EPA 402-R-16-004

National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Radionuclides
National Emission Standards for Radon from Operating Mill Tailings

40 CFR Part 61, Subpart W

Background Information for Final Rule
Summary of Public Comments and Responses

December 2016

Office of Radiation and Indoor Air

U.S. Environmental Protection Agency

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Introduction

This document contains a summary of and responses to public comments on the EPA's rulemaking to revise the "National Emission Standards for Radon Emissions from Operating Mill Tailings," 40 CFR part 61, subpart W, referred to throughout as "Subpart W." Subpart W was promulgated in 1986 under the EPA's Clean Air Act authority to establish National Emission Standards for Hazardous Air Pollutants (NESHAPs). 51 FR 34056 (September 24, 2986). Following a voluntary remand, the EPA re-promulgated Subpart W on December 15, 1989. 54 FR 51654.

This rulemaking was undertaken as part of a settlement agreement with the Colorado Citizens Against Toxic Waste (CCAT) and Rocky Mountain Clean Air Action. These groups notified the EPA of an intent to sue based on the EPA's failure to timely review, and if appropriate revise, Subpart W as required by § 112(q)(1) of the Clean Air Act. This section was part of the Clean Air Act Amendments of 1990 and requires the EPA to undertake a review of pre-Amendments standards within ten years. Upon completion of the review, if the EPA finds revision to be appropriate, the standard is to be revised to comply with the requirements of § 112(d).

The EPA determined that revisions to Subpart W are appropriate. The EPA proposed revisions on May 2, 2014. 79 FR 25388. Consistent with the authority provided to the Administrator under CAA § 112(d), the proposed and final standards incorporate Generally Available Control Technology (GACT) management practices. See the preamble to the final rule for more detail.

What is Subpart W?

Subpart W provides standards to limit emissions of radon-222 ("radon") from uranium byproduct material or tailings, which are the wastes resulting from the extraction or concentration of uranium from any ore processed primarily for its source material content. Radon is a naturally-occurring radioactive gas that results from the decay of uranium and can cause lung cancer if inhaled. It is considered a hazardous air pollutant (HAP) under the Clean Air Act. The EPA determined that radon is the HAP of most significance associated with uranium byproduct material or tailings.

Uranium recovery facilities subject to Subpart W are licensed by the Nuclear Regulatory Commission (NRC) or NRC Agreement States under the Atomic Energy Act. Uranium recovery facilities addressed in Subpart W include conventional mills, *in-situ* leach (ISL) facilities, and heap leach facilities. Structures at these facilities that may contain uranium byproduct material or tailings include conventional impoundments, non-conventional (liquid) impoundments, and heap leach piles. Subpart W does not apply to these structures once they formally enter the closure process.

Public Comments

The EPA's proposed rule was published with a 90-day public comment period. In response to multiple requests, the EPA extended the comment period by 90 days, until October 29, 2014. The EPA also held two public hearings on September 4 and 5, 2014.

The EPA received approximately 45 separate sets of comments on the proposed rule, including multiple submittals by the same author(s). The comments range in size from one page to several hundred pages, and in many cases contain dozens of individual comments. All told the EPA identified over 4,000 individual comments. A mass mailer that contains over one thousand signatures is also in the docket for this rulemaking (Docket No. EPA-HQ-OAR-2008-0218). The docket also includes the transcripts of the two public hearings held in Denver, CO on September 4 and 5, 2014. All of the comments received are in the docket for this rulemaking. All comments can be accessed electronically through the Federal Document Management System (FDMS), available at *http://www.regulations.gov*. This website provides instructions on how to access the electronic docket. Some submittals may be duplicated in FDMS, as a commenter may have used several methods to ensure the comments were received, such as statement at a public hearing, fax, e-mail, U.S. mail, or directly through FDMS.

This document summarizes comments received on the proposed rule, broken out by topical area. Full responses to the most significant comments are contained in the preamble to the final rule, and are referenced in this document. Additional responses are provided in this document. All comments, whether written or oral, were given the same consideration.

Each section of this document includes a list of issues addressed in that section. Many comments touched on different topical areas, or on different issues within a topical area. Cross-references have been provided where possible, but readers are encouraged to consider this document as a whole, for it collectively reflects the EPA's consideration of public comments. Commenters are identified by number, which correlates to the listing found in Appendix A and to the submittals in the docket, where readers can find the full text of comments. Appendix B provides a list of acronyms and abbreviations.

Section 1 – Legal Authority to Promulgate Subpart W Regulations

Issue 1: Major source threshold for radionuclide emissions

Summary of Comments Under Issue 1:
Commenter 0153 argued that uranium recovery operations should be considered, by definition, major sources of hazardous air pollutants and should be subject to major source requirements. Commenter 0153 further stated that the EPA's document "Background Information for Proposed Area Source Standards" (EPA-HQ-OAR-2008-0218-0001, 0002) is misleading because it uses the standard major source threshold at Clean Air Act (CAA) §112 (a)(1), that any stationary source that emits or has the potential to emit 10 tons per year (tpy) or more of any single hazardous air pollutant (HAP) or 25 tpy or more of any combination of HAP, to support its conclusion that uranium recovery facilities regulated under Subpart W are area sources. The commenter stated that radon is not measured in tpy and that the CAA § 112 threshold of 10 or 25 tpy was not intended to apply to radon or other radionuclides.

Response to Issue 1:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 2: Listing the facilities regulated by Subpart W as a source category or subcategory

Summary of Comments Under Issue 2:
Commenters 0155 and 0168 stated that the EPA must establish a source category pursuant to CAA § 112(c)(1) before promulgating CAA § 112(d) standards. Commenter 0155 cites to a 2007 EPA rulemaking which stated that listing pursuant to section 112(c) is a critical aspect and a condition precedent to issuing CAA § 112(d)(5) standards. Commenters also argued that the EPA must determine all HAPS present at uranium recovery facilities before the EPA can establish a source category, develop criteria to differentiate between major and area sources of radionuclides, and promulgate emission standards, whether MACT or GACT.

Commenter 0153 asserted that because CAA § 112(q) requires pre-1990 regulations to be reviewed and, if appropriate, revised in accordance with the requirements of subjection (d), the revision must comply with all applicable requirements in CAA § 112, including all parts of CAA § 112 enacted as part of the 1990 CAA Amendments.

Commenter 0155 also argued that the EPA must establish a source category or subcategory before promulgating standards under CAA § 112(d)(5) for facilities licensed to manage uranium byproduct materials. The comments state that the EPA has not complied with the requirements of CAA § 112 and has not taken the requisite preliminary actions and evaluations to support establishing revised standards for uranium recovery facilities, specifically GACT. Commenter 0153 stated that the EPA has no basis for setting GACT standards in lieu of MACT standards.

Response to Issue 2:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 3: Adoption of emissions standards instead of management practices

Summary of Comments Under Issue 3:
Several commenters argued that the EPA improperly proposed to promulgate design and work practice standards in lieu of emissions standards. Specifically, Commenters 0153, 0155, 0172.3 and 0187 stated that the EPA cannot promulgate design and work practice standards without the Administrator first making a finding pursuant to CAA § 112(h) that emission standards are not feasible. Commenter 0153 took the position that the EPA has not and cannot make a finding pursuant to CAA § 112(h) that radon emissions standards are not feasible at uranium recovery facilities. Commenters 0153 and 0155 assert that the EPA has not and cannot make the "not feasible" showing, so the EPA must promulgate an emissions standard.

Commenter 0153 stated that the EPA has no legal basis for the promulgation of a design, equipment, work practice, or operational standard, or combination thereof, in lieu of a radon emission standard, because design, equipment, work practice, or operational standards are meant to supplement, not replace, a standard that places specific numerical limitations on HAP emissions. Commenter 0153 also asserts that the EPA has no legal basis for eliminating the emission standard for existing mill tailings impoundments.

Commenter 0155 pointed to text from the legislative history of the 1990 Clean Air Act Amendments and stated that work practice standards must achieve the same or greater level of emissions reduction as a numerical emission standard. Commenter 0155 argues that radon emissions will be higher under the GACT standards than they would be under a numerical emission standard and therefore EPA should promulgate an emission standard.

Commenter 0187 argues that, since the 1977 Clean Air Act (Public Law 95-95) contained similar language in § 112(e), "it appears that the 1989 design and work practice standards for 'new' impoundments were promulgated contrary to" the statute because the rule did not contain a finding that an emission standard was infeasible for new impoundments. The commenter notes that the Agency made a finding that emission standards were not feasible in the 1986 rulemaking; however, the commenter finds that, by establishing an emission standard for "existing" impoundments in the 1989 rulemaking, it was not permissible for the EPA not to do so for "new" impoundments without a corresponding infeasibility finding.

Response to Issue 3:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

The issues raised by Commenter 0187 regarding the 1989 rulemaking have no bearing on this rulemaking. Our review of Subpart W is being conducted under the authority of CAA section 112(q)(1), which requires us to revise Subpart W, as appropriate, to comply with the provisions of section 112(d). This final rule sets standards pursuant to section 112(d)(5), which is applicable to area sources and does not require a finding of feasibility related to emission standards. Further, section 112(q)(1) states that standards in effect before the 1990 CAAA "shall remain in force and effect…unless modified as provided in this section." The flaws perceived by the commenter notwithstanding, the 1989 rule is no longer subject to challenge on these grounds.

Issue 4: Regulation of evaporation ponds at uranium recovery facilities, specifically ponds associated with in-situ leach operations

Summary of Comments Under Issue 4:
Numerous commenters challenged the EPA's authority to regulate impoundments associated with in-situ leach facilities, referred to as non-conventional impoundments in the Subpart W rulemaking. Commenter 0162 submits that Subpart W does not apply to evaporation ponds at currently operating and future operating uranium recovery facilities, specifically in-situ facilities because of the significant amount of process or waste water present. Commenters 0162 and 0169 explain that evaporation ponds should not be regulated in Subpart W because the liquid cover substantially eliminates radon emissions. Commenter 0169 further supports excluding evaporation ponds because the original 1989 rulemaking stated that science did not support the EPA exercising jurisdiction over fluid retention impoundments.

Commenter 0169 similarly argues that the EPA has no legal or regulatory bases to apply 40 CFR Part 61, Subpart W to evaporation ponds at uranium recovery facilities. Further, Commenter 0169 states that after 20 years of consistent interpretation that Subpart W is only applicable to uranium mill tailings impoundments, the EPA is now asserting that Subpart W applies to evaporation ponds at in-situ recovery and conventional mill tailings facilities. Commenter 0169 argues that the EPA's position is inconsistent with the language and the rulemaking history associated with Subpart W since the regulations discuss uranium mill tailings "piles" and the rulemaking record states that the radon cover requirements in Subpart W's work practice standards are not intended to apply to such fluid retention impoundments.

Commenter 0169 challenges that evaporation ponds are not covered by Subpart W because the specific examples in the regulations do not include evaporation ponds.

Commenter 0173.9 argues that the water impoundments should not be regulated as tailings impoundments and should not be subject to 40 CFR part 192.

Alternatively, Commenter 0167 supported the EPA's confirmation that in-situ leach facilities are subject to the EPA's CAA NESHAP jurisdiction. The commenter also stated that where the rule does not include emissions limits confirmed by monitoring and reporting requirements, the EPA has not carried out its Clean Air Act duty to minimize or eliminate radon emissions.

Response to Issue 4:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 5: Inclusion of groundwater protection requirements

Summary of Issue 5 Comments:
Commenters 0159 and 0162 both commented that they do not believe that the EPA has the legal authority to regulate fluid retention impoundments at uranium recovery facilities. Commenters 0159 and 0162 both questioned the appropriateness of including groundwater protection requirements in a NESHAP promulgated under the Clean Air Act since they do not affect air

pollution. Further, Commenter 0162 added that the rule is unnecessary because it is designed to regulate HAPs yet it incorporates groundwater protection standards. The commenters stated that the additional requirements for fluid retention impoundments imposed by the imposition of 40 CFR 192.32(a)(1) and, by extension 40 CFR 264.221(c), are not justified.

Commenters 0159 and 0162 both asserted that if the NRC believed that the imposition of the part 192 requirements were justified, NRC would have explicitly referenced 40 CFR 192.32(a)(1) and by extension 40 CFR 264.221(c) in 10 CFR 40 Appendix A, but it does not.

Alternatively, Commenter 0143 asserted that the EPA cannot allow a situation where the reduction of radon emissions comes at the expense of increased pollution of the groundwater or surface water. The commenter is concerned that the rule works at cross-purpose with 40 CFR part 192.

Response to Issue 5:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 6: The scope of activity regulated by Subpart W

Summary of Comments Under Issue 6:
Commenters 0153 and 0186 concurred with the EPA's authority under Section 112 of the Clean Air Act to regulate radionuclide emissions at holding or evaporation ponds at conventional mills, at in-situ leach facilities and at heap leach facilities. However, the commenters contend that the EPA should not only regulate uranium mill tailings, liquid effluent ponds, and heap leach piles, because large amounts of radon is also emitted from wellfields and other parts of in situ leach operations. Commenter 0153 used the Smith Ranch-Highland operation in Wyoming as an example.

Commenters 0153, 0186 and 0188 also advocated for the EPA expanding the scope of operations covered by Subpart W at heap leach facilities. Specifically, the commenters encourage the EPA to regulate radon emissions from the time ore is placed on the pile, to the placement of a final radon barrier, including periods of standby, and time periods prior to and during the placement of lixiviant on a heap leach pile. The commenters also take the position that heap leach piles that are drying out should be subject to a radon emission standard.

Commenter 0154/0170 believes our CAA authority for Subpart W derives from Section 275(e) of the AEA, and concludes that "EPA's jurisdiction under the Clean Air Act is therefore limited to 11e.(2) byproduct material as defined in the AEA." Commenter 0186 disagrees and states that "the AEA does not limit the authority of the CAA over other radionuclide sources (including radon emission sources) that may or may not fall under the authority of the AEA. Just because [Section 275(e) of] the AEA does not limit the CAA jurisdiction over 11e.(2) byproduct material, it does not follow that the AEA limits the CAA jurisdiction to just 11e.(2) byproduct material."

Response to Issue 6:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

We agree with the more expansive reading of AEA Section 275(e). That section recognizes the EPA's existing CAA authority and does not limit it to 11e.(2) byproduct material. Further, that section does not address CAA jurisdiction over other materials or facilities regulated under the AEA.

Issue 7: EPA's authority relative to the Nuclear Regulatory Commission (NRC)

Summary of Comments Under Issue 7:
Commenters 0114, 0159, 0162 and 0172.5 stated that the NRC has exclusive jurisdiction over the radiological and non-radiological aspects of uranium mill operations and the nuclear energy business and that the EPA lacks jurisdiction, particularly once the NRC promulgates conforming regulations. Commenters 0159 and 0162 question the need to retain Subpart W at all. Commenter 0173.13 contends that the existence of the AEA makes Subpart W redundant and not necessary.

