25 alternate disposal methods of solid material. The release of material using the 10 CFR 20.2002
26 process is consistent with other disposition provisions in Part 20 that allow for the unrestricted
27 release of material (e.g., 10 CFR 20.2003 and 10 CFR 20.2005). With regard to evaluation of 10
28 CFR 20.2002 requests, the guidance that NRC has used to evaluate these requests has evolved
29 over time in response to increases in technical capabilities and changes in the regulations. In the
30 mid-1980's, NRC used several documents including NUREG-11101, Vol. 2 (Onsite Disposal of
31 Radioactive Waste - Methodology for Radiological Assessment of Disposal by Subsurface
32 Burial), NUREG/CR-3332 (Radiological Assessment - A Textbook on Environmental Dose
33 Analysis), and NUREG/CR-5512, Vol. 1 (Residual Radioactive Contamination From
34 Decommissioning). Most of the alternate disposal requests involved burying the waste on-site or
35 at off-site locations (e.g., landfills). In 1988, NRC promulgated the rule on "General
36 Requirements for Decommissioning Nuclear Facilities" (Timeliness rule). In part, this rule
37 required licensees to submit evaluations of inactive areas of sites including former burials under
38 10 CFR 20.302 and 20.304. Additional clarification was provided in Information Notice 96-47.
39 In 1996, NRC developed a preliminary Screening Methodology for evaluating former burials (61
40 FR 56716). After issuance of requirements in Subpart E of 10 CFR 20 in the License
41 Termination Rule (LTR) in July 1997, NRC concluded that the screening methodology did not
42 always produce a dose below the unrestricted dose limit when a more rigorous methodology was
43 used, and the screening methodology was never finalized.
44

45 The current guidance document that would be used to evaluate doses associated with 20.2002
46 requests is NUREG-1757, Volume 2 (Consolidated NMSS Decommissioning Guidance:

1 Characterization, Survey, and Determination of Radiological Criteria), dated September 2003.
2 This NUREG provides guidance on complying with Subpart E of Part 20, and represents the
3 current state of thinking for dose assessments. The guidance in NUREG 1757, Volume 2, was
4 based substantially on guidance in NUREG-1727 (NMSS Decommissioning Standard Review
5 Plan), dated September 2000. Prior to this NUREG being finalized, NRC issued interim
6 guidance entitled "Preliminary Guidelines for Evaluating Dose Assessments in Support of
7 Decommissioning," dated February 11, 1999. Thus, the standard practice over the years has been
8 to allow the release of material with slight levels of volumetric contamination based on a case-
9 by-case evaluation.

11 **2.2 Reactor Licensees**

13 For reactor licensees, the disposition of volumetrically contaminated materials is being
14 implemented under the provisions of Information Notice No. 88-22: Disposal of Sludge from
15 Onsite Sewage Treatment Facilities at Nuclear Power Stations. Certain materials may be
16 surveyed using a representative sample and gamma spectrometry analytical methods. The
17 provision requires that materials can be released if no licensed radioactive material above natural
18 background levels is detected, provided the radiation survey used a detection level that is
19 consistent with the lower limit of detection values used to evaluate environmental samples. NRC
20 guidance states that the lower limit of detection (LLD) to be used for radiation surveys is the
21 "operational state of the art" LLD values given in the Standard Radiological Effluent Technical
22 Specifications (RETS) for environmental samples taken as part of the licensee's radiological
23 environmental monitoring program.

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25 The environmental LLDs are contained in Regulatory Guide 4.8, "Environmental Technical
26 Specifications for Nuclear Power Plants," and in a Branch Technical Position (NRC 1979).
27 They are also contained in NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard
28 Radiological Effluent Controls for Pressurized Water Reactors," and NUREG-1302, "Offsite
29 Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water
30 Reactors." There are several different acceptable survey applications of the environmental LLDs
31 and applications have included a variety of environmental media including soils, sediments,
32 liquids and slurries.

34 **2.3 Materials Licensees**

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36 For materials licensees, the disposition of volumetrically contaminated materials is being
37 implemented under the provisions of the December 27, 2002, NRC Memorandum "Update on
38 Case-Specific Licensing Decisions on Controlled Release of Concrete from Licensed Facilities,"
39 (referenced in STP-03-003). This memorandum indicates that controlled releases of
40 volumetrically contaminated concrete may be approved, pursuant to 10 CFR 20.2002, under an
41 annual dose criterion of a "few mrem."

43 **3. Agreement State Practices for Releasing Solid Materials**

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45 As part of the technical basis development for the control of solid materials, NRC obtained
46 information from the Agreement States on their practices with respect to the release of surficially

1 and/or volumetrically contaminated materials for unrestricted use. The responses indicate the
2 States vary in their approaches. The types of criteria applied on a case-by-case basis include use
3 of levels that are indistinguishable from background, use of guidelines similar or equivalent to
4 Regulatory Guide 1.86, and use of dose-based analyses. The approaches listed below were
5 identified by one or more Agreement States in their responses to the All Agreement States letter
6 SP-99-074, dated November 2, 1999:

- 7
- 8 • Materials to be released must be indistinguishable from background. The level used for
9 background could be based on NRC guidance such as Regulatory Guide 1.86.
- 10
- 11 • Radioactive material can only be transferred to persons licensed to receive it. Therefore,
12 licensees cannot release either surficial or volumetric contaminated solid materials for
13 unrestricted use.
- 14
- 15 • NRC guidance documents are used to determine, on a case-by-case basis, whether radioactive
16 materials (e.g., dirt, resins, asphalt, concrete, metals) can be released for unrestricted use.
17 This includes but is not limited to NRC guidance documents such as Regulatory Guide 1.86,
18 Policy and Guidance PG-8-08, Policy and Guidance Directive FC 83-23, NUREG/CR 5849,
19 and computer models such as RESRAD, and DandD.
- 20
- 21 • Regulatory Guide 1.86 is used but the contamination limits for the second group of nuclides
22 in Table 1 are increased by a factor of ten.
- 23
- 24 • In addition to meeting specific surface contamination limits similar to Regulatory Guide 1.86,
25 porous materials (e.g., concrete), which are to be released for unrestricted use, shall be
26 evaluated to determine whether radioactive materials have penetrated to the interior of the
27 material. If radioactive contamination has penetrated into the material, analysis of the average
28 concentration, in picocuries per gram, shall be made. The material may be released for
29 unrestricted use if the radionuclide concentrations do not exceed the limits specified for soil
30 (which preclude a member of the public from receiving a total effective dose equivalent in
31 excess of 25 mrem/year from all pathways (excluding radium and its decay products)).
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- 33 • Volumetric releases are based upon a concentration equivalent to the 10 CFR Part 20 values
34 for water converted to grams rather than volume.
- 35
- 36 • Releases can be based on a life-time fatal cancer risk of 1.0E-6. One State identified used a
37 risk criterion of 1.0E-4.
- 38
- 39 • Use of maximum doses included 1, 10, 15 or 25 mrem/yr.
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- 41 • Allowance of up to 8 pCi/gm of Co-60 in soil. Allowance of 5 pCi/gm of Cs-137 in flue
42 dust.
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- 44 • Requirements that no licensee may possess, receive, use, or transfer licensed radioactive
45 material in such a manner as to cause contamination of soil or vegetation in unrestricted areas

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that causes a member of the public to receive a total effective dose equivalent in excess of 25 mrem/year from all pathways (excluding radium and its decay products).