UNITED STATES
NUCLEAR REGULATORY COMMISSION
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CHAIRMAN

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Jill Lipoti, Ph.D.
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Dear Dr. Lipoti:

Thank you for your letter of July 1, 1999, forwarding a copy of New Jersey's proposed rule, *Soil Remediation Standards for Radioactive Materials* (N.J.A.C. 7:28-12), for comment by the U.S. Nuclear Regulatory Commission (NRC). The Commission is interested in State soil cleanup standards and appreciates the opportunity to comment on the proposed New Jersey standards.

The NRC staff has reviewed the proposed new rule, *Soil Remediation Standards for Radioactive Materials* (N.J.A.C. 7:28-12); Chapter 12, "Radiological Assessment," of the New Jersey Department of Environmental Protection's (NJDEP's) *Field Sampling Procedure Manual* (referenced by the proposed rule); the NJDEP technical basis document for the rule, *Development of Generic Standards for Remediation of Radioactively Contaminated Soils in New Jersey, a Pathways Analysis Approach*; and the New Jersey Ground Water Quality Standards (N.J.A.C. 7:9-6). They have sought specifically to address the question of whether a site (especially one containing NRC-regulated material as well as naturally occurring radioactive material) cleaned up to meet the New Jersey proposed standards, would be found acceptable for license termination under NRC's License Termination Rule (10 CFR Part 20, Subpart E). The staff's detailed comments are enclosed.

The NRC believes that the proposed New Jersey regulation raises Federal preemption concerns because it appears that the regulation could apply to special nuclear material, source material, and byproduct material. As you are aware, pursuant to the Atomic Energy Act of 1954, as amended, the NRC has regulatory authority over the possession and use of these materials to protect the public health and safety. States are preempted from regulating such material for the purposes of radiation protection unless they enter into a formal agreement with the NRC. To date, New Jersey has not done so. In addition to the legal issues, the proposed regulations also raise practical concerns associated with dual regulation, for both power-reactor and materials facilities licensed by NRC.

In general, the NRC agrees with the intent of the proposed rule to develop generically applicable standards that are easy to use and flexible. However, we believe that as written, the proposed New Jersey regulation raises concerns by proposing a separate groundwater standard, rather than using an all-pathways approach that includes a groundwater pathway as recommended by both national and international organizations. As you are aware, the groundwater pathway is included in NRC's 25 millirem per year all-pathways dose criterion and

licensees are required to apply the as low as is reasonably achievable principle. NRC has previously discussed its analyses of groundwater and the rationale for its all-pathways standard in the license termination rule Federal Register notice (62 FR 39074, July 21, 1997), stating that: (1) all-pathways criterion provides a consistent risk-based regulation, (2) separate groundwater standards that use the maximum contaminant levels (MCLs) are not set at consistent risk levels (and include some set above the 25 mrem/yr dose criterion), and (3) the costs of meeting certain MCLs may be extraordinarily excessive compared to the benefits obtained in certain cases. Most importantly, the all-pathways criterion is unlikely to result in a community water system delivering water to the tap with concentrations above the MCLs, because of processes of dilution, decay, and transport in nature as the radionuclides move through the aquifer.

The NRC would recommend that New Jersey consider changing its proposed 15 mrem/yr dose limit to an all-pathways regulation that would include the groundwater pathway. If this recommendation is adopted, the New Jersey dose criterion could be directly compared with NRC's all-pathways license termination rule, and the NRC would be able to find sites acceptable for termination under NRC's license termination rule that are cleaned up to meet a New Jersey all-pathways standard (assuming similar models and assumptions are used by New Jersey and NRC). The NRC staff notes that if New Jersey adopts an all-pathways standard, then the State should not require remediation of contaminated groundwater to MCLs, and Sections 7:28-12.8(a)(3) and 7:28-12.10(a)(3) should be deleted from the proposed rule.

In addition, the NRC staff has provided a number of technical comments on the proposed rule relating to screening, or generically allowable soil concentrations, dilution of contaminated soil, and requirements for release of sites for restricted use. As a result, the staff believes that New Jersey has not provided enough information and justification for NRC to make a final conclusion that compliance with the proposed New Jersey rule would be sufficient to show compliance with NRC's License Termination Rule.