Commenter 0169 takes the position that the EPA does not have authority to define when uranium recovery facilities are considered to be "active" or involved in "operations." Instead, Commenter 0169 states that NRC, not the EPA, has authority over decommissioning and decontamination of AEA-licensed source material recovery facilities, including the mill itself, site soil cleanup, final tailings stabilization, and groundwater restoration or corrective action. Further, Commenter 0169 states it is inefficient for uranium recovery operations to obtain two separate authorizations with essentially the same requirements for radon risk from fluid retention impoundments (*i.e.*, NRC operating license or license amendment and the EPA Subpart W construction approval), and that these duplicative requirements are inconsistent with EPA's past efforts towards regulatory efficiency evidenced by the rescissions of Subparts I and T.

Commenter 0114 states the Department of Energy also has authority to regulate this industry.

Alternatively, Commenters 0173.3 and 0172.8 supported the EPA's authority under the Clean Air Act to regulate HAPs, particularly radon, from uranium processing and do not believe that the Clean Air Act limits the EPA's regulatory authority with respect to 11e.(2) byproduct material at uranium recovery mill operations. Similarly, Commenter 0166 supported the proposed clarification to 40 CFR § 61.252(b) that the EPA, and not the NRC, is the regulatory agency administering the radon NESHAP requirements.

Response to Issue 7:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 8: The definition of uranium byproduct material in Subpart W relative to the Atomic Energy Act and NRC regulations

Summary of Comments Under Issue 8:
Commenters 0169 and 0172.5 stated that the NRC, not the EPA has exclusive authority over the definition of 11e.(2) byproduct material, as well as the material itself. Commenters 0154, 0169 and 0170 question the EPA's authority to promulgate a new definition for "11e.(2) byproduct material" or to equate the definition to the term "mill tailings." Commenters 0169 and 0172.5 opine that the EPA may not infringe on NRC authority by proposing an alternative definition of 11e.(2) material.

Commenter 0172.5 also thinks that the EPA does not have statutory authority to define tailings as restoration fluid because that authority rests exclusively with the NRC.

Response to Issue 8:
See Section IV.A.2 of the preamble to the final rule for responses to this issue. See also Section 2 of this document for other comments related to the definition of uranium byproduct material or tailings under Subpart W.

Issue 9: EPA's authority to regulate radon emissions from uranium processing facilities

Summary of Comments Under Issue 9:
Commenter 0167 opposed comments of the regulated industry which argued that the EPA does not have authority to directly regulate radon emissions from uranium processing facilities. Commenter 0167 argued that the industry's arguments amount to an argument the EPA lacks authority over emissions from uranium mill tailings impoundments. Commenter 0167 opined that if industry wishes to remove a tailings facility from NESHAP regulation, it should submit a petition showing that radon emissions are not hazardous, but believes that such an effort would fail. Commenter 0167 continued that the EPA's proposed rule continues to recognize the health hazards of uncontrolled radon emissions from uranium mill tailings and the rulemaking record confirms that CAA NESHAP regulation is a necessary part of the EPA's role in regulating uranium mill tailings pursuant to its CAA and UMTRCA authorities.

Numerous commenters supported the EPA's decision to regulate radon emissions from uranium mill facilities. Specifically, Commenters 0173.8 and 0186 state that the EPA has authority to regulate all radon at mills and Commenter 0173.3 confirmed that the EPA has a role in regulating uranium mill tailings. Commenter 0173.6 stated that the EPA has authority to conduct radon flux measurements.

Response to Issue 9:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 10: Public opportunity to comment on construction of tailings impoundments

Summary of Comments Under Issue 10:
Commenters 0153 and 0172.8 commented that the EPA or Utah Division of Air Quality should be required to provide an opportunity for public comment on any application to construct a tailings impoundment, pursuant to 40 CFR 61.07 and that there has always been a requirement for approval of new impoundments because a uranium recovery licensee must apply for a construction authorization.

Response to Issue 10:
The provisions requiring application for approval of construction or modification at 40 CFR 61.07 are contained in the 40 CFR part 61 General Provisions (subpart A), which are applicable to the owner or operator of any stationary source for which a standard is prescribed under 40 CFR part 61. *See* 40 CFR 61.07(c). Therefore, the requirements of 40 CFR 61.07 are applicable to sources subject to Subpart W. The EPA did not propose any changes to the §61.07 requirements or applicability for Subpart W sources, therefore these comments are beyond the scope of this rulemaking.

Section 2 – Definition of Uranium Byproduct Material

Issue 1: Suggestion that EPA distinguish between "tailings" and "byproduct material" for its CAA authority

Summary of Comments Under Issue 1:
Several commenters addressed the definition of "uranium byproduct material or tailings" in Subpart W. Commenters generally raised the distinction between "tailings" and "byproduct material" under the AEA as germane to the scope of this rulemaking (see also Issue 2 in this section). Commenter 0169 suggests that the historical focus on conventional mill tailings impoundments (or "piles") is linked to the CAA, and that we are impermissibly re-defining non-tailings byproduct material as "tailings" as a means to address them under the CAA. Commenter 0172.5 noted the following in referring to the AEA definition: "All tailings are byproduct material, but not all byproduct materials are tailings." Commenter 0144 asks for clarification on how restoration fluids may be considered byproduct material.

Commenter 0153 raises an additional question regarding wastes at uranium recovery facilities that do not derive from ores. The commenter stated that such wastes may derive from "alternate feed" materials that contain sufficient uranium to make processing worthwhile (e.g., tailings from other mineral extraction operations), or could include wastes placed directly into conventional impoundments because they are physically or chemically similar to the material already being managed.

Commenter 0172.2 opposes the proposed regulation of heap leach piles under Subpart W. The commenter believes that material remaining in the heap does not become byproduct material until processing is completed.

Commenter 0144 notes that uranium is also produced as a byproduct at other mineral recovery facilities and asks for clarification on the status of the wastes from such operations.

Response to Issue 1:
See Sections IV.A.2 and IV.F.2 of the preamble to the final rule for responses to comments on the definition of "uranium byproduct material or tailings." See Section IV.D.2 of the preamble to the final rule for responses to comments related to heap leach piles. Regarding the production of uranium as a byproduct of other mineral production operations, Subpart W applies to "owners or operators of facilities licensed to manage uranium byproduct materials during and following the processing of uranium ores." 40 CFR 61.250. If a facility is licensed to conduct such activities, it would be subject to Subpart W.

Issue 2: Consistency between EPA's CAA definition of byproduct material and the AEA/NRC definition

Summary of Comments Under Issue 2:
A number of commenters noted the difference between the definition of "uranium byproduct material or tailings" in Subpart W and the definitions of "byproduct material" in section 11e.(2) of the Atomic Energy and in 10 CFR part 40 (see also the response to Issue 1 in this section). In

particular, several commenters (0154/0170, 0172.5, 0173.10) stated that the Nuclear Regulatory Commission (NRC), not the EPA, has exclusive authority over the definition of 11e.(2) byproduct material, as well as the material itself. Commenters question EPA's authority to promulgate a new definition of "11e.(2) byproduct material" or to equate the definition to the term "mill tailings." The commenters opine that EPA may not infringe on NRC authority by proposing an alternative definition of 11e.(2) byproduct material. Commenter 0169 also thinks that the EPA does not have statutory authority to define tailings as restoration fluid because that authority rests exclusively with NRC.

Several commenters (0154/0170, 0159, 0162, 0165, 0186) also suggested that we modify the definition in Subpart W to be identical to NRC's definition in 10 CFR 40.4.

Response to Issue 2:
See Sections IV.A.2 and IV.F.2 of the preamble to the final rule for responses to this issue.

Issue 3: Regulation of treated water if it does not contain byproduct material

Summary of Comments Under Issue 3:
We received some comments from industry opposing our proposed requirements for non-conventional impoundments on the grounds that certain impoundments may be used to hold treated effluents from which byproduct material has been removed. Commenters 0107 and 0144 believe we need to define a threshold level which no longer constitutes byproduct material. Commenters 0154/0170 and 0173.9 believe that liquids treated to meet effluent standards should no longer be regulated. Commenter 0186 disagrees "because the radium content could increase during evaporation" and the same construction standards should apply. See also Issue 4 in this section and Section 6 of this document.

Response to Issue 3:
See Section IV.E.2 of the preamble to the final rule for responses to this issue. Liquids can be treated to effectively remove uranium and radium such that their concentrations remain low, even if evaporation occurs.

Issue 4: Clarification regarding whether liquids *are* byproduct material or *contain* byproduct material

Summary of Comments Under Issue 4:
Commenter 0153 wishes us to be more clear that solids *and* liquids in impoundments are byproduct material. Commenters 0159 and 0162 also wish us to clarify this point, specifically whether byproduct material can be removed from process liquids (see also Issue 3 above).

Response to Issue 4:
See Section IV.F.2 of the preamble to the final rule for responses to this issue.

Section 3 – GACT vs. MACT

Issue 1: Request that EPA define major and area sources and opinion that CAA 112(d) requires MACT for sources not so defined

Summary of Comments Under Issue 1:
Several commenters (0153, 0155, 0156, 0167) believe our use of GACT to control radon emissions from uranium byproduct material under Subpart W is in violation of the Clean Air Act. The commenters refer to CAA §112(d)(5), which allows the Administrator to designate GACT, rather than MACT, for area sources listed under CAA §112(c)(3). The commenters note that EPA has not included sources subject to Subpart W on the list of area sources.

Response to Issue 1:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 2: Justification for using MACT instead of stronger MACT

Summary of Comments Under Issue 2:
Some commenters stated that the designation as an area source is not in itself sufficient to justify use of GACT. Commenters 0131 and 0132 cite the legacy of contamination associated with the uranium industry as justifying the "strongest preventive measures." Similarly, Commenters 0143 accuses the industry of "cutting corners" and Commenter 0152 believes GACT "runs counter to everything EPA knows" about past practices. Commenter 0153 argues that the Agency's "discretion" must be supported by full and complete explanation and justification. These and other commenters (0157, 0163, 0166, 0167, 0173.3) also believe EPA has not sufficiently considered MACT approaches.

Response to Issue 2:
See Section IV.C.2 of the preamble to the final rule for responses to this issue. While this section of the preamble specifically addresses comments on the GACT management practices applicable to conventional impoundments, the response as it regards the Administrator's authority to set CAA standards applies more broadly to all sources regulated under Subpart W. The CAA does not require a consideration of MACT approaches before setting GACT-based standards for area sources.

Issue 3: Requirement under CAA 112(h) for an emission standard unless not feasible

Summary of Comments Under Issue 3:
Commenter 0153 states that CAA §112(h) prohibits the use of work practices in lieu of emissions standards unless the Administrator determines that it is not feasible to establish emissions standards.

Response to Issue 3:
See Section IV.A.2 of the preamble to the final rule for the response to this issue. See also Section 1 of this document.

Issue 4: Appropriateness of typical mass-based definition of major source for uranium byproduct material impoundments

Summary of Comments Under Issue 4:
Commenter 0155 believes that it is inappropriate for EPA to rely upon the CAA §112(a)(1) emissions threshold of 10 tons per year to categorize uranium byproduct management structures as area sources. The commenter considers it "absurd" to apply this threshold to radionuclides, and asserts that this "exceed[s] the amount of radioactive material released over a short period of time in a nuclear disaster."

Response to Issue 4:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 5: Data supporting EPA's justification for GACT as effective at newer impoundments

Summary of Comments Under Issue 5:
Several commenters (0153, 0155, 0158, 0167, 0173.3) believe our designation of GACT is unsupported because there is no monitoring data to demonstrate the effectiveness of the measures for post-1989 impoundments. Commenters criticize the analysis of control technologies in the Background Information Document (BID) prepared to support the proposal as flawed and insufficient. Commenter 0153 states that limiting the size of the impoundment is not in itself an effective means to limit radon emissions without monitoring, reporting, and the requirement of liquid or soil application. This commenter, as well as Commenter 0185, also believe that any new impoundments should be required to use the continuous disposal method, as the commenters view the phased disposal method as ineffective in controlling radon emissions, particularly when using water cover. Commenter 0153 further disputes the reliance on 40 CFR 192.32(a)(1) as an effective control technology to limit radon emissions. Commenter 0155 also suggests that the most effective control technology is an emissions limit coupled with monitoring, and believes the rule should be re-crafted along those lines. Commenter 0158 agrees with Commenter 0155 and specifically refers to the Cotter facility's "wide fluctuations in radon flux between 2000 and 2011" as demonstrating the need for monitoring. The commenter further asserts that Cotter is a "prime example" of the failure of GACT, citing the facility's experience in maintaining a water cover in its impoundments.

Commenters also do not believe we have sufficiently examined other technologies employed either in other countries or in related industries. Commenter 0167 argues that other technologies (e.g., dry-stack placement, paste tailings, solidification) may be superior to open-air storage and cover in conventional impoundments, but were not evaluated in the BID. Commenter 0153 believes we should specify that impoundments have berms to limit wind turbulence and use barium chloride to precipitate radium from solution.

Response to Issue 5:
The final rule retains the radon flux standard and monitoring requirement for conventional impoundments in existence on December 15, 1989. We find that the reasoning employed for specifying

work practices for newer impoundments in the 1989 rule (designated as GACT management practices in the final rule), namely the ability to control their size and construction, remains valid.

Contrary to Commenter 0158's assertions, practices undertaken to limit radon emissions appear to have been effective at the Cotter facility. Radon flux data reported by Cotter for the period 1999-2009 does not indicate that annual emissions exceeded the 20 pCi/m^2-sec standard. This information was submitted by the commenter and may also be found in Table 18 of the updated risk assessment (Docket No. EPA-HQ-OAR-2008-0218-0078). Regardless of the fluctuation in reported results over this period, and taking the commenter's point that there may have been periods during which radon emissions were increased because soil or water cover was not maintained, we find that this situation supports our statement at the time of the 1989 rule that "This rule will have the practical effect of requiring the mill owners to keep their piles wet or covered." 54 FR 51689. We recognize stakeholders' concerns with the Cotter facility and whether its monitoring was properly conducted or enforced, but we do not find this to be a failure of the GACT approach. The Cotter facility is being decommissioned and remediated as a Superfund site, so is no longer subject to the requirements of Subpart W.

See Section IV.C.2 of the preamble to the final rule for responses to comments related to the effectiveness of GACT for conventional impoundments constructed after December 15, 1989, including discussion of alternative technologies. See Section IV.E.2 of the preamble to the final rule for responses related to specifications for non-conventional impoundments. As discussed in that section (see also Issue 7), the Administrator expects that the design and engineering requirements for impoundments will protect against reasonably foreseeable weather events, including potential wind turbulence. We do not find it necessary to specify the construction of berms for that purpose in Subpart W. See also Issue 6 regarding treatment of liquid effluents.

Issue 6: Treatment of liquid effluents to remove radium

Summary of Comments Under Issue 6:
Commenters 0153 and 0185 assert that liquids in non-conventional impoundments have been underestimated by EPA as a source of radon emissions. The commenters believe these sources must be monitored and licensees must be required to treat effluents to remove radium. Commenter 0155 also states that EPA should not pre-determine low emissions from non-conventional impoundments.

Response to Issue 6:
See Section IV.E.2 of the preamble to the final rule for responses to this issue. As described in that response, the commenters' data do not support their contention that we have underestimated radon emissions from liquids. We find that it is not necessary to require treatment of effluents to remove radium.