Details of these comments, as well as additional technical comments, are described in the enclosures. We hope you find these comments useful. The NRC staff is interested in, and available for, a continuing dialogue on this subject, should you desire such. If you have questions about our comments, please contact John Greeves, Director of the Division of Waste Management, in the Office of Nuclear Material Safety and Safeguards (301-415-7437).

Sincerely,

Greta Joy Dicus

Greta Joy Dicus

Enclosures:
(1) Detailed review comments
(2) Computer disk, with electronic file of detailed comments

cc w/encl.: Ann Zeloof, Esq.,
Office of Legal Affairs, NJDEP

NUCLEAR REGULATORY COMMISSION REVIEW OF PROPOSED SOIL REMEDIATION STANDARDS FOR RADIOACTIVE MATERIALS IN NEW JERSEY, N.J.A.C. 7:28-12

A. INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) staff received the proposed New Jersey rule, *Soil Remediation Standards for Radioactive Materials* (N.J.A.C. 7:28-12). In addition, a member of the NRC staff spoke to Dr. Jill Lipoti of the New Jersey Department of Environmental Protection (NJDEP) by phone on July 21, 1999. In that conversation, Dr. Lipoti indicated that New Jersey was especially interested in NRC's answer to the question: If a site (especially one containing NRC-regulated material as well as naturally occurring radioactive material) were cleaned up to meet the New Jersey proposed standards, would NRC find the site acceptable for license termination under NRC's license termination rule (10 CFR Part 20, Subpart E)? In reviewing the proposed rule, we have tried to specifically address this question. We have also provided comments on the issue of Federal preemption and on a number of technical concerns.

The NRC staff has reviewed: (1) the proposed new rule, *Soil Remediation Standards for Radioactive Materials* (N.J.A.C. 7:28-12); (2) Chapter 12, "Radiological Assessment," of the NJDEP's *Field Sampling Procedure Manual*; (3) the NJDEP technical basis document, *Development of Generic Standards for Remediation of Radioactively Contaminated Soils in New Jersey, a Pathways Analysis Approach*; and (4) the New Jersey Ground Water Quality Standards (N.J.A.C. 7:9-6).

Based on this review, NRC offers the following comments. The comments are supplied in the format requested in the New Jersey notice asking for comment on the proposed rule.

B. FEDERAL PREEMPTION AND RELATED ISSUES

7:28-12.2. COMMENT: As written, the New Jersey regulation raises potential Federal preemption concerns. Pursuant to the Atomic Energy Act of 1954 (AEA), as amended, NRC has regulatory authority over the possession and use of special nuclear material, source material, and byproduct material, as defined in that Act, in order to protect the public health and safety. NRC regulations covering these various topics can be found in Title 10 of the U.S. Code of Federal Regulations. States may regulate some of these materials if they enter into an agreement with NRC pursuant to section 274 of the AEA. New Jersey has not entered into such an agreement.

In general, Congress has given NRC complete regulatory authority regarding radiation protection over the topics listed above. Accordingly, as a general matter, States are preempted from regulating such material for the purposes of radiation protection. If the State regulatory action is taken for a purpose other than protection of the public health and safety, it is possible that the State law will not be preempted. See Pacific Gas & Electric Co. v. State Energy Resources Conservation and Development Comm'n, 461 U.S. 190 (1983). However, even if the State action is taken for a reason other than protection of public health and safety, it is likely that the State law will be preempted if it directly interferes with or has a substantial effect on Federal regulation of radiation hazards. Therefore, dual Federal and State government regulation over radiation hazards of these aforementioned materials is generally prohibited.

The stated purpose of New Jersey's proposed regulations is to regulate radioactive hazards to protect the public health and safety (see narrative accompanying the proposed rule, page 4). In

addition, NRC understands that New Jersey intends these regulations to apply to radioactive material covered by the AEA and thus currently under NRC regulations. Accordingly, it appears that New Jersey's proposed regulations raise possible preemption concerns to the extent they regulate special nuclear material, source material, and byproduct material, as defined in the AEA. However, issues of preemption and State jurisdiction must be made by the courts; NRC does not have authority tc issue final, legally binding decisions with regard to these issues.