Issue 7: Extreme weather events

Summary of Comments Under Issue 7:
Commenter 0153 states that the current and proposed rules do not actually contain any measures to control releases during extreme weather events. The commenter asserts that EPA has not provided any data to support the conclusion that the requirements of 40 CFR 264.221 will prevent dispersion of contents in severe events. The commenter expresses concern that generally available technologies do not exist that could prevent dispersion of contents or failure of the impoundment in a severe event such as a tornado or hurricane.

Response to Issue 7:
See Section IV.E.2 of the preamble to the final rule for responses to this issue.

Section 4 – Considering All Radionuclides Emitted at Uranium Recovery Facilities

Issue 1: Evaluating and considering all HAPs, including Th-232 decay products

Summary of Comments Under Issue 1:
A number of commenters expressed the view that EPA should not limit the scope of Subpart W to Rn-222. Commenter 0153 believes EPA must take this approach in order to support a source category listing for uranium recovery facilities. Commenter 0153 also states that the White Mesa Mill has been authorized to accept materials that are high in Thorium-232 content. Thorium-232 decays through Radium-228, Radium-224 and then to Radon-220 (also known as thoron). The commenter notes that the facility has developed special handling procedures for these wastes. The commenter believes that EPA is well aware that other radionuclide HAPs are being emitted at uranium recovery facilities and should require facilities to monitor for them. Similarly, Commenter 0155 believes that non-radionuclide HAPs are present and need controlling. The commenter notes that little information on these substances is available from the facilities, and believes EPA should rectify this situation.

Commenter 0173.8 expresses concern that EPA's risk assessment to support the proposal does not adequately consider radon progeny (decay products). The commenter points to an NRC guidance that attributes most radon dose to the decay products (such as lead). The commenter also believes that radon in ground water may present a greater threat and notes that no comprehensive epidemiological studies have been done for the populations surrounding the Cotter facility.

Response to Issue 1:
We are aware that there is the potential for other HAPs (radionuclide and non-radionuclide) to be emitted at uranium recovery facilities. See Section IV.A.2 of the preamble to the final rule for the response to Commenter 0153 regarding the need to identify all HAPs to support a source category listing for uranium recovery facilities.

In response to Commenter 0153, the presence of other radionuclides in wastes placed into impoundments, and even in fairly high concentrations, does not necessarily translate into an off-site hazard from air emissions. Nor does a special handling procedure for certain radionuclides, which is likely implemented to protect workers from more immediate exposures. Radium-228 has a half-life of slightly more than 5 years (compared to 1,600 years for Radium-226), and Radon-220 has a half-life of slightly less than one minute (compared to more than three days for Radon-222), so these more rapidly-decaying radionuclides would present a more significant health and safety concern for workers. However, this also means that Radon-220 is far less likely than Radon-222 to reach the surface of an impoundment or, if it does, to reach an off-site receptor.

In response to Commenter 0155, Subpart W is one of a series of NESHAPs developed specifically to address radionuclides. The Agency has not determined that uranium mills or other uranium recovery facilities represent a significant source of other HAPs, nor did we propose to extend the scope of Subpart W to HAPs other than Radon-222.

In response to Commenter 0173.8, EPA's risk assessment does evaluate the impacts to off-site receptors of radon and its progeny. It is well-understood that the greatest impacts from exposure

to radon come from its radioactive progeny. However, for purposes of Subpart W, the air pathway is the primary pathway of concern (that is, radon traveling through the air, but also considering re-suspension of soil containing lead, polonium, or other decay products). Radon in ground water would not be expected to be a significant hazard, although this would depend to some extent on site-specific conditions (e.g., ground water travel time and chemistry, magnitude of the radionuclide source term). As a Superfund site, remediation and remedy selection for the former Cotter mill and associated properties will take into account all exposure pathways in a more detailed fashion than did our risk assessment to support this rulemaking.

Issue 2: Evaluating and considering all sources of radionuclides at uranium recovery facilities

Summary of Comments Under Issue 2:
Commenters 0153, 0155, 0156, 0161, 0172.8 and 0186 believe that Subpart W should also take into account non-waste sources of radon, such as ore stockpiles, alternate feed materials, and contaminated soils.

Response to Issue 2:
See Section IV.A.2 of the preamble to the final rule for the response to these comments. As a practical matter, Subpart W has not been applied to other sources of radon at uranium recovery facilities where wastes are present, such as material in thickeners or other processing units. The NRC, or NRC Agreement State, regulates the radionuclide emissions from all sources at a uranium recovery facility. The operator is required to report particulate radionuclide and Rn-222 concentrations at the facility boundary. Thus, radon emissions from sources not covered under Subpart W, including those from the raw ore in heap leach piles or processed yellowcake, are captured by the NRC reporting requirements.

Further, the EPA is taking this action pursuant to CAA § 112(q). The 1990 Amendments, which added CAA § 112(q), explicitly provides that § 112 standards in effect prior to the date of enactment of the 1990 CAA Amendments shall remain in force and effect after that date. CAA § 112(q)(1) also provides that: “Each [standard in effect before the enactment of the CAA Amendments of 1990] shall be reviewed and, if appropriate, revised to comply with the requirements of subsection (d) of this section….” In sum, Congress clearly intended that (1) standards promulgated prior to 1990 remain in effect; and (2) the EPA may update the standards, as appropriate. CAA § 112(q) does not direct the EPA to expand the scope or applicability of the regulation at issue.

Issue 3: Evaluating alternative monitoring methods

Summary of Comments Under Issue 3:
Commenter 0153 states that the monitoring method used by the White Mesa Mill “does not capture and measure radon-220 or radon-220 progeny.” The commenter doubts that other devices in the vicinity of the site are capable of such measurements.

Response to Issue 3:
Subpart W does not require measurements of radon-220 or its progeny.

Section 5 – Eliminating the Distinction with Existing Impoundments

Issue 1: Grandfathering non-conventional impoundments that are already approved

Summary of Comments Under Issue 1:
Commenter 0107 (0173.9) expresses concern that non-conventional impoundments that have already been approved are not designed to maintain the proposed one meter of liquid cover. This is of particular concern because the liquid level must remain low enough to avoid overtopping the embankment. Commenter 0162 expresses similar, but more general, concern that recent approvals of both conventional and non-conventional impoundments will remain valid. The commenter requests that the final rule explicitly address this situation.

Response to Issue 1:
See Section IV.E.2 of the preamble to the final rule for responses to comments related to the liquid level in non-conventional impoundments and the impact on recent approvals. More generally, the final rule retains the requirement that impoundments must meet the criteria in 40 CFR 192.32(a)(1), and clarifies that this requirement applies to both conventional and non-conventional impoundments. Therefore, recent approvals should not be impacted by the final rule.

Issue 2: Monitoring and emissions standard for existing impoundments

Summary of Comments Under Issue 2:
Many commenters opposed the proposed elimination of the monitoring requirement for conventional impoundments in existence on December 15, 1989 (0131, 0132, 0143, 0145, 0153, 0155, 0161, 0173.2, among others). Commenters expressed a general concern that no data would be available, but several also specifically questioned our rationale for doing so. They provided information indicating that the three “existing” (i.e., pre-1989) impoundments would not be able to meet the work practice standards (now designated as GACT) (e.g., Commenters 0151, 0153, 0155, 0162 and 0172.3).

By contrast, Commenters 0159 and 0162 supported eliminating the monitoring requirement, based on the effectiveness of the work practice standards.

Response to Issue 2:
See Section IV.B.3 of the preamble to the final rule for responses to this issue.

Issue 3: Monitoring and limits for non-conventional impoundments

Summary of Comments Under Issue 3:
We received some comment on the proposal to not place limits on either the number or size of non-conventional impoundments. Commenter 0145 opposed the proposal, and also expressed support for monitoring these impoundments. Commenter 0173.4 supported the proposal, at least as it applies to ISL facilities.

We requested information on appropriate monitoring methods for liquid-covered impoundments and received some suggestions from Commenters 0159 and 0162 that Large Area Activated Charcoal Canisters (LAACCs) have been used to collect data from liquid surfaces. Commenters 0159 and 0162 supported the proposal. Commenter 0153 opposed the proposal and supported monitoring for non-conventional impoundments, suggesting that EPA would prefer not to know if facilities are not controlling radon emissions.

Response to Issue 3:
Non-conventional impoundments are used to manage process liquids during the operation of the facility. These liquids may be evaporated or held for recycling back into the process. We proposed that non-conventional impoundments not be limited in size or number, because they may be important for operational flexibility, and as long as they are managing liquids and any solid materials remain saturated, radon emissions will be substantially reduced. We also proposed that non-conventional impoundments not be subject to monitoring. At the time of the proposal, we were unable to identify reliable methods for monitoring liquid surfaces (Method 115, the specified method for pre-1989 conventional impoundments, is not suitable for liquid surfaces). Our proposed approach relied upon maintenance of liquids in non-conventional impoundments to control radon emissions, thereby rendering monitoring unnecessary.

After considering the comments received, the final rule does not limit the size or number of non-conventional impoundments, nor does it require monitoring. See Section IV.E.2 of the preamble to the final rule for responses to comments related to the size and number of non-conventional impoundments. We appreciate the information regarding the potential use of LAACCs for monitoring of liquid surfaces. We have determined that the requirement in the final rule to maintain saturation of solids in non-conventional impoundments will adequately control radon emissions and represents a generally available technology consistent with the broader GACT approach to the rule. Therefore, it was not necessary for us to further evaluate monitoring methods. We do not accept the premise of Commenter 0153's statement.

Issue 4: Scope of Subpart W with respect to non-conventional impoundments

Summary of Comments Under Issue 4:
Commenter 0151 disputes our statements that the Agency has historically considered non-conventional impoundments subject to the requirements of Subpart W. The commenter recommends making this interpretation explicit in the final rule. Commenter 0186 agrees that "The EPA never regulated evaporation ponds in accordance with the Subpart W requirements."

Response to Issue 4:
See Section IV.A.2 of the preamble to the final rule for responses to this issue.

Issue 5: Monitoring conventional impoundments

Summary of Comments Under Issue 5:
A number of commenters expressed the view that monitoring should not be limited to conventional impoundments constructed before December 15, 1989 (Commenters 0131, 0132, 0153, 0157, 0173.2, 0173.5). They asserted that they have little confidence that the management practices in place for newer impoundments are effectively being implemented, and argue that it is not possible to verify their effectiveness without monitoring (see also Issue 9 in this section). The commenters also expressed concern that impoundments that are drying out ("dewatering") are emitting larger amounts of radon, and that without monitoring the operators are not compelled to provide additional soil cover (Commenter 0173.2).

Response to Issue 5:
See Section IV.B.3 of the preamble to the final rule for responses to this issue. Although we proposed that no impoundments would be required to conduct monitoring, the final rule retains the radon flux standard and monitoring requirement for conventional impoundments in existence on December 15, 1989.

Issue 6: Restriction on switching of conventional and non-conventional impoundments

Summary of Comments Under Issue 6:
Some comments noted that impoundments may be used as both conventional and non-conventional during their active lifetimes. One industry commenter (0154/0170) noted that the practice of using an impoundment to manage process liquids before beginning to emplace tailings is an effective means to manage operational capacity, and encouraged EPA to address this in the final rule. By contrast, Commenter 0155 urged us to prohibit this practice in the final rule. The commenter expressed concern that this practice could lead to an increased risk of liner or other failure, and stated that this has already occurred at the White Mesa Mill. The commenter warns that this is more likely if impoundments are not all constructed to meet the same standards, and further notes that this practice may create complications for site closure activities if it is unclear which impoundments will be left in place and which will be removed. The commenter also raises the possibility that operators will deliberately use conventional tailings impoundments to hold liquids as a way to avoid restrictions on the number of conventional impoundments that can operate at any one time.

Response to Issue 6:
We do not find the concerns expressed by Commenter 0155 persuasive, for several reasons. The same engineering requirements apply to all impoundments constructed since 1992, whether conventional or non-conventional. It also seems unlikely that operators will leave more impoundments in place than are truly necessary at the time of site closure, as this will have implications for license termination and financial sureties. If an operator finds it advantageous to convert an impoundment that has been accepting solid uranium byproduct material or tailings into a non-conventional impoundment (or vice versa), even for a relatively brief period, we see no reason to prohibit that approach as long as the required practices are followed. The operator

will ultimately have to close that unit accordingly. For sites that operate over decades, it is not unreasonable to believe there may be one or more modifications to the facility license and closure/reclamation plan. Further, this is not an issue at ISL sites, which have become the dominant method of uranium recovery. The definition of "non-conventional impoundment" in the final rule acknowledges this practice, and we do not find it necessary to prohibit or limit it.

Issue 7: Clarification of references to construction requirements

Summary of Comments Under Issue 7:
Commenter 0155 recommends that we provide more specificity regarding the construction requirements in 40 CFR 264.221 (which are applied through cross-reference to 40 CFR 192.32). The commenter proposes that the cross-reference to this section be limited to 40 CFR 264.221(c), which includes more robust liner requirements for impoundments constructed after January 29, 1992 (the commenter prefers that Subpart W directly incorporate these provisions, rather than cross-referencing). The commenter believes that the less strict liner requirements for impoundments constructed before that date do not provide the level of ground water protection envisioned by the Agency. The commenter also requests that inspection requirements be added to ensure that liners are operating as intended.

Commenter 0151 recommends that the final rule either directly cite 40 CFR 264.221 for the construction and design requirements, or include them in the rule. The commenter believes this would limit the potential for confusion and misunderstanding. The commenter specifically notes the language related to evaporation and precipitation and the requirements of 40 CFR 264.228(a)(2)(iii)(E).

Response to Issue 7:
We disagree with Commenter 0155 that a narrower reference to 40 CFR 264.221(c) is necessary. This provision was not incorporated into regulation until 1985. 50 FR 28747. Adopting the commenter's approach would require impoundments constructed before 1985 to upgrade or close, which we did not propose to require. Those older impoundments are required to comply with the provisions of 40 CFR 264.221 that are applicable to them. The commenter's approach would also eliminate consideration of §264.221(d), which allows for an alternative design or operating practices if "such design and operating practices, together with location characteristics" would prevent migration of hazardous constituents and allow detection of leaks at least as effectively as the requirements of §264.221(c). It is not appropriate to eliminate this flexibility, particularly for sites that may employ improved liner materials or have exceptional natural characteristics that lend themselves to such a demonstration. The final rule includes requirements that operators confirm the state of saturation of impoundment sediments, and these visual inspections can also serve to indicate whether there are problems with the liners. Further, NRC requirements in 10 CFR part 40, Appendix A, Criterion 8A, require daily inspections of impoundments.

We have chosen not to adopt Commenter 0151's recommendation. We believe the reference to 40 CFR 192.32(a)(1) provides sufficient clarity for purposes of Subpart W, and retains the

connection to the original requirement for impoundment construction, which is located in 40 CFR part 192. Regarding the reference to 40 CFR 264.228, we note that this section applies to actions to be taken during closure and post-closure. Subpart W does not extend to actions taken after the impoundment has entered closure.

Issue 8: Level of emission standard based upon current control technologies and data

Summary of Comments Under Issue 8:
Some comments favored retaining the emissions standard for conventional impoundments constructed before December 15, 1989, but at a more stringent level. Commenter 0167 stated that a standard below 10 pCi/m^2-sec would be appropriate, and also that a review of current control technologies would support a standard of 1 to 5 pCi/m^2-sec. Commenter 0156 noted that the 1989 Background Information Document found that a 6 pCi/m^2-sec standard was achievable and cost effective. Commenter 0173.3 agreed that 4 or 5 pCi/m^2-sec would be appropriate, stating that the 20 pCi/m^2-sec standard was established "for economic reasons." This general view was supported by Commenter 0173.7. Commenter 0167 also expressed concern that EPA did not evaluate monitoring methods other than Method 115, and specifically referred to the Landauer RadTrak.

Response to Issue 8:
See Section IV.B.3 of the preamble to the final rule for responses to this issue.

Issue 9: Violations of the current standard and practices

Summary of Comments Under Issue 9:
Several commenters (0167, 0173.2, 0173.6) disputed our statements regarding the effectiveness of work practices, citing radon monitoring results from the White Mesa Mill in excess of 20 pCi/m^2-sec. The comments note that, while averaged results may fall within the standard, large areas of the impoundment can be well above the standard for extended periods of time, indicating that the mill operators are not applying soil cover in a timely manner to limit emissions.

We also received some comment disagreeing with our proposal regarding radon emissions from non-conventional impoundments (Commenters 0153, 0155, 0173.2, 0185). These comments present calculated radon emissions based on data from the White Mesa mill, which appears to contradict our conclusions regarding the effectiveness of water in limiting radon emissions.

Response to Issue 9:
We are familiar with the results submitted by the commenters, which were presented in the BID supporting the proposed rule. The Agency strongly encourages operators to take the appropriate actions to limit radon emissions; however, the actual implementation of those measures is a matter of enforcement, which at the White Mesa Mill is the responsibility of the State of Utah.

See Section IV.E.2 of the preamble to the final rule for responses to comments regarding the radon emissions from non-conventional impoundments.

Section 6 – Evaporation Pond Issues

Issue 1: Proposal to retain one meter of liquid in non-conventional impoundments

Summary of Comments Under Issue 1:
Many commenters opposed the proposed requirement to maintain one meter of liquid in non-conventional impoundments. Commenters primarily cited cost and the logistical difficulty of obtaining and transporting water as making this proposed requirement overly burdensome, particularly in the arid West (Commenters 0107, 0141, 0144, 0151, 0154/0170, 0159, 0162, 0169, 0172.2, 0173.1, 0173.9, 0173.10).

Commenters 0107, 0172.2, and 0173.9 express concern that impoundments that have already been approved and operating were not constructed with a depth that could accommodate an additional meter of water, potentially necessitating costly renovation. Commenters 0154/0170 and 0173.10 noted that this requirement would have effects on facility operation, where it is necessary to manage holding or evaporative capacity, and to control the characteristics of liquids that may be recycled through the process. Commenter 0154/0170 also raised the additional stress on the impoundment liner resulting from one meter of liquid.

Commenters 0151, 0159, 0162, 0169, 0172.2, and 0173.1 questioned the need for this requirement, and noted statements in previous rulemakings that the difference between saturation and one meter of water is negligible. Commenter 0141 requested clarification as to whether the proposed requirement was for one meter of liquid above any solids in the impoundment, or one meter depth total. Commenters further argued that non-conventional impoundments present a small risk in any case. Commenters 0144, 0154/0170, and 0173.10 suggested that a better approach would be to require that solid materials in the impoundment remain saturated, with no solids visible above the liquid level.

Response to Issue 1:
See Section IV.E.2 of the preamble to the final rule for responses to this issue.

Issue 2: Reliability of measurement methods for liquid levels

Summary of Comments Under Issue 2:
Commenter 0104 finds difficulties in measuring compliance with the proposed one meter liquid requirement. The commenter believes direct measurements will be difficult because of the density of sediments and may present health and safety risks to workers. The commenter suggests that calculations based on mass and liquid balances would be more effective. Commenters 0107 and 0173.9 make a similar suggestion, that the one meter requirement be replaced with a calculation to take into account site-specific factors and give operators greater flexibility. Commenters 0141, 0144 and 0154/0170 expresses similar concerns. Commenter 0144 sees problems with the slope of the impoundment and the distance that must be observed, and notes that past experience suggests that measuring devices (such as pressure transducers) will need frequent maintenance and calibration. The commenter prefers to have a simple permanent indicator allowing visual confirmation, rather than measurement.

Response to Issue 2:
See Section IV.E.2 of the preamble to the final rule for responses to this issue.

Issue 3: Clarifying the term "continuous" as it relates to liquid levels

Summary of Comments Under Issue 3:
Commenter 0141 asks for clarification of the proposed requirement that operators keep records showing that they maintain a "continuous one meter of liquid in the impoundment." The commenter is concerned that this will require "around-the-clock" measurements and asks that the word be removed in the final rule.

Response to Issue 3:
The final rule does not require that one meter of liquid be maintained above any solid materials in the impoundment. Instead, the final rule requires only that solids remain saturated, which will be demonstrated if solids are not visible above the liquid in the impoundment. Should inspection find that the liquid has diminished to the point that solids are visible, the operator will have seven days (or other time specified by the Administrator) to rectify the situation.

Issue 4: Limiting the size and number of non-conventional impoundments

Summary of Comments Under Issue 4:
Commenter 0143 believes Subpart W should contain limits on the size of non-conventional impoundments. The commenter believes that larger impoundments are more likely to fail and limits must be imposed to minimize the potential for ground water contamination. Commenters 0145 and 0155 agree (Commenter 0155 believes the number should also be limited). Commenter 0153 does not believe we have adequately supported our conclusion that the requirements of 40 CFR 192.32(a)(1) will provide protection against extreme weather events and may be subject to greater turbulence. Commenter 0144 wishes us to clarify that no actual impoundment has been as large as 80 acres, but this size has been used only for modeling purposes. Commenter 0166 supports the proposed liner requirements and weather protections.

Response to Issue 4:
See Section IV.E.2 of the preamble to the final rule for responses to comments related to the size and number of non-conventional impoundments, as well as comments related to weather protection. See also Sections 5 and 7 of this document for additional comments of this nature. See Section IV.A.2 of the preamble to the final rule for responses to comments related to the liner requirements, as well as Sections 1 and 5 of this document.

Issue 5: Regulation of treated water if it does not contain byproduct material

Summary of Comments Under Issue 5:
Commenter 0144 believes that Subpart W should not apply to impoundments that only contain water that has been treated to meet effluent limits. The commenter sees this as having no

regulatory benefit, but a potential additional cost to operators who must meet the more stringent requirements in 40 CFR 192.32(a)(1). Commenters 0154/0170, 0159, 0162, 0173.4 and 0173.9 support this view. The commenter also asks whether the liner designs for treated water storage ponds at the proposed Dewey-Burdock site meet with EPA's approval. Commenter 0186 disagrees "because the radium content could increase during evaporation" and the same construction standards should apply.

Response to Issue 5:
See Section IV.E.2 of the preamble to the final rule for responses to this issue. Liquids can be treated to effectively remove uranium and radium such that their concentrations remain low, even if evaporation occurs. Decisions regarding the specific question of storage ponds at the Dewey-Burdock site are the responsibility of EPA Region 8 and are not part of this rulemaking.

Issue 6: Clarify the amount of radon reduction from liquid cover

Summary of Comments Under Issue 6:
Commenter 0144 asks for clarification on the effectiveness of liquid cover. The commenter finds discrepancies between statements that one meter of water will reduce emissions by 93%, but saturation or less than one meter will reduce emissions by about 98% compared to dry tailings. Commenter 0172.2 states that the reduction would be 2%, not 93%.

Response to Issue 6:
The statements can be reconciled by understanding their respective points of comparison. The preamble to the proposed rule referred to analyses prepared to support the 1986 rulemaking: "[R]adon emissions from tailings covered with less than one meter of water, *or merely saturated with water*, are about 2% of emissions from dry tailings." 79 FR 25398, emphasis added. The statement cited by the commenter can be found on page 25402 of the proposal, as follows: "Solving the above equation shows that one meter of water has a radon attenuation factor of about 0.07. That is, emissions can be expected to be reduced by about 93% *compared to no water cover*" (emphasis added). Thus, saturation reduces emission from dry tailings by about 98%, and one meter of liquid cover will provide an additional reduction of about 93%. One meter of liquid cover would provide a total reduction of about 99.85% compared to dry tailings.

For the final rule, we are using an attenuation factor of nearly 95% for saturated material (see Figure 12 of the BID) and requiring that liquid levels in non-conventional impoundments be maintained to cover any solid materials. Even though the level of attenuation is slightly reduced from the figure cited in the preamble to the proposed rule, the requirement for saturation ensures that radon emissions from non-conventional impoundments will be controlled to levels that represent limited risk to public health.

Issue 7: Use of liquid cover to limit radon emissions instead of monitoring

Summary of Comments Under Issue 7:
Commenters 0153, 0155, 0168, 0172.8, 0185 and 0186 dispute our conclusion that radon emissions from non-conventional impoundments are minimal and do not believe the risk assessment fully considered these sources. The commenters provide calculations based on data from the White Mesa Mill showing that radon emissions are tens to hundreds of times the 20 pCi/m^2-sec flux standard applied to existing conventional tailings impoundments. The commenters further find our description of the processes producing the waste to be lacking in detail. The commenters do not believe we can say that radon emissions are regulated unless we impose an emissions standard and monitoring (using an adapted Method 115 or other appropriate method), or quarterly calculations, and request that we summarize and analyze actual data to support our position. Commenters also suggest it is necessary to control the radium content of liquids being added to the impoundments. Commenters 0156 and 0173.2 similarly find that our assumptions may be faulty. Commenter 0153 also states that the equation in the Background Information Document was derived for solid tailings with an actual water cover, not to liquids that contain radium. Commenter 0167 supports an emissions standard of 1 to 2 pCi/m^2-sec but does not believe we have collected sufficient information to determine the appropriate standard. Commenter 0168 notes that in practice liquid levels can vary significantly depending on rainfall and evaporation.

Commenter 0172.7 agrees with the proposal that monitoring is not needed and cites research sponsored by the National Mining Association, which found radon emissions from liquid surfaces within the range of background. Commenters 0172.9 and 0172.11 agree and cite other experience and documentation to that effect.

Response to Issue 7:
We believe the description in the BID of the uranium recovery process, and the wastes that result therefrom, is adequate. In addition to the equation to calculate radon attenuation from solids covered by liquid, the BID also contains information to estimate radon emissions based upon the concentration of Ra-226 in the liquid. We agree that liquid levels in non-conventional impoundments can fluctuate. The final rule requires that liquids be maintained to a level such that no solid material in the impoundment is visible. See Section IV.E.2 of the preamble to the final rule for responses to comments related to emissions from non-conventional impoundments at the White Mesa Mill.

We appreciate the information provided by commenters on testing that has been conducted to measure radon emissions from liquid surfaces. We also requested information on appropriate monitoring methods for liquid-covered impoundments and received some comments suggesting that Large Area Activated Charcoal Canisters (LAACCs) may be effective in monitoring liquid surfaces. We appreciate the information regarding the potential use of LAACCs, but more testing and validation of this method would be necessary before it could be accepted for a regulatory application. We have determined that the requirement in the final rule to maintain saturation of solids in non-conventional impoundments will adequately control radon emissions and represents a generally available technology consistent with the broader GACT approach to the rule.

Therefore, it was not necessary for us to further evaluate monitoring methods. See also Section 5 of this document.

Issue 8: Clarification of the purpose of non-conventional impoundments

Summary of Comments Under Issue 8:
Commenter 0153 finds the discussion of non-conventional impoundments confusing. The commenter believes we have inconsistently and inaccurately described the purpose of these impoundments, the nature of the materials in them, and our regulatory approach. The commenter wishes us to clarify that the liquids are not held in the impoundments for the purpose of covering uranium byproduct material, but the liquid in fact contains (or is) uranium byproduct material. The commenter questions how the liquid can be used to control radon emissions, when the liquid is itself in need of control, and requests that we consider that liquids high in radium content may actually cause an increase in emissions. Commenters 0155 and 0156 make similar points. Commenters 0159, 0161 and 0162 also ask for clarification of the status of the liquid effluents.

Response to Issue 8:
See Section IV.E.2 of the preamble to the final rule for responses to this issue.

Issue 9: Request that EPA consider the entire life cycle of non-conventional impoundments up to removal

Summary of Comments Under Issue 9:
Commenter 0153 requests that we clarify situations where (for example) evaporation ponds are left only with solids, until the impoundment is removed. The commenter notes that operating contingencies may lead to decreases in liquid levels. The commenter believes that monitoring must be required if solid sediments become exposed. The commenter also requests that we acknowledge that non-conventional (liquid) impoundments may be intended to transition to accepting solid tailings as a conventional disposal impoundment.

Commenter 0173.11 addresses the potential for conventional uranium milling in Virginia. The commenter believes this would require a significantly larger number of ponds to handle runoff and effluents, because the precipitation rate is higher than the evaporation rate. The commenter questions the assumption that tailings could be dried to allow installation of a permanent radon barrier under such conditions and recommends that EPA and NRC evaluate the water balance issue.

Response to Issue 9:
Non-conventional impoundments are subject to Subpart W as long as they are operating. The final rule requires only that solids in the impoundment remain saturated (covered with liquid). We do recognize that non-conventional impoundments may transition to use as conventional impoundments, and this is reflected in the definition adopted for non-conventional impoundments in the final rule. The impoundment would then need to meet the requirements

applicable to conventional impoundments. We believe these operational contingencies can be addressed by the operator and regulator. Should uranium milling be undertaken in the eastern part of the country, there will need to be consideration of local conditions.

Issue 10: Construction authorization renewals

Summary of Comments Under Issue 10:
Commenter 0153 raises two issues with respect to construction authorizations: first, that such authorization should be required whenever an impoundment is to be reconstructed or replaced; and second, that there should be a time limit on the authorization so that impoundments are not indefinitely approved. The commenter suggests five years. The commenter also suggests that there should be limit to the length of time a facility can remain on standby (10 years is suggested).

Response to Issue 10:
Subpart A (40 CFR 61.07(a)) requires an application for construction approval for construction of a new source or modification of an existing source. The review of Subpart W under CAA §112(q)(1) is limited to the existing rule, which does not address the construction approval process. The commenter's concerns regarding facilities on standby are addressed through the NRC licensing process. Facilities are required to renew their licenses periodically, and impoundment inspection and maintenance requirements continue to apply during standby.

Issue 11: Evaporation ponds on top of tailings

Summary of Comments Under Issue 11:
Commenters 0159 and 0162 believe that an evaporation pond on top of a conventional tailings impoundment should not be regulated under Subpart W (including liner requirements), because the conventional impoundment is already regulated. Commenter 0185 believes such ponds should not be approved because it is "fiction that a water cover on solid tailings serves to attenuate the radon and reduce the radon emissions to insignificant levels." The commenter cites radon flux calculations based on data from the White Mesa Mill to support this position.