In addition to the legal issues, New Jersey's regulations also raise practical concerns, for both power-reactor and materials facilities licensed by NRC. The impact of New Jersey's regulations on the implementation of NRC's regulatory program is unclear. Also, NRC staff notes that New Jersey's regulations have the potential to decrease the efficiency of regulation by requiring regulated entities to comply with two separate cleanup standards as well as potentially impede NRC licensees from terminating operations because of conflicting cleanup standards. In addition, NRC is concerned about the finality of NRC license terminations (i.e., it is unclear whether the State would attempt to require additional cleanup after license termination by NRC).

7:28-12.2(b). COMMENT: If the proposed rule is not intended to apply to AEA-regulated materials, that should be clearly stated in the rule text. (U.S. Nuclear Regulatory Commission)

C. ACCEPTABILITY TO NRC OF SITES CLEANED UP TO MEET PROPOSED NEW JERSEY STANDARDS

Development of Generic or Screening Allowable Concentrations:

COMMENT: The NRC staff finds the New Jersey methodology for developing the generic allowable soil concentrations lacking in a number of areas. It appears that the New Jersey generically allowable soil concentrations and supporting documentation would not provide, on a generic or screening basis (i.e., without additional, site-specific information or justification), reasonable assurance that NRC's dose limit is being met. The following comments provide more details. (U.S. Nuclear Regulatory Commission)

7:28-12.8(a). COMMENT: NRC's criteria for license termination are given in 10 CFR Part 20, Subpart E. NRC's dose criterion of 25 mrem/year for unrestricted release of a site applies to the dose to the average member of the critical group. The critical group is a group that includes the most highly exposed individuals.

The proposed New Jersey standards apply the 15 mrem/year dose limit to protect "any person," but it is not clear how that is being assured in the calculations of generic allowable soil concentrations. It is not clear what approach New Jersey used in establishing the exposure scenarios and receptors: average person, average member of the critical group, maximally exposed individual, or reasonably maximally exposed individual? The Technical Basis Document (Section 1.2) is also not clear on the description of the receptor being evaluated. The New Jersey analysis does not adequately discuss the assumed habits and characteristics of the receptor in such a way that one can be assured that the receptor would be among the highest exposed (i.e., an average member of the critical group). From the data used in the analysis it appears that the receptor is an average member of the public rather than a member of a more highly exposed subgroup. Thus, NRC staff cannot determine on a generic basis that implementation of the proposed New Jersey standards would meet the intent of NRC's criteria for license termination. (U.S. Nuclear Regulatory Commission)

Technical Basis Document. COMMENT: NRC used a screening approach to develop default or screening concentrations that would be considered acceptable for use for essentially all NRC-licensed facilities. The basis of this screening is to use relatively simple models and associated parameter values in a way that attempts to overestimate the actual dose to people from the majority of sites to be cleaned up. The screening analyses are set up so that facilities are required to supply minimal (or almost no) site-specific information to use the models to show compliance. If compliance is demonstrated with the screening approach, NRC has high confidence that the criteria are met and that no complex calculations are needed for the site.

As described in the Technical Basis Document and in the narrative for the proposed rule (page 18), the dose assessment strategy for the proposed New Jersey standard excluded a few pathways from consideration for the intake scenario. The exclusions included: (1) the aquatic pathway (ingestion of aquatic foods, such as fish); (2) meat and milk pathways; and (3) crop irrigation. On a generic basis, the assessment disregarded the possible use of ground water for any purpose other than drinking water. The Technical Basis Document does not provide sufficient justification regarding why these alternate uses would be unreasonable to assume. NRC assesses these excluded pathways in its determinations of screening concentrations. Because of these excluded pathways, NRC staff cannot determine on a generic basis that implementation of the proposed New Jersey standards would meet the intent of NRC's criteria for license termination. (U.S. Nuclear Regulatory Commission)

7:28-12.9(a). COMMENT: This section of the rule provides generic allowable soil concentrations that can be met to show compliance with the dose limit of 7:28-12.8. In this section (12.9(a)) of the rule, there are no requirements to consider doses from pathways not included in the analyses for the generic concentrations. However, the narrative for the proposed rule (page 18) states that for some sites, licensees will need to do dose calculations for other possible uses of ground water, such as irrigation onto crops. The result of including additional exposure pathways would likely be the establishment of lower allowable concentrations than those published as generic. The narrative also states that the staff (New Jersey) may need to include other pathways (irrigation) at certain sites but gives no guidance or criteria on when this will need to occur. Additionally, the rule does not provide any definitive information that the facility would need to provide to the State to allow the staff to make such a decision.

NRC believes that the purpose of creating generic cleanup criteria is to provide concentrations that a site can use without (or with very limited) site-specific justification (i.e., to provide screening values). The whole process of requiring some undefined sites to do additional dose analysis to model pathways not included in the default calculations runs counter to this purpose and does not relieve any regulatory burden. Although NRC's screening approach is intended to be applicable to essentially all NRC-licensed facilities, the New Jersey generic concentrations appear to have more limitations in applicability. Thus, NRC believes that the generic allowable concentrations proposed by New Jersey are not screening concentrations in the same sense as NRC's screening values. Thus, cleanup to meet New Jersey's generic allowable concentrations may not be acceptable for showing compliance with NRC's License Termination Rule (Part 20, Subpart E), without additional justification. (U.S. Nuclear Regulatory Commission)

7:28-12.9(a). COMMENT: As a result of differences in the scenario and pathway descriptions, models, and parameter values used, the New Jersey proposed generic allowable soil concentrations are greater than the concentration levels used by NRC for screening in the absence of site-specific information (see NUREG/CR-5512, Volume 3). Since the

methodologies and assumptions used are not equivalent, the generic concentrations are not expected to be the same as the NRC screening concentrations. However, the use of justified methodologies and assumptions is more important than the exact values of the results, when NRC determines acceptability of a specific site for release. New Jersey does not provide sufficient justification of the methodologies and assumptions for NRC to make a final conclusion that compliance with the proposed New Jersey rule would be sufficient to show compliance with NRC's License Termination Rule. The State should provide additional justification for its scenario and pathway descriptions, models, and parameter values used. (U.S. Nuclear Regulatory Commission).

Technical Basis Document. COMMENT: The level of crop ingestion and growing time, for home-grown crops, that New Jersey assumes for the intake scenario (see Section 1.3.3.3) are insufficiently supported. It appears that New Jersey uses national average values for the general population for both total vegetable and fruit ingestion rates and home-grown fractions, instead of the values for home-grown intake for the Northeast region from EPA's 1996 draft version of the Exposure Handbook. EPA's draft Exposure Handbook, which was based on surveys, provides more specific information than the national average. If New Jersey opts to use the national average, or has State-specific information (e.g., decreased annual growing time) that it believes is more accurate than EPA's regional data, then the State should provide additional justification. In some cases, NRC agrees that New Jersey's assumptions may be more appropriate for the State, such as assuming intakes from home-grown crops for 50% of the year, as opposed to the same intake rate for the whole year. However, the assumptions need to be supported better. (U.S. Nuclear Regulatory Commission).

Site Use Scenarios. COMMENT: The proposed soil limits were derived assuming areas of 500 m^2 (0.12 acres) and 1000 m^2 (0.25 acres) for the land-use scenario for the unrestricted and restricted use cases respectively (see page 7 of narrative, "Site Use Scenarios" section). No justification is provided for why these are considered to be appropriate land-use areas for the analysis. In addition, the proposed rule is not clear on how facilities are expected to address contaminated areas larger than these. For example, would these facilities be expected to perform their own dose analyses, and if so, would they be expected to add exposure pathways not considered because of the small land areas. Also, these assumed land-use areas are within, but less than, the upper limit recommended in the Multi-Agency Survey and Site Investigation Manual (MARSSIM) for Class 1 survey units (i.e., 2000 m^2). It is unclear whether the land-use areas assumed for the dose modeling are consistent with the actual site areas and with the survey methods that will be used. (U.S. Nuclear Regulatory Commission)