Response to Issue 11:
We understand the commenters' position to be based on the premise that, if such a non-conventional impoundment were to leak, the releases would still remain within the larger conventional impoundment. And if the larger impoundment is operating, the evaporation pond may fit within the work practices (now GACT) by maintaining sufficient liquid to cover any solid material in the impoundment. However, we do not believe this question should be addressed within this rulemaking. This would be a matter for the regulators to determine based on facility operation and the designated use of the impoundment. We disagree with Commenter 0185 that a water cover is ineffective in reducing radon emissions. See Section IV.E.2 of the preamble to the final rule for responses to comments related to radon emissions from liquid surfaces. See also Issue 7 in this section.

Issue 12: Evidence or justification for EPA's proposal

Summary of Comments Under Issue 12:
Commenter 0169 finds questionable legal and scientific bases for our proposal to regulate non-conventional impoundments under Subpart W. The commenter also finds inconsistencies in our discussion of liner performance, and contrasts our concerns with weather events and the reliance upon such liners for long periods in 40 CFR part 192. Commenters 0172.2 and 0173.1 agree that regulation of these impoundments is unwarranted because radon emissions are negligible. Commenters 0172.1 and 0172.11 express the view that the rulemaking is unnecessary because radon exposures to real people, as opposed to calculations at the fenceline or flux measurements, do not rise to a level of concern. Commenter 0172.5 questions the application of Subpart W on the grounds that the uranium byproduct material in non-conventional impoundments is not tailings.

Response to Issue 12:
We disagree with the commenters. Regulation of radon emissions from uranium byproduct material or tailings managed in non-conventional impoundments is well within the Agency's authority under the Clean Air Act. We have determined that non-conventional impoundments containing uranium byproduct material or tailings represent a potential source of radon emissions that warrants control and is amenable to a GACT approach. See also Sections 1 and 2 of this document for responses to comments related to our legal authority and the definition of uranium byproduct material or tailings under Subpart W.

Commenter 0169 has mistaken an excerpt from the surface impoundment construction requirements in 40 CFR 264.221(h) ("In ensuring structural integrity, it must not be presumed that the liner system will function without leakage during the active life of the unit") for a statement of policy unique to the Subpart W rulemaking. When designing and constructing dikes for a surface impoundment, analyses should consider potential leakage rates that could undermine their structural integrity. As the commenter notes, conventional impoundments are required under 40 CFR 192.32(b)(1)(i) to be effective for 200 to one thousand years, for which period releases to groundwater must be limited to prevent contamination.

Section 7 – Limits on Allowable Impoundments

Issue 1: Limiting the total number of disposal cells allowed at a facility

Summary of Comments Under Issue 1:
Commenters 0131 and 0132 believe the history of uranium recovery in the United States calls for greater limitation on the size and number of conventional tailings impoundments used for disposal. The commenters find that the continuous disposal method is likely more effective at controlling radon emissions, but believe there should be size and quantity limitations placed on such impoundments similar to those using the phased disposal method. They point out EPA's conclusion that impoundment area is a more significant factor in radon emissions than is depth or volume.

Response to Issue 1:
The commenters have overlooked a key distinction between the two methods. The continuous disposal method does not limit the overall area of the impoundment, but does limit the area that can be exposed, because the tailings are dried first, then emplaced and immediately covered. By contrast, tailings emplaced using the phased disposal method are typically wet, which inhibits radon emissions. Thus, the continuous disposal limitation on the exposed area (10 acres) effectively serves the same purpose as the overall area limitation of two 40-acre impoundments using the phased disposal method. In its 1989 rulemaking, EPA found that both methods protected public health with an ample margin of safety, although we also believed that continuous disposal would be more cost-effective over the life of the facility.

Issue 2: Limiting the size of impoundments

Summary of Comments Under Issue 2:
Many commenters expressed opinions related to limiting the size of impoundments, both conventional and non-conventional. Commenters 0144, 0154/0170, 0159, 0169, 0173.4, 0173.10 express general support for the proposal not to limit the size of non-conventional impoundments. Commenters 0152, 0153, 0156, and 0168 believe non-conventional impoundments should be limited in size. Commenter 0168 disputes our statement that it is reasonable to assume that such impoundments will not exceed 80 acres in area, simply because one never has. Commenter 0153 further questions our conclusion that 40 acres is a reasonable size restriction for conventional impoundments using the phased disposal method. The commenter points to the limited operating history of such impoundments since promulgation of Subpart W in 1989 and expresses the view that we have given no adequate justification for not imposing a lower limit, such as 10 or 20 acres.

Response to Issue 2:
The 40-acre limit on conventional impoundments using the phased disposal method was adopted in 1989 because the Agency believed that it represented best industry practice at that time. ("Comments and Responses to Comments – NESHAPs for Radionuclides," EPA/520/1-89-031, 1990, page 61) The Agency has not found information to indicate that impoundments of this size cannot be operated in a manner that protects public and worker health and the environment. See

Section IV.E.2 of the preamble to the final rule for responses to comments related to the size of non-conventional impoundments.

Issue 3: Counting and approval of liquid impoundments

Summary of Comments Under Issue 3:
Commenter 0153 believes that EPA has not enforced the limit on the number of allowable operating impoundments, because we have not paid sufficient attention to non-conventional impoundments. This commenter and Commenter 0155 also point to a specific structure at the White Mesa Mill, Roberts Pond, as an impoundment for managing liquid effluents that never received approval by EPA under 40 CFR part 61, subpart A.

Response to Issue 3:
The commenter is correct. EPA has not been counting non-conventional impoundments against the limit of two that may be operated at any one time using the phased disposal method, which is the method employed by the White Mesa Mill. One purpose of the current rulemaking is to clarify this situation. The final rule applies this limitation only to conventional impoundments. The final rule does not limit the number of non-conventional impoundments that may operate at a uranium recovery facility, but promulgates other criteria that non-conventional impoundments must meet. Our understanding is that Roberts Pond is now closed.

Issue 4: Risk of spills or leaks from larger liquid impoundments

Summary of Comments Under Issue 4:
Commenter 0153 believes that EPA has not given sufficient attention to the potential for larger impoundments to have spills or leaks. The commenter asserts that EPA has not provided adequate information to allow comparison of different size impoundments and their ability to withstand physical stresses, such as those associated with the external environment (temperature, wind, freeze/thaw cycles) or the hydraulic pressure of liquid contents. The commenter suggests that very large impoundments may prove to be less resilient, and that size may actually contribute to these effects (for example, whether greater turbulence is found at larger impoundments). Commenter 0186 agrees that "large evaporation ponds at ISLs increase the potential for ground and surface water contamination when there is leakage of the ponds."

Response to Issue 4:
See Section IV.E.2 of the preamble to the final rule for responses to this issue.

Issue 5: Limiting the total number of operating impoundments

Summary of Comments Under Issue 5:
A number of commenters expressed the view that the total number of non-conventional impoundments should be limited (0153, 0158, 0161, 0168). Commenters 0153, 0155, 0161 and 0185 cite data showing radon emissions well above the 20 pCi/m^2-sec standard from non-

conventional impoundments at the White Mesa Mill. Commenter 0153 believes no more than three impoundments (conventional and non-conventional) should be allowed to operate at any one time. Commenter 0161 believes no more than one non-conventional pond should be in operation. Commenter 0168 believes EPA has not adequately considered the likelihood that large amounts of unreclaimed uranium byproduct material or tailings will remain at sites if there is no limit on the number of impoundments that can be operating at any one time.

A similar number of commenters supported the proposal to allow an unlimited number of such impoundments (0144, 0154/0170, 0159, 0169, 0173.4, 0173.10). Commenter 0144 notes that most in-situ leach (ISL) facilities use injection wells for disposal of waste waters, not evaporation ponds.

Commenter 0186 believes the proposal should have addressed the potential for a heap leach operation to be located at a conventional mill. The potential for multiple operating piles and multiple operating impoundments that are not being monitored leads the commenter to conclude that "The EPA should not permit the establishment of a heap leach operation at a conventional mill."

Response to Issue 5:
EPA has examined the information referred to by Commenters 0153, 0155, 0161, 0168 and 0185. See Section IV.E.2 of the preamble to the final rule for a detailed response to comments regarding radon emissions from non-conventional impoundments at the White Mesa Mill. Our analysis of the data presented by the commenters supports our conclusion that liquids contained in impoundments effectively mitigate radon emissions, and that the liquids themselves are not a source of radon that needs further control. While the potential for uranium byproduct material or tailings to remain unreclaimed was an important consideration in placing limits on conventional impoundments, we do not believe that non-conventional impoundments present the same concern because they contain significantly less radon-generating material. The final rule does not apply to heap leach piles during their operational life and will encourage operators of heap leach facilities to begin the closure process in a timely manner. We are not taking the approach, requested by Commenter 0186, of prohibiting the licensing of a heap leach operation at a licensed conventional mill.

Issue 6: Approval of new impoundments relative to closure of existing impoundments

Summary of Comments Under Issue 6:
Commenter 0153 states that new conventional impoundments should not begin to operate until non-operational impoundments have an approved closure plan and demonstrate compliance with the radon flux standard. Commenter 0157 goes farther and states that new impoundments should not receive permission to operate until other impoundments are fully closed.

Response to Issue 6:
See Section IV.F.2 of the preamble to the final rule for responses to comments related to "operation" and "closure". See also Section 9 of this document.

Section 8 – Regulation of Heap Leach Piles

Issue 1: Regulating heaps under the CAA during the leaching process

Summary of Comments Under Issue 1:
We received significant comment on the regulatory approach in the proposed rule. Most commenters (Commenters 0154/0170, 0159, 0162, 0169, 0173.10, 0172.2, 0172.4, 0172.12) disagreed with our proposal to regulate heap leach piles under Subpart W while they are being processed. These commenters expressed the view that material in the heap leach pile does not become uranium byproduct material or tailings until processing is complete, including a final rinse. As stated by Commenter 0154/0170, "Heap leaching is part of the milling process, and the proposed rules would interfere with such processing operations." The commenter believes that, in essence, the heap leach pile is analogous to the conventional mill, which we have not previously proposed to regulate under Subpart W.

Further, several of these commenters stated that heap leach piles will immediately enter into closure upon the cessation of processing, so there is no period when they are "operating" simply as uranium byproduct material or tailings management units. As a result, they see no time at which Subpart W can apply to heap leach piles.

Commenters 0154/0170, 0159 and 0162 raised the distinction between "close in place" piles and "on-off" piles. Commenters explain that the latter operations involve the removal of the processed heap and placement in a conventional impoundment. In this case, the commenters agree that the uranium byproduct material or tailings from the heap, and the impoundment into which it is placed, would be subject to Subpart W.

By contrast, we received some comment supporting our proposed approach, and recommending that we establish an emissions standard and monitoring requirements for heap leach piles (Commenters 0153, 0167 0186, 0188). These commenters agree that, because uranium byproduct material or tailings is generated within the heap leach pile at the time processing begins, the pile serves to manage that material during the operation of the facility. These commenters believe this function brings it under the scope of Subpart W. These commenters also take a more expansive view, and believe EPA is obligated under the CAA to address the entire process at heap leach facilities in the final rule. In this approach, Subpart W would apply to ore stockpiles, ore crushing and heaps that are awaiting processing, as well as to the heap until placement of the final cover. Commenter 0167 further recommends that open-air heap leaching not be approved, when leaching can be conducted more safely and with lower emissions inside a designed enclosure.

Response to Issue 1:
See the responses to these comments in Section IV.D.2 of the preamble to the final rule.

Issue 2: EPA's proposed GACT for heap leach piles

Summary of Comments Under Issue 2:
A significant number of commenters raised objections to the proposed requirement that heap leach piles be maintained at 30% moisture content as a means to limit radon emissions

(Commenters 0104, 0153, 0154/0170, 0159, 0161, 0162, 0169, 0172.12, 0173.10). Calculations submitted by numerous commenters have shown that to maintain a 30% moisture content across the heap leach pile would require the pile to be almost submerged. The commenters broadly agreed that this is an unrealistic goal that could severely undermine the stability of the pile. Further, it would result in a significantly greater hydraulic head, which raises the risk of liner failure. Several commenters also consider the monitoring requirement to be difficult to implement. As with the proposal to maintain one meter of liquid in non-conventional impoundments, concern was also expressed regarding the source of the water (see Section 6 of this document). Commenters 0104 and 0154/0170 suggested that a simpler water balance, which would involve calculations of the amount of liquid entering and leaving the pile, would be a more implementable method of estimating moisture content. Commenter 0154/0170 also offered an alternative to the moisture requirement, in which a layer of gravel could be placed on the pile to limit dust and radon emissions. The leaching solution would be applied through the gravel layer. The commenter sees this as more workable, but believes such approaches should be addressed in licensing, not through Subpart W.

Response to Issue 2:
See the response to these comments in Section IV.D.2 of the preamble to the final rule. We appreciate the suggestion of an alternative method to help reduce radon emissions.

Issue 3: Adequacy and accuracy of EPA's technical information on the heap leach process

Summary of Comments Under Issue 3:
A number of commenters requested additional information on the heap leach process or commented that EPA's descriptions of the heap leach process in the proposed rule were incomplete or incorrect. Commenter 0153 broadly criticizes the discussion in the preamble to the proposed rule and the BID as not fully characterizing the potential sources of radon found throughout the operation, or when the emission potential is greatest. This commenter also disputes our conclusion that work practices are effective at limiting radon emissions from heap leach piles, since no such facilities are operating. The commenter does not believe we have sufficiently investigated control technologies for heap leach piles. Finally, the commenter finds no basis for the proposal's estimate of the number of sampling locations for testing the moisture content of the heap. The commenter also notes an industry presentation to NRC and requests that we reconcile statements in that presentation with our proposal. Commenter 0186 finds that our description of heap leach facilities did not recognize the number of impoundments anticipated for managing different liquid effluents.

Several commenters (0154/0170, 0159, 0162) noted that the assumption that an acidic solution will be used for heap leaching may be incorrect. Alkaline solutions have been used previously and may be more appropriate for some types of ore. Commenter 0172.12 provided general information on different types of heap leaching (on-off and vat, as well as conventional).

Commenter 0172.12 generally agrees with our statements that heap leach piles would have lower radon emissions than conventional impoundments of similar size and condition, because of the lower-grade ore. However, Commenter 0154/0170 notes that our assumption may not be accurate. While the ore in the heap leach pile is lower grade, tailings in the impoundment are likely to be more saturated, which will inhibit radon emissions. The commenter suggests emissions will be similar for the two sources.

Response to Issue 3:
Many of these comments touched on topics discussed in Issues 1 and 2 in this section. We appreciate the additional information provided by commenters. The information EPA relied on to support the proposal was adequate for that purpose, and we note that we requested comment on some specific aspects of the heap leach process. After considering public comments, the final rule does not apply to heap leach piles during processing or during the closure process. We believe this will provide incentive for licensees to begin the closure process for heap leach piles that have completed their operational life. The final rule includes limits on the size and number of heap leach piles that can be in the state between processing and closure, but does not specify that they be kept to a specific level of moisture or have soil applied to reduce radon emissions. To address Commenter 0186's point, non-conventional impoundments associated with heap leach operations that contain uranium byproduct material or tailings are regulated under the final rule.