7:28-12.10. COMMENT: The parameter values used in the analysis (i.e., Tables 6-9) were selected to be conservative, but not overly conservative. However, selecting parameters individually does not ensure conservatism in the analysis. In other words, incorporating a group of parameters that are conservative individually does not ensure that collectively the results will be conservative. To ensure conservatism in the analysis, the parameter values should be selected as a group, which allows their interdependence to be considered (e.g., through the use of Monte Carlo analyses). (U.S. Nuclear Regulatory Commission)

Release for Restricted Use:

7:28-12.11. COMMENT: The proposed New Jersey standard provides requirements for cleanup of sites for limited restricted use and for restricted use. These proposed New Jersey requirements are in some cases less stringent than those required under NRC's criteria of

10 CFR 20.1403. First, the New Jersey proposed standards do not include any eligibility "test" for a site to be considered for cleanup for restricted use. In contrast, the NRC criteria require that release for restricted use only be used when either further cleanup would result in net public or environmental harm or when the residual radioactivity levels associated with restricted conditions are already reduced ALARA.

Second, the requirements for the institutional and engineering controls are different. NRC's regulation requires that institutional controls are legally enforceable. The proposed New Jersey standard does not include this requirement. Third, NRC's regulation also requires that specific public involvement activities be performed. The New Jersey proposal does not include such requirements. There also are slight differences in the financial assurance requirements for the costs of implementing and maintaining engineering and institutional controls.

In addition, we note that under the proposed New Jersey standards, the New Jersey Department of Environmental Protection is the entity responsible for determining the nature and duration of all engineering and institutional controls. Under NRC's regulations, this responsibility belongs to the site licensee. Because of these differences, NRC cannot determine generically that sites meeting the proposed New Jersey requirements for release for restricted use would be acceptable for restricted release under NRC's criteria of 10 CFR 20.1403. Applications for release under restricted use conditions would thus have to be evaluated by NRC on a case-by-case basis, following NRC guidance documents. (U.S. Nuclear Regulatory Commission)

Soil Mixing:

7:28-12.9(b). COMMENT: The proposed New Jersey regulation generically allows facilities to mix (with depth) contaminated soil with uncontaminated soil to meet the allowable soil concentrations.

While NRC does not explicitly prohibit soil mixing and dilution, NRC staff does not generally permit soil mixing as a means of reducing radionuclide concentrations in soil. NRC views the use of dilution within the context of an overall approach to the site cleanup, which includes application of the as low as reasonably achievable (ALARA) principle. Clearly it would be appropriate to remove significantly elevated contamination where reasonable. NRC staff would consider the use of soil mixing and dilution as a means of reducing radionuclide concentrations only in those cases in which it was demonstrated that removal of the soil would not be reasonably achievable. (U.S. Nuclear Regulatory Commission)

Survey Methodology:

Field Sampling Procedure Manual, Chapter 12. COMMENT: The area dose factors described in Section F.5 and shown in Table F.1 are taken from the MARSSIM (Table 5.6). These area factors were derived using the RESRAD code, Version 5.6, using default parameters. Because RESRAD was not used to develop the soil concentration limits, it is not clear that the use of the area factors from the MARSSIM are appropriate for the dose assessments New Jersey is using. In addition, the MARSSIM clearly states that these values are for illustrative purposes only. (U.S. Nuclear Regulatory Commission).

Groundwater:

Summary, 7:28-12.8(a)(3), and 7:28-12.10(a)(3). Comment: NRC believes that, as written, the proposed New Jersey regulation raises concerns by proposing a separate groundwater standard, rather than using an all-pathways approach that includes the groundwater pathway as recommended by both national and international organizations. The groundwater pathway is included in NRC's 25 mrem/yr all-pathways dose criterion and licensees are required to apply the as low as is reasonably achievable principle. NRC has previously discussed its analyses of groundwater and the rationale for its all-pathways standard in the license termination rule Federal Register notice (62 FR 39074, July 21, 1997), stating that: (1) all-pathways criterion provides a consistent risk-based regulation, (2) separate groundwater standards that use the maximum contaminant levels (MCLs) are not set at consistent risk levels (and include some set above the 25 mrem/yr dose criterion), and (3) the costs of meeting certain MCLs may be extraordinarily excessive compared to the benefits obtained in certain cases. Most importantly, the all-pathways criterion is unlikely to result in a community water system delivering water to the tap with concentrations above the MCLs, because of processes of dilution, decay, and transport in nature as the radionuclides move through the aquifer.

NRC would recommend that New Jersey consider changing its proposed 15 mrem/yr dose limit to an all-pathways regulation that would include the groundwater pathway. If this recommendation is adopted, the New Jersey dose criterion could be directly compared with NRC's all-pathways license termination rule, and NRC would be able to find sites acceptable for termination under NRC's license termination rule that are cleaned up to meet a New Jersey all-pathways standard (assuming similar models and assumptions are used by New Jersey and NRC). NRC staff notes that if New Jersey adopts an all-pathways standard, then the State should not require remediation of contaminated groundwater to MCLs, and Sections 7:28-12.8(a)(3) and 7:28-12.10(a)(3) should be deleted from the proposed rule.

The summary narrative (page 3) states that the proposed cleanup standards take the New Jersey groundwater quality standards into consideration. Although the dose assessment does include the dose due to transport from soil into drinking water, there is no mention of a separate comparison of the maximum groundwater concentrations and the MCLs, in order to derive the allowable soil concentrations. The Technical Basis Document does not address this.

The proposed standards in 7:28-12.8(a)(3) require remediation of contaminated groundwater to MCLs. If the groundwater quality standards were not considered in establishing the soil concentration limits, the proposed standards could result in different groundwater standards being applied for remediation as opposed to what would be applied to protecting groundwater from residual contamination in soils. This problem could be averted if New Jersey adopted an all-pathways standard and eliminated the requirement to remediate contaminated groundwater to MCLs.

Given that the transport of radioactivity through ground water is included as an exposure pathway in developing the soil concentration limits, NRC believes that additional protection for the groundwater pathway (by also limiting radionuclide concentrations in groundwater) is unwarranted.

D. OTHER TECHNICAL COMMENTS ON THE PROPOSED RULE

Regulatory Requirements:

Technical Basis Document. COMMENT: In establishing the 15 mrem/year dose limit based on the total dose increment, the State took credit for the shielding that the building provides from external exposure originating outside the building while people are indoors (see Section 2.1.1). The State did not account for the indoor exposure from building materials. The National Council on Radiation Protection and Measurements' Report 94, the document used for external gamma rate data, discusses indoor gamma exposure and concludes that indoor exposure rates on average are approximately the same as outdoor rates because the exposure from building materials tends to cancel out the dose reduction due to the shielding effect. Thus, one could assume that the variability in indoor exposure rates is approximately the same as the variability in outdoor exposure rates. When this is accounted for, the allowable total dose increment would be increased to 18 mrem.

Additionally, the dose increment calculation takes no account of the variation of cosmic radiation across the State caused by variations in altitude. If variability in exposure rates from cosmic radiation were also accounted for, the allowable total dose increment would increase even more. (U.S. Nuclear Regulatory Commission)

7:28-12.8(a)2. COMMENT: The 3-pCi/L indoor radon limit (above background) would result in a total concentration of 4.35 pCi/L at an "average" (geometric mean) home in New Jersey (see also the Technical Basis Document, Section 2.2). This concentration is slightly greater than the U.S. Environmental Protection Agency's action limit of 4 pCi/L for homes. The American Society for Testing and Materials (ASTM) provides a calculation method ("Radon Prevalence, Measurements, Health Risks, and Control;" Niren Nagda, Editor; ASTM MNL 15; Philadelphia, PA; 1994) that estimates the annual average American's dose from radon to be 200 mrem (based on average concentrations of 1.2 pCi/L indoors and 0.3 pCi/L outdoors). Using this same method, a person exposed to the limit above the average concentration (total 4.35 pCi/L) would receive approximately 670 mrem per year, based on a 75 percent indoor occupancy rate. The 3-pCi/L radon limit is one of two criteria (the other is the 15 mrem/year dose limit for other pathways) for the development of allowable soil concentrations for Ra-226. This radon concentration criterion is, on a dose basis, over an order of magnitude higher than the 15 mrem/year basic dose limit. (U.S. Nuclear Regulatory Commission).