Commenter 0153 calls attention to statements that the commenter believes are unsupported. We agree with the commenter that there is no experiential basis to conclude that the work practices applicable to conventional impoundments have also been effective for heap leach piles, simply because no such facilities have operated since Subpart W has been in effect. We further accept the commenter's view that the number of sampling locations to check moisture content for a heap leach pile may not be directly comparable to the number of sampling locations for monitoring radon emissions a conventional impoundment using Method 115, even if the areas are nominally the same. The final rule does not contain a required level of moisture for heap leach piles, so there is no need to determine the proper number of sampling locations.

Commenter 0154/0170 provides additional perspective regarding the relative radon emission potential of conventional impoundments and heap leach piles. Another factor that may be relevant is the physical matrix of material that has been processed through a conventional mill, compared to what is essentially (in physical form) raw ore. Radon may be more tightly bound by the conventional waste material, which would likely tend to lower the emission rate from the conventional impoundment.

Regarding the industry presentation referenced by Commenter 0153, we note that it took place several years before our proposal was issued. The EPA is not responsible for assumptions made by regulated parties in the absence of specific requirements.

Issue 4: Suggestions for EPA's final rule related to heap leaching

Summary of Comments Under Issue 4:
Commenter 0154/0170 provided a number of suggestions for revising the proposed rule as it relates to heap leach piles. These include a separate definition of "heap leach facility," a distinction between conventional impoundments and heap leach piles that are closed in place, and inclusion of fully leached ore in a revised definition of "tailings." The commenter also suggests eliminating the proposed definition of "heap leach pile operational life," although it is "not unreasonable" should EPA decide to retain it in the final rule. Similarly, Commenter 0186 believes the definition of "operation" as it applies to heap leach facilities must cover activities beginning with the receipt of ore at the site.

Response to Issue 4:
We appreciate Commenter 0154/0170's suggestions and have considered them for the final rule. We are retaining the proposed definition of "heap leach pile operational life" and the references to heap leach facilities or piles in other definitions. We are not adopting the commenter's other suggestions. The fact that the final rule does not apply to heap leach piles during their operational life, or after the pile has entered the closure process, as well as clarification regarding when final closure begins, addresses the commenter's concerns. If the heap leach pile enters the closure process immediately after processing has completed, as was indicated by industry commenters, heap leach piles will not be subject to Subpart W at any time. For similar reasons, we are not adopting the suggestion of Commenter 0186.

Section 9 – Definition of Operation/Closure

Issue 1: Extending "operation" through completion of final closure and installation of final cover

Summary of Comments Under Issue 1:
A number of commenters advocated that the scope of Subpart W be extended to include all activities undertaken to achieve final closure of the impoundment (see also Issue 3 in this section). As defined in Subpart W, "operation" ends "the day that final closure begins" (40 CFR 61.251(e)). Many of the commenters would like this definition extended and explicitly stated that Subpart W should apply until the final cover is installed on the impoundment (or, for non-conventional impoundments, until the impoundment is removed, if that is the closure approach). See Commenters 0131, 0132, 0142, 0143, 0152, 0153, 0157, 0158, 0167, and 0173.7 for comments of this nature. Commenter 0188 does not want the definition changed (see Issue 8 in this section), but suggests amending the scope of Subpart W to address impoundments in closure. The commenter notes that the title of Subpart W as promulgated in 1986 was "National Emission Standard for Radon-222 Emissions from Licensed Uranium Mill Tailings," and EPA is not prohibited from adopting a similar title.

Response to Issue 1:
See Section IV.F.2 of the preamble to the final rule for responses to this issue. See also Issues 3 and 4 of this section. In response to Commenter 0188, despite the title of Subpart W as promulgated in 1986, the "Applicability" section (61.250) clearly stated: "This subpart applies during the period of operation."

Issue 2: Expanding the definition of "operation" to address all phases of operation that generate radon

Summary of Comments Under Issue 2:
Commenter 0153 believes the definition of "operation" is too limited to address sources of radon at uranium recovery facilities. The commenter states that Subpart W must address ore prior to processing, as well as the processing, spills, etc. This would include all phases of heap leaching, including heap leach piles that are awaiting processing.

Response to Issue 2:
When the EPA initially promulgated Subpart W in 1986, we identified radon as the radionuclide released to air that presented the highest risk at uranium recovery facilities and determined that units managing uranium byproduct material or tailings were the most significant source of radon emissions. 51 FR 34056. Since 1986 and re-promulgation in 1989, Subpart W has only regulated units that manage uranium byproduct material or tailings at uranium recovery facilities. 40 CFR § 61.250. Other potential emission points in these facilities were not previously the subject of Subpart W regulation and were not assessed for the 1989 rulemaking. The EPA's CAA § 112(q) review of Subpart W was limited to the existing standard. Because Subpart W did not regulate other potential emission points, the EPA did not include any other potential emission points in its CAA § 112(q) review. EPA did not propose to expand the scope to include ore or the processing facilities, and has not evaluated the radon emissions from these sources.

Thus, Subpart W has not been applied to other sources of radon at uranium recovery facilities where wastes are present, such as material in thickeners or other processing units. The NRC, or NRC Agreement State, regulates the radionuclide emissions from all sources at a uranium recovery facility. The operator is required to report particulate radionuclide and Rn-222 concentrations at the facility boundary. Thus, radon emissions from sources not covered under Subpart W, including those from the raw ore in heap leach piles or processed yellowcake, are captured by the NRC reporting requirements.

After considering comments, the final rule will not regulate heap leach piles under Subpart W during their operational life (i.e., while being processed to extract uranium) or after they have entered closure. Impoundments used to manage uranium byproduct material or tailings associated with heap leach operations are regulated under Subpart W. See Section 8 of this document and Section IV.D.2 of the preamble to the final rule for responses to comments on heap leach piles.

Issue 3: Implications for regulatory oversight of EPA's proposed definition

Summary of Comments Under Issue 3:
Several commenters stated that the current regulatory scheme allows an unacceptable period during closure activities when impoundments are not being monitored or otherwise managed to limit radon emissions (Commenters 0153, 0155, 0158, 0167, 0172.14, 0173.6, 0173.7, 0173.8, 0188). They further argue that closure is not being conducted in a manner that will lead to timely installation of a final cover or removal of an evaporation or holding pond. They cite periods of decades during which tailings are being "dewatered" or impoundments are used to deposit wastes from decommissioning activities, while the drying-out of impoundments allows increased radon emissions. This is attributed in some part to the Agency's rescission of subpart T, which called for installation of final covers on conventional tailings impoundments within two years of the cessation of operations. Commenter 0153 notes that an impoundment undergoing closure will be required to demonstrate compliance with the 20 pCi/m^2-sec radon emissions standard if it requests extension of the milestones in the closure plan, where it may not have been required to monitor previously under Subpart W. Commenter 0188 notes that subpart T contains an emission standard, but no compliance requirements during closure. The commenter further questions whether Agreement States have the enforcement procedures that were required under the 1991 EPA-NRC MOU.

Response to Issue 3:
See Section IV.F.2 of the preamble to the final rule for responses to this issue. See also Issues 1 and 4 of this section. Enforcement procedures, particularly those unrelated to Subpart W, are not within the scope of this rulemaking.

Issue 4: Including an approved closure plan and milestones in the facility license

Summary of Comments Under Issue 4:
Commenters 0153, 0155, 0158, 0172.14, 0173.7 and 0188 expressed concern that impoundments are not being closed in accordance with closure plans, because the plans do not exist, milestones are absent or unclear, or milestones are not being enforced. Commenters 0153 and 0188 state that EPA should not consider an impoundment in closure until such plans are incorporated into the facility license. Commenter 0155 recommends that we amend 40 CFR part 192 to include a provision that EPA will verify the existence of a closure plan. Commenters 0172.14, 0158 and 0173.7 offer specific comments related to the White Mesa and Cotter sites, respectively, and what they perceive as a lack of closure plans. Commenter 0188 finds that the situation at White Mesa regarding the closure of Cell 2 "flies in the face of the EPA and NRC justification for rescinding Subpart T for operational mills" and believes "There is plenty of justification for reinstating Subpart T for the White Mesa Mill."

Response to Issue 4:
See Section IV.F.2 of the preamble to the final rule for responses to this issue. See also Issues 1 and 3 of this section. The Agency has no plans to reinstate subpart T.

Issue 5: Applicability of Subpart W to new impoundments at "closed" sites

Summary of Comments Under Issue 5:
Commenter 0153 believes that new impoundments established at sites undergoing closure should be subject to Subpart W. The commenter suggests that such sites may construct new impoundments that are actively accepting waste (i.e., they are "operating"), even while the site is decommissioning. The commenter gives the example of contaminated soils or uranium mine waste (e.g., waste rock, overburden, or low-grade ore) from other sites.

Response to Issue 5:
As discussed in the responses to Issues 1 and 3 in this section, if the impoundment is undergoing closure, Subpart W does not apply to the use of that impoundment for management of closure wastes. An impoundment that was already subject to Subpart W and is still in operating status continues to be subject to Subpart W, even if it is accepting wastes generated during closure activities for another impoundment or portion of the site. The Agency has no plans to change this position.

New impoundments constructed while the facility is being closed, according to the approved facility closure plan and for the sole purpose of managing closure or remediation wastes would not be subject to Subpart W, because they were only constructed to address closure activities. Subpart T is relevant here: "A pile cannot be considered operational if it is filled to capacity or the mill it accepts tailings from has been dismantled or otherwise decommissioned" (40 CFR 61.221(b)). Note that the construction requirements in 40 CFR 192.32(a)(1) still apply to these closure-only impoundments, to the extent that it is managing material covered under UMTRCA. Regardless of the source of the waste, if the impoundment is accepting uranium byproduct

material or tailings, and is not being managed under a closure plan, it would be subject to Subpart W. We note that waste from conventional uranium mines (open pit or underground) would not be considered uranium byproduct material or tailings because it does not result from the concentration or extraction of uranium from ore processed primarily for its source material content.

Issue 6: Operations as it involves placement of tailings from process operations, or use for evaporative or holding purposes

Summary of Comments Under Issue 6:
A few commenters took the opposite view of that addressed under Issue 1 in this section (0154/0170, 0172.2, 0172.4). These commenters wish us to clarify that the period of operations for either a conventional or non-conventional impoundment only extends to the management of uranium byproduct material produced by the concentration or extraction of ore processed primarily for its source material content (which may include the commercial management of such wastes produced at other facilities), and not to the management of wastes (byproduct material or otherwise) generated during closure or decommissioning activities. Commenter 0188 points out that some closure activities, such as application of a partial cover, may take place while the impoundment is still operating, before it formally enters the closure process.

Response to Issue 6:
See Section IV.F.2 of the preamble to the final rule for responses to this issue. See also Issues 1 and 3 of this section. Commenter 0188 is correct that a licensee need not wait until the entire impoundment is full to implement some closure activities, if that is compatible with continued operation.

Issue 7: Implications of existing and proposed definitions

Summary of Comments Under Issue 7:
We received a number of comments regarding the existing and proposed definitions, some of which we find useful and others that seem contradictory or not well supported. Several commenters (0154/0170, 0159, 0162, 0169) viewed the proposed definition as extending the jurisdiction of Subpart W throughout the closure process. Commenter 0169 states that EPA has no authority under the Clean Air Act to determine which facilities are “operating,” “active,” or “inactive,” and that this authority lies solely with NRC.

Commenter 0154/0170 provided extensive comments on the proposed definitions, as well as suggestions for others. These comments include:

- explicitly address both conventional and non-conventional impoundments in the definitions;
- clarify the definition of “operations” by replacing the phrase “final closure begins” with “the closure period for the impoundment begins”;

- modify the proposed definition of "standby";
- add a definition of "closure period" that starts with notification that an impoundment is no longer used for its operational purpose; and
- add a definition of "tailings".

Commenter 0186 similarly recommends adding a definition of "closure period" specifying that the closure period cannot begin until a closure plan is approved and incorporated into the facility license. The commenter also proposes adopting the definitions in 40 CFR part 192 for "closure plan," "tailings closure plan (radon)," and "milestone."

Several commenters stated that definitions in or proposed for Subpart W are inconsistent with NRC's definitions in 10 CFR part 40 (and Appendix A) (Commenters 0154/0170, 0159, 0162, 0165, 0169, 0172.2). For example, Commenters 0159 and 0162 state that "[t]he definition of *Operation* conflicts with existing regulations, specifically those in 10 CFR part 40 Appendix A following the rescission of 40 CFR part 61 Subpart T." These commenters also suggest that we look to the Appendix A definition of "closure" and they note that the closure period is tied to the "end of milling operations" in Criterion 6.

Commenter 0153 requests clarification of the term "day that final closure begins," which the commenter believes has never been adequately explained. Commenter 0172.14 requests clarification on the steps that must take place for closure to begin.

Response to Issue 7:
See Section IV.F.2 of the preamble to the final rule for responses to comments related to the definition of "operation" as it relates to the jurisdiction of Subpart W, consistency with NRC definitions, and closure, including the phrase "final closure." See also Issue 1 in this section. See Section IV.A.2 of the preamble to the final rule for responses to comments on EPA's authority to define these terms under Subpart W.

In addition to comments addressed in Section IV.F.2 of the preamble to the final rule, Commenter 0154/0170 also had several suggestions for definitions that we are not adopting. The commenter suggests that the definition of "operations" could be further clarified by replacing the phrase "final closure begins" with "the closure period for the impoundment begins." The commenter also suggests modification to the proposed definition of "standby." The commenter also proposed that we add a definition of "tailings" as a further means to distinguish from non-tailings byproduct material. We do not see the need to do this. We did not propose to change the definition of "uranium byproduct material or tailings," and are retaining that definition in the final rule (see Section 2 of this document). We do find it interesting that the same commenter has stated the view that the Clean Air Act does not give EPA the authority to define UMTRCA-related terms differently from the way they are defined either in that statute or by NRC. The definition of "tailings" proposed by the commenter is not the same as that in Section 101(8) of UMTRCA, nor does it appear that NRC has separately defined "tailings" in 10 CFR part 40.

In response to Commenter 0186, the definition of "final closure" adopted in the final rule requires the notification to affirm that an approved reclamation plan, with requirements and milestones, is being implemented. The EPA does not approve reclamation or closure plans, and

we do not believe it is necessary to require that plan to be incorporated into the facility license. The final rule adopts a definition of "reclamation plan" that is consistent with NRC's definition in 10 CFR part 40, Appendix A. Appendix A also contains a definition of "milestone." These definitions are consistent with those in 40 CFR part 192.

Issue 8: Extending operations through final closure as it affects actual facility operations

Summary of Comments Under Issue 8:
Commenter 0154/0170 disagreed with comments presented under Issue 1 of this section and pointed out that maintaining impoundments under Subpart W jurisdiction while they are undergoing closure may cause facilities to be out of compliance with the restriction on the number of conventional impoundments. The commenter posits that this situation could arise if a facility opened a new conventional impoundment for operational byproduct material, while having another one in operation and one in closure (or multiple impoundments in closure). To avoid compliance issues, the commenter explained that facilities may have to defer opening new impoundments, which could lead to temporary shutdown of the facility's processing operations if there is no outlet for the wastes. The commenter specifically notes that non-conventional impoundments may continue in operation when conventional impoundments are in closure. Commenter 0188 agrees with Commenter 0154/0170. The commenter further believes that changing the definition in Subpart W would also require changes to the definition in 40 CFR part 192. The commenter sees the lack of an emission standard during closure activities as an underlying problem that would not be addressed by changing the definition of "operation."

Response to Issue 8:
See Section IV.F.2 of the preamble to the final rule for responses to this issue. See also Issue 1 of this section. See also Section 6 of this document for responses to comments related to the operation of non-conventional impoundments. The need for standards to apply during closure is not within the scope of this rulemaking.

Section 10 – Eliminating "As Determined by the Nuclear Regulatory Commission"

Issue 1: Potential for EPA's proposal to create dual regulation

Summary of Comments Under Issue 1:
Many commenters objected to the proposal to eliminate the phrase "as determined by the Nuclear Regulatory Commission" from provisions related to review of the impoundment construction requirements in 40 CFR 192.32(a)(1) (Commenters 0144, 0151, 0154/0170, 0159, 0162, 0165, 0169, 0172.2, 0172.5, 0172.6, 0173.1, 0173.10). Commenters in general argued that this would result in unnecessary dual regulation if both EPA and NRC need to review and approve construction applications, with limited if any benefit. Commenter 0144 suggests this will have significant cost implications that were not considered during the rulemaking. Commenter 0151 questions how disagreements between the agencies will be resolved, and suggests that appeals will be "inappropriately complicated".

A number of these commenters asserted that our proposal was contrary to the legal framework established by Congress for management of byproduct material as defined in Section 11e.(2) of the Atomic Energy Act (AEA). Commenters cite to the framework in Section 275 of the AEA, which directs the EPA to establish standards for management of byproduct material and which gives the NRC sole authority over implementation and enforcement of EPA's standards through its licensing process (Commenter 0151 cites Title 42 of the United States Code, Section 2022(d) rather than Section 275 of the AEA). Commenters 0154/0170, 0159 and 0173.10 refer specifically to that section's statement that "no permit issued by the Administrator is required…for the processing, possession, transfer, or disposal of byproduct material, as defined in section 11e.(2) to this subsection." Commenter 0172.6 suggests that EPA is attempting to expand its role by improperly assuming or duplicating NRC's responsibilities.

Commenter 0169 does not make these specific statutory references, but more generally criticizes EPA for "grossly inefficient, dual regulation" that is "inconsistent with efficient regulatory practices" and goes against previous efforts by the two agencies to avoid such situations, as illustrated by EPA's rescission of subparts I and T. The commenter suggests that Subpart W could also be rescinded, and notes that EPA's separate rulemaking related to 40 CFR part 192 may be used to incorporate elements of Subpart W as needed.

We also received some comment in support of the proposal to remove the phrase "as determined by the Nuclear Regulatory Commission" (Commenters 0166, 0173.3, 0173.11, 0172.8). Commenter 0166 believes this is a welcome clarification that EPA is administering the NESHAP program. Commenter 0173.3 notes that it is not unusual for an industry to be regulated under more than one statute or agency. Commenter 0173.11 points out that this situation has existed for several decades. Commenter 0172.8 agrees and cites EPA approvals under subpart A, as well as the division of responsibilities at the state level in Utah as they relate to the White Mesa Mill.

Response to Issue 1:
See the response to this issue in Section IV.F.2 of the preamble to the final rule.

Issue 2: Record-keeping and reporting requirements

Summary of Comments Under Issue 2:
Several commenters also contend that the proposed record-keeping provisions would constitute burdensome dual regulation (Commenters 0154/0170, 0159, 0172.6, 0173.10). Commenters 0159, 0172.6 and 0173.10 generally raised this issue of dual regulation. Commenter 0154/0170 raised concerns regarding the proposal to require that facilities maintain records demonstrating compliance with the requirements of 40 CFR 192.32(a)(1), which the commenter sees as the purview of the NRC or Agreement State.

Commenter 0166 supports the proposed requirement to maintain records of impoundment design and construction. Commenter 0153 believes records required under Subpart W must be available to the public, and not only retained by the facilities, and also states that the final rule must include a schedule for submittal of these records. Commenter 0155 believes clear recordkeeping and compliance demonstrations are necessary for the "new, more complicated set of bifurcated work practice standards for conventional and non-conventional impoundments."

Response to Issue 2:
We proposed three specific requirements for records to be maintained by the facility: demonstration of compliance with the requirements of 40 CFR 192.32(a)(1); documentation that one meter of liquid is maintained in non-conventional impoundments; and documentation that heap leach piles are maintained at 30% moisture content. The final rule includes requirements to maintain records related to compliance with 40 CFR 192.32(a)(1), as well as documentation that solids in non-conventional impoundments are maintained in a saturated state, which can be demonstrated by visual evidence that solids are not visible above the liquid surface. Specifically, the final rule requires that digital photographs documenting the liquid level in non-conventional impoundments be collected at least weekly and uploaded to a designated reporting system at least monthly. These photographic records will be made available to the public. The final rule does not include records related to heap leach piles. We believe these record-keeping requirements are appropriate for Subpart W, are not burdensome to licensees, and are within our authority under the Clean Air Act.

Section 11 – Cost and Economic Impact Analysis Issues

Issue 1: General cost and economic comments

Summary of Comments Under Issue 1:
Commenter 0114 believes our proposal will negatively impact the uranium recovery companies, as well as the national and global economies. The commenter believes we do not have sufficient justification for the proposed changes. Commenter 0173.1 takes a similar view and believes we may be underestimating the impacts of the rule on ISL facilities. Commenter 0154/0170 disagrees with our statement related to Executive Order 13211 ("Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution or Use"), stating that the proposed requirements would make certain types of uranium recovery less competitive, and overall would disadvantage the industry compared to other sources of energy. Commenter 0173.3 disagrees, stating that the uranium industry is not economically viable without government price supports.

Commenter 0144 disagrees that the trend from conventional milling to in-situ leach (ISL) is driven by economics. The commenter points out that the baseline cost for a conventional mill is lower than that for an ISL facility, and that the smaller footprint, as well as other operational advantages, play an important part in these decisions.

Commenter 0153 questions whether any uranium recovery facilities are owned by small businesses. The commenter notes that it is not uncommon for companies to be owned by large multi-national firms. As noted in Issue 4, Commenter 0155 agrees, at least as far as conventional mills. However, Commenter 0154/0170 recommends that we re-assess the estimated costs for their impacts on small businesses and provides information to correct our assessment of which facilities are owned by small entities.

Commenter 0172.1 believes EPA has not fully considered the effects on employment of the proposed requirements.

Response to Issue 1:
The economic impact analysis has appropriately considered impacts on small businesses, employment effects, and price of uranium. We disagree with Commenter 0154/0170 regarding the impacts of the proposed rule on the uranium recovery industry, both in comparison to other sources of energy and in the relative advantage of certain types of uranium recovery. Indeed, for the most part these requirements have been in place since 1989. The final rule presents a more limited impact than the proposal and we reach the same conclusion regarding the Executive Order. We agree that the uranium recovery industry is sensitive to price fluctuations, as are many natural resource extraction industries. EPA works to balance the necessary level of public health and environmental protection with economic impacts.

We also have found that ownership of facilities can be complicated; however, we find that most of the companies that are operating or in the process of developing facilities do qualify as small businesses, even with the recent reduction in the Small Business Administration (SBA) employment threshold for such facilities (from 500 to 250 employees, see 13 CFR 121.201 for North American Industrial Classification System (NAICS) code 212291, effective February 26, 2016). We appreciate the information provided to correct any errors we made in determining

which facilities are owned by small businesses. We also appreciate Commenter 0144's perspective; however, we must point out that Table 4 in the preamble to the proposal, which was cited by the commenter, does not include capital costs for the processing facilities themselves, nor does it address the long-term costs that are borne by conventional mills conducting permanent disposal. These aspects are not affected by this rulemaking.

Issue 2: Costs related to water use

Summary of Comments Under Issue 2:
A number of commenters expressed the view that our proposal would require significantly more water than current practice (Commenters 0104, 0151, 0154/0170, 0172.2, 0173.10). The commenters generally refer to the challenges of providing large volumes of water in arid regions. Commenters 0104, 0172.2, 0154/0170 and 0173.10 discuss the aspects of operation that would be affected, including drilling additional wells, with associated piping and pumping. The commenters believe this will affect operations in important ways, assuming that water rights can even be obtained.

Response to Issue 2:
We thank the commenters for this information. After considering comments, the final rule does not include a requirement to maintain one meter of liquid in non-conventional impoundments or a requirement to maintain a 30% moisture content in heap leach piles. Operators will be required to maintain solids in non-conventional impoundments in a saturated state, such that solid materials are not visible above the liquid level. This requirement is more compatible with current operations and will adequately control radon emissions. See Sections 6, 7, and 8 of this document and Sections IV.D.2 and IV.E.2 of the preamble to the final rule for responses to comments related to water usage for non-conventional impoundments and heap leach piles.

Issue 3: Costs associated with impoundment design and construction

Summary of Comments Under Issue 3:
Commenter 0107 states that evaporation ponds are typically not designed to a depth that can easily accommodate an additional one meter of liquid. This will result in significant cost to re-design the affected impoundments. Commenter 0173.9 agrees and states that EPA should grandfather such impoundments if it does not remove the requirement from the final rule.

Several commenters state that impoundments used only to manage liquids that have been treated to meet effluent standards should not be subject to Subpart W (Commenters 0107, 0144, 0154/0170, 0173.4). Commenter 0107 states that such impoundments may not meet the full requirements of 40 CFR 192.32(a)(1), which will necessitate re-design and construction at significant cost. Commenter 0144 views the proposed revision of 40 CFR 61.252(b)(1) (to remove "as determined by the Nuclear Regulatory Commission") as "dual regulation," potentially making this situation more likely. Commenter 0154/0170 agrees and suggests changes to the proposed definitions.

Commenter 0151 wishes us to clarify that non-conventional impoundments that contained uranium byproduct material and were constructed before 40 CFR part 192 was promulgated (October 7, 1983) need not be upgraded to meet those requirements (as conventional impoundments are not). If that is not the case, the commenter believes the Agency must conduct a cost-benefit analysis.

Commenter 0154/0170 believes that the proposed requirements for heap leach facilities will lead to construction of larger holding ponds and process facilities than would otherwise be considered necessary, leading to less efficient operations. The commenter believes this will disadvantage heap leach facilities compared to ISL facilities. This may also be necessary at other types of facilities as well. Commenter 0172.2 agrees.

Response to Issue 3:
After considering comments, the final rule does not include a requirement to maintain one meter of liquid in non-conventional impoundments or a requirement to maintain a 30% moisture content in heap leach piles. Operators will be required to maintain solids in non-conventional impoundments in a saturated state, such that solid materials are not visible above the liquid level. Heap leach piles themselves are regulated by Subpart W only to the extent that they have completed processing (i.e., have reached the end of their operational life) and have not yet entered the closure process. Non-conventional impoundments associated with heap leach piles are subject to the requirements of Subpart W. See Sections 5, 6, and 7 of this document and Section IV.E.2 of the preamble to the final rule for responses to comments related to non-conventional impoundments. See Section 8 of this document and Section IV.D.2 of the preamble to the final rule for responses to comments related to heap leach piles.

Regarding impoundments used for treated water, Subpart W applies to impoundments that are managing uranium byproduct material or tailings. If the impoundment does not contain uranium byproduct material or tailings, it does not fall under Subpart W. We believe this determination is appropriately made by the NRC or NRC Agreement State, but we have not included specific provisions of this nature in the final rule. See Sections 1 and 6 of this document and Sections IV.A.2 and IV.E.2 of the preamble to the final rule for responses to comments related to impoundments used only to manage liquids that have been treated to meet effluent standards. See Section 10 of this document and Section IV.F.2 of the preamble to the final rule for responses to comments related to removal of the phrase “as determined by the Nuclear Regulatory Commission.”

See Section IV.F.2 of the preamble to the final rule for responses to Commenter 0151 regarding impoundments constructed prior to the promulgation of 40 CFR part 192.

Issue 4: Environmental cost of not monitoring emissions

Summary of Comments Under Issue 4:
Commenter 0153 believes the cost of monitoring is negligible when compared to company revenues. The commenter believes this must be weighed against the cost of environmental and

health impacts of not monitoring, which have not been fully examined. However, the commenter also suggests that EPA has not calculated all of the cost savings that will be accrued if the monitoring requirement is eliminated. These would include items such as monitoring, reporting, maintenance, and corrective action. The commenter believes that "many thousands of dollars" will be saved by "EPA's disregard of the provisions of the CAA."

Response to Issue 4:
After considering information provided by commenters, the radon flux standard and monitoring requirement for conventional impoundments constructed prior to December 15, 1989 is being retained. See Section 5 of this document and Section IV.B.3 of the preamble to the final rule for responses to comments related to the radon flux standard and monitoring requirement.

Issue 5: Adequacy of EPA's cost analysis of GACT

Summary of Comments Under Issue 5:
Commenter 0153 finds that our cost analysis of GACT is not valid because the Administrator has not determined that an emissions standard is not feasible. The commenter further believes that our Economic Impact Analysis contains much outdated and incomplete information. The commenter notes that the cost analysis does not address costs associated with soil or liquid covers or extreme weather events.

Commenter 0155 similarly finds the analysis lacking. The commenter points to the legislative history of CAA §112 as intending GACT to apply to "smaller, area sources" where economic impacts are more important. The commenter does not believe these considerations are relevant to uranium recovery facilities, when conventional mill owners cannot be considered small businesses. The commenter further finds that we did not evaluate the cost and economic impact of all control technologies as a means to identify those for further consideration, only a few pre-selected technologies. The commenter notes that we considered the cost of eliminating radon flux monitoring, but did not evaluate the impacts of extending the monitoring to all impoundments. The commenter cites the cost of monitoring at the White Mesa Mill as representing a limited impact if extended to all impoundments.

Commenter 0168 believes EPA should require concurrent reclamation of conventional mill sites, citing studies showing the surety for the White Mesa Mill is only about 20% of the projected liabilities. The commenter believes disproportionate remediation costs will be borne by taxpayers, and this was not accounted for in our analysis. The commenter suggests this situation would be improved by limiting the number of operating non-conventional impoundments.

Response to Issue 5:
The Economic Impact Analysis (EIA) has appropriately considered the aspects cited by Commenters 0153 and 0155. The EIA evaluates the cost of implementing the GACT management practices. Soil or water cover is not designated as a component of GACT for conventional impoundments, but maintaining liquid in non-conventional impoundments is assessed in the EIA.