7:28-12.9(a)1. COMMENT: The tables providing allowable incremental concentrations of residual radionuclides in soil only include values for naturally occurring radionuclides. The rule also specifically applies to accelerator-produced residual radioactivity and apparently applies to all radionuclides, yet concentration limits for these other radionuclides are not included. In addition, concentration limits are not provided for Th-230, even though the Technical Basis Document (Section 1.1 and Table 1) indicates that Th-230 would be treated as a separate subchain of the U-238 series. (U.S. Nuclear Regulatory Commission)

7:28-12.9(a)1. COMMENT: The tables of allowable incremental concentrations of residual radionuclides in soil include limits for different thicknesses of the contaminated layer of soil, from 1 to 9 feet. The availability of multiple standards for different contamination thicknesses should be useful to those cleaning up contaminated facilities. (U.S. Nuclear Regulatory Commission)

Federal Standards Statement. COMMENT: On page 18 of the narrative statement is the sentence: "An examination of the methodology used by NRC to determine compliance with the [NRC's] ALARA limit shows that it is reasonable to assume that a 15 mrem/year dose standard would be achieved." NRC staff disagrees with this statement. NRC has found, through generic analyses, that when cleanup of contaminated soil would require shipment to a low-level waste disposal facility, cleanup below concentrations that would produce doses of 25 mrem/year would generally not be required on an ALARA basis (U.S. Nuclear Regulatory Commission, August 1998, Draft Regulatory Guide DG-4006, "Demonstrating Compliance with the Radiological Criteria for License Termination."). (U.S. Nuclear Regulatory Commission)

Dose Modeling:

Technical Basis Document. COMMENT: As noted previously, the models used in the dose assessment did not include any radionuclide contributions to food concentrations from irrigating with ground water. In addition, the crop ingestion equations in Section 3.2.4 only include the process of direct incorporation of radionuclides from the soil into plants. The model does not address contributions to the plant concentrations from resuspension or rainsplash of surface soil onto the plant surfaces, nor does it address the potential for direct consumption of crops without washing or processing. (U.S. Nuclear Regulatory Commission)

Federal Standards Statement. COMMENT: The narrative states that some modeling assumptions used by NRC differ from those used by the Department. Section 1.3 of the Technical Basis Document also cites NRC references for parameter values. It is important to point out that these NRC parameter values cited have been largely updated or superseded. Information about parameter distributions currently used by NRC for its screening calculations is provided in NUREG-CR/5512, Vol. 3, "Residual Radioactive Contamination from Decommissioning, Parameter Analysis," a draft of which is available on the Internet at URL: (http://techconf.llnl.gov/cgi-bin/library?source=*&library=rad_cri_public&file=*). (U.S. Nuclear Regulatory Commission)

Survey Methodology, Field Sampling Procedure Manual, Chapter 12:

Field Sampling Procedure Manual, Chapter 12. COMMENT: Overall, draft Chapter 12 of the NJDEP *Field Sampling Procedures Manual* provides an easy to read, simple guide to performing surveys following (generally) the methods in the MARSSIM. (U.S. Nuclear Regulatory Commission)

Field Sampling Procedure Manual, Chapter 12. COMMENT: Section C.5 of Chapter 12 states that for surveys of Class 1 survey units, triangular grids must be used. NRC staff agrees that triangular grids are more efficient, but it is unclear why their use is required. The MARSSIM approach allows the use of square or triangular grids. This comment also applies to other sections of Chapter 12. (U.S. Nuclear Regulatory Commission)

Field Sampling Procedure Manual, Chapter 12. COMMENT: Section F.2 of Chapter 12 describes the determination of the relative shift (Δ/σ). This section recommends that if the relative shift exceeds 3, the lower bound of the gray region (LBGR) should be increased until the relative shift is less than or equal to 3. It is not clear why this guidance differs from that given in the MARSSIM (see the MARSSIM, page D-20). Without considering some of the detailed guidance provided by the MARSSIM, people following the New Jersey guidance may arbitrarily decrease the relative shift too far, and may thus end up performing excessive

sampling (more sampling locations than would have been necessary). We recommend that the New Jersey guidance refer to the discussion in the MARSSIM. (U.S. Nuclear Regulatory Commission)

Field Sampling Procedure Manual, Chapter 12. COMMENT: Section F.4 of Chapter 12 describes the process for determining the number of samples needed for final status surveys. The first paragraph of this section describes the process to use in cases where a contaminant is present in background. However, this first paragraph does not state that it applies to such cases only. This should be clarified.

In addition, in the first and second paragraphs in this section, the number of samples needed for each survey unit is described as N. This is inconsistent with the use in the MARSSIM (see the MARSSIM, page 5-29), where N represents the total number of samples needed for each pair of survey unit plus reference unit. Thus, in the MARSSIM, the number of samples needed from each survey unit is N/2 (N/2 are also needed from each reference unit). The terminology should be clarified. We note that the example later in Section F.4 of Chapter 12 appears to correctly use the MARSSIM terminology. (U.S. Nuclear Regulatory Commission)

Field Sampling Procedure Manual, Chapter 12. COMMENT: The last equation in section F.5 of Chapter 12 is used to determine acceptability of the elevated measurement comparison. The text describes the variable δ (lower-case delta) as the average residual radioactivity concentration for all sample points, in the survey unit, that are outside the elevated area. This definition differs from that given in the MARSSIM. The text in the MARSSIM describing equation 8-2 (the MARSSIM page 8-23) states that δ is the estimated average residual radioactivity concentration in the survey unit (i.e., not the concentration outside the elevated area). (U.S. Nuclear Regulatory Commission)

Field Sampling Procedure Manual, Chapter 12. COMMENT: There appears to be an inconsistency in Section F of Chapter 12 regarding the use of area factors and acceptable concentrations for elevated concentration areas. Section F.7 indicates that after further investigation of potentially elevated areas, if it is determined that the concentration of the area exceeds the Derived Concentration Guideline ($DCGL_{w}$) by more than a factor of 2, the elevated area should be remediated. In contrast, Section F.5 describes area factors that can be used to determine acceptable minimum detectable concentrations (MDCs) for scanning. The area factors, presented in Table F.1, range of up to 54.8, which means that the scanning MDC could be up to 54.8 times greater than the $DCGL_{w}$. With such scanning MDCs, it is likely that elevated areas with concentrations of 2 times the DCGL would not be located during scanning. In summary, it appears that the MARSSIM approach to area factors has been implemented for determining required scanning sensitivities, but not implemented for acceptable concentrations in elevated concentration areas. This appears to be a significant inconsistency. (U.S. Nuclear Regulatory Commission)

Other Comments:

Federal Standards Statement. COMMENT: The narrative (page 20) states that the proposed new rule does not contain any standards or requirements that exceed the standards or requirements imposed by Federal law. However, it also states that it is impossible to determine if NRC's standards are more or less stringent than the proposed standards. These statements appear to be contradictory. (U.S. Nuclear Regulatory Commission)

7:28-12.3. COMMENT: The definition of "uncontaminated surface soil" is unclear. The present wording indicates that uncontaminated surface soil has background radionuclide concentrations that are less than the residual radionuclide concentrations. Perhaps the intent was to indicate that the total concentrations have to be less than the limits for residual radionuclides and less than 20 percent greater than the site average background concentrations. The definition should be clarified. (U.S. Nuclear Regulatory Commission)

7:28-12.9(a)1. COMMENT: In Table 3A, there appears to be a typographical error in the value for Ac-227, for a 1-ft-thick layer of contaminated soil with 2 ft of uncontaminated surface soil. (U.S. Nuclear Regulatory Commission)

Technical Basis Document. COMMENT: There appears to be a typographical error in the equation for the Vertical Extent Factor, *VEF*, in Section 3.3. In one component of the equation, inequality operators are missing. (U.S. Nuclear Regulatory Commission)