We also disagree with the commenters' interpretations of the Clean Air Act and limitations on taking a GACT approach. CAA § 112(q)(1) requires EPA to review Subpart W and, if appropriate, revise it to comply with § 112(d). Provisions related to area sources in § 112(d)(5) do not reflect the limitations on GACT cited by Commenter 0155, nor do they require an affirmative finding that an emissions standard is not feasible before establishing GACT, as suggested by Commenter 0153. Further, review under § 112(q)(1) is limited to the existing standard, and does not require analyses of control technologies or management practices that are not within the scope of the current standard. Commenter 0155 is correct that we did not propose to extend monitoring to all conventional impoundments because we determined that the management practices finalized as GACT are effective in limiting radon emissions. We proposed instead to apply the GACT management practices proposed under § 112(d)(5) to impoundments that had previously been subject to an emissions standard and monitoring requirement. The emissions standard was initially established because construction of these older impoundments could not be controlled, as it can be for new impoundments. After evaluating comments, we are retaining the radon flux standard and monitoring requirement for impoundments in existence on December 15, 1989. See Section 1 of this document and Section IV.A.2 of the preamble to the final rule for more detailed responses to comments related to the Clean Air Act and GACT.

In response to Commenter 0168, Subpart W applies to operating structures that manage uranium byproduct material or tailings. It does not apply to such structures that have entered the closure process. We understand the commenter's concern that inadequate financial sureties could limit the ability to conduct full closure and site remediation should the licensee declare bankruptcy. Similar concerns regarding the potential for multiple unreclaimed conventional impoundments prompted EPA to establish the limits on size and number of such impoundments in the original 1986 rulemaking, carried through as GACT management practices in the final rule. However, we do not see a similar potential for licensees to construct multiple non-conventional impoundments beyond their immediate processing needs, given the cost of constructing such impoundments. Financial sureties are established by the NRC. Closure and remediation requirements are found in 40 CFR part 192, implemented by 10 CFR part 40, Appendix A.

Section 12 – General Comments

Issue 1: EPA's rulemaking process

Summary of Comments Under Issue 1:
Several commenters expressed the view that EPA did not follow the required process for a rulemaking and did not adequately involve stakeholders. Commenter 0155 states that EPA staff discouraged facility-specific comments, which the commenter believes provide relevant experience to inform the rulemaking. This commenter and others believe that EPA should essentially begin the rulemaking process again because of the significant deficiencies they find in the proposal and supporting information. Commenter 0167 believes this is necessary to satisfy Clean Air Act mandates, as well as fulfill environmental justice principles and recognize that the 1989 work practice standard have not been effective. Commenter 0153 further suggests that EPA's proposal was not objective and that the Agency is instead "manipulating the experience of the implementation and enforcement of Subpart W." Several commenters (0140, 0167, 0172.3, 0173.3, 0173.5) expressed their concern that public hearings were not held in communities closer to operating facilities, instead of "the industry's headquarters." Commenter 0167 suggests that EPA has made no effort to address the concerns of these communities.

Response to Issue 1:
We disagree with these comments. Our § 112(q)(1) review addresses the mandates of the Clean Air Act. EPA's rulemaking process was appropriate and provided opportunity for public comment. We appreciate additional information provided by commenters, including facility-specific information, and have considered it in developing the final rule. We recognize that some aspects of our proposal were based on inaccurate information; however, we disagree that this necessitates an entirely new rulemaking effort. The fact that we have used information provided by these commenters in retaining the radon flux standard and monitoring requirement for conventional impoundments in existence on December 15, 1989 refutes the suggestion that our decisions were pre-determined. See Section 5 of this document.

We recognize that many stakeholders are not satisfied with the performance of specific facilities or the enforcement of the requirements of Subpart W. These are matters beyond the scope of this specific rulemaking, which is to conform Subpart W, as appropriate, to the requirements of CAA § 112(d). See Section 1 and Section 13 of this document.

Contrary to the statements of commenters, we made extensive efforts to collect input from affected stakeholders. In addition to the two public hearings we held in Denver, which is centrally located from numerous uranium recovery facilities, we solicited comment through EPA's rulemaking docket at EPA-HQ-OAR-2008-0218. We initially provided a 90-day comment period; in response to public requests, we extended the comment period by 90 days. We have also tried to capture community knowledge through the use of informal meetings in Cañon City, CO; Rapid City, SD; Gallup, NM; Tuba City, AZ; and White Mesa, UT. We held an additional meeting with Cañon City stakeholders during a break from the public hearing. We held a consultation with the Ute Mountain Ute Tribe (see Issue 2 of this section). We also held a nationwide webinar to collect information. We have held quarterly stakeholder conference calls. We have diligently provided opportunities for community input.

Issue 2: EPA's Tribal obligations

Summary of Comments Under Issue 2:
Commenters 0131 and 0132 urged the EPA to do more than simply adhere to its legal Tribal consultation requirements and to integrate recommendations from Tribes impacted by uranium mill tailings, mining operations into this rule and future rules. Commenter 0155 argued that the EPA failed to properly exercise its trust responsibility to the Ute Mountain Ute Tribe. Commenters 0183 and 0184 refer to environmental impacts of the White Mesa facility that affect the Tribe.

Commenters 0131 and 0132 also challenged the EPA's statement in the Proposed Rule that Subpart W does "not have tribal implications, as specified in Executive Order (EO) 13175 (65 FR 67249, November 9, 2000)," asserting that that EO 13175 does not require the direct regulatory requirement be placed on Tribal governments for EO 13175 to be applicable. These commenters claimed that the EPA should reconsider the applicability of EO 13175 in light of the historic and ongoing environmental contamination from uranium operations.

Commenter 0155 understands that statutory restrictions and rulemaking processes constrain the manner in which the EPA undertakes a rulemaking like the revision to Subpart W. However, the commenter maintains that the EPA must still exercise its trust responsibility to protect human health and the environment in White Mesa and consult with the Tribe about the Subpart W rule in a manner that allows the Tribe to give meaningful input into the EPA's rulemaking process. Commenter 0155 explained that the Ute Mountain Ute Tribe sought to engage with the EPA because the Tribe's White Mesa community is located less than three miles from the only operational conventional uranium mill and that the EPA should have held a government-to government consultation with the Tribe before the Proposed Rule was released for public comment. Commenter 0155 claims that the EPA violated its trust responsibility and the EPA's duty to consult with the Tribes by not meaningfully consulting with the Tribe or answer questions about the rulemaking after repeated consultation requests, and by forcing the Tribe to give input during a public comment process. Commenter 0132 encouraged the EPA to engage with Tribes in government-to-government consultation to help insure that any actions proposed by the EPA do not adversely impact Tribes.

Response to Issue 2:
The EPA recognizes the importance of appropriate consultation with tribes in developing this rule, consistent with the federal government's trust responsibility to federally recognized tribes. The EPA's policy is to consult on a government-to-government basis with federally recognized governments when the EPA's actions and decisions may affect tribal interests. Consultation is a process of meaningful communication and coordination between the EPA and tribal officials prior to the EPA taking actions or implementing decisions that may affect tribes. As a process, consulting includes several methods of interaction that may occur at different levels. The EPA stands by its trust responsibility to tribes. The EPA is focused on fully implementing Executive Order 13175, the 1984 Indian Policy for the Administration of Environmental Programs on Indian Reservations, with an ultimate goal of strengthening the consultation, coordination, and partnership between tribal governments and the EPA.

Subpart W imposes requirements on owners and operators who are licensed to manage uranium byproduct material at uranium mills, not tribal governments. Therefore, the Subpart W rulemaking did not trigger our trust responsibility and consultation responsibility under EO 13175. There are no "tribal implications" as that term is used in EO 13175 because Subpart W does not impose substantial direct compliance costs (or, for that matter, any compliance costs) on the Tribal governments, and does not preempt Tribal law. Even though Subpart W does not have tribal implications, as defined by EO 13175, the EPA sought and considered the Tribe's input through formal consultation and through correspondence throughout the rulemaking process.

Tribes and other stakeholders have had an opportunity to inform the content of the proposed rule from the very beginning of the drafting process. Prior to releasing the proposed rule, the EPA held initial meetings with tribes. Since December 2009, the EPA has held quarterly stakeholder calls to discuss Subpart W. The EPA has sought input from the Ute Mountain Ute Tribe since at least May 2010 when the EPA visited the Tribe in White Mesa, Utah. The EPA gave a presentation outlining the process of revising the Subpart W rule. Beginning in 2009, the EPA held public information meetings regarding Subpart W to facilitate participation and solicit input from stakeholders, including tribal members, to increase stakeholder awareness and to help identify issues to be taken into consideration. Meetings were held in Cañon City, Colorado (June 2009); Tuba City, Arizona (2009 Uranium Contamination Stakeholder Workshop); Gallup, New Mexico (2010 Uranium Contamination Stakeholder Workshop); Rapid City, South Dakota (October 2009, at the Western Mining Action Network); and on the lands of the Ute Mountain Ute Tribe in White Mesa, Utah (May 2010). The EPA also hosted a national webinar for interested parties.

The proposed rule was released on May 2, 2014. In June, EPA gave a presentation for the National Tribal Air Association (NTAA) on the monthly NTAA/EPA policy call. On May 8, 2014, we sent letters to 53 tribal leaders offering consultation on the rule, to ensure tribes had the opportunity to participate in the process. The Ute Mountain Ute Tribe responded and requested a formal consultation. The Tribe and the EPA held a formal consultation on July 10, 2014 (Docket No. EPA-HQ-OAR-2008-0218-0120). Consultation is a process of meaningful communication and coordination between EPA and tribal officials prior to EPA taking actions or implementing decisions that may affect tribes. At the formal consultation, at least eight attendees were associated with the Ute Mountain Ute Tribe and at least twelve participants were associated with the EPA, including members from EPA Region 8 and from the Office of Radiation and Indoor Air (ORIA), which is the office within the Office of Air and Radiation that is conducting the rulemaking. EPA Region 8 personnel attended the consultation at the tribal headquarters in Towaoc, CO. ORIA personnel were located in Washington, DC.

In advance of the meeting, the Tribe sent the Agency a number of questions regarding the proposed rule. The questions covered topics including EO 13175, specific analyses of the White Mesa facility, development of the concept and definitions for non-conventional impoundments and conventional impoundments and Subpart W's references to 40 CFR part 192. A conference call was held in advance of the consultation to ensure that the consultation would be as productive as possible. Over the course of the consultation, the Tribe and the Agency held

discussions on issues related to the Subpart W rulemaking. The issues centered on radon emissions from evaporation ponds, liner requirements for conventional mills and potential for radon emissions in the impoundments during the active life of the impoundments.

In August 2014, the Tribe requested a second consultation. The EPA responded and expressed our willingness to hold another consultation to discuss public comments received and the questions the Tribe submitted in advance of the July 2014 consultation. However, the Agency explained that it would be unable to provide final resolution on these issues until after final rule publication since the EPA continues to evaluate all comments from all stakeholders throughout the final rule development process. The EPA remains willing to hold future meetings with the Tribe regarding Subpart W.

The EPA stands by its trust responsibility and the commitment made in our 1984 Indian Policy to honor the unique legal and historical relationship between the United States and Indian tribes. This special government-to-government relationship only functions properly when there is mutual respect between the sovereigns involved. The EPA appreciates the level of sophistication with which the Ute Mountain Ute Tribe approached the Subpart W comment process and consultation.

Issue 3: Data to support the proposed rule

Summary of Comments Under Issue 3:
A number of commenters expressed the view that EPA did not make adequate efforts to collect available data to support the proposed rule. Commenters pointed to specific data in the background documents that they believe is incorrect or identify other data they believe was not considered. Typical concerns were that EPA relied too heavily on "hypothetical models" (Commenter 0173.6) and not enough on "investigation of conditions on the ground" (Commenter 0167, as well as Commenters 0173.3 and 0173.7). Specific comments related to the Cotter facility and the failure to conduct required measurements (Commenters 0158 and 0173.5) and the incorrect data in EPA's record (Commenter 0173.6). Commenter 0167 made similar comments related to the post-1989 impoundments at the White Mesa Mill. Commenters 0106, 0172.3 and 0185 note that, although EPA sent CAA § 114 letters requesting information on their impoundments, EPA either did not send the letters to, or receive responses from, certain facilities (White Mesa, Sweetwater, and Shootaring Canyon). Commenters 0106 and 0185 believe EPA must pursue that information, through enforcement actions if necessary. Commenter 0153 believes that EPA must investigate all possible methods of monitoring radon emissions in order to satisfy the CAA mandate to establish emissions standards.

Response to Issue 3:
We disagree with the commenters. EPA investigated conditions "on the ground" by sending owners or operators of uranium recovery facilities a letter under the authority of the CAA § 114. These letters, which were sent by EPA's Office of Enforcement and Compliance Assurance (OECA), required facilities to provide detailed information about the uranium mill and/or in-situ leaching facility, as well as the number, sizes and types of affected sources (tailings

impoundments, evaporation ponds and collection ponds) that now or in the past held uranium byproduct material. We requested information on the history of operation since 1975, ownership changes, whether the operation was in standby mode and whether plans existed for new facilities or reactivated operations were expected. We also reviewed the regulatory history of Subpart W and the radon measurement methods used to determine compliance with the existing standards.

Commenters are correct that we did not send § 114 letters to the Shootaring Canyon and Sweetwater mills. The letters were only sent to mills that were operating, and those two were on standby. We appreciate the information provided by commenters to correct the information we presented on those two mills. It is also correct that we sent two letters in 2009 to Denison Mines, which owned the White Mesa Mill at the time. The company replied to the initial request for information as it related to White Mesa. A subsequent request for testing specifically applied to "*in-situ* leach and recovery (ISL&R) uranium facilities." The company clarified that it did not own or operate an ISL at that time.

We disagree with Commenter 0153 regarding the investigation of monitoring methods. We determined that Method 115 remains appropriate for measuring radon emissions from conventional impoundments (Docket No. EPA-HQ-OAR-2008-0218-0122). Further, the commenter is incorrect that the CAA requires us to establish emissions standards for all sources of radon covered under Subpart W. We did request information on potential methods to monitor liquid surfaces (non-conventional impoundments), but are not required to do so by the CAA. See Section 1 of this document for more discussion of legal issues.

Issue 4: Strength of the proposed rule

Summary of Comments Under Issue 4:
A number of commenters stated generally that the rule should be strengthened (Commenters 0157, 0158, 0163, 0164, 0167, 0172.14, 0173.3, 0173.6, 0173.11, 0183, 0184). These commenters express concern that the proposed rule is less stringent than the 1989 rule. Commenter 0167 views the proposed rule as a "radical and nearly complete departure from the purpose and structure of the CAA NESHAP program." Commenter 0173.3 states that "open air processing and disposal" is "absurd" and "dark ages" and should not be considered adequately protective. Commenters 0173.11 and 0186 suggest that the final rule should place limits on the length of time a facility can be on standby, citing the Shootaring Canyon mill, which has been on standby for more than thirty years, as an example. Commenter 0185 believes that the existing impoundment at Shootaring Canyon would be unable to "receive future tailings from the processing of ore," so it must be on standby only "to receive over 100,000 tons of material from the cleanup and reclamation of the old mill and mill site."

Response to Issue 4:
We appreciate the commenters' desire to see a more stringent rule. Information provided in public comments has led us to retain the radon flux standard and monitoring requirement for conventional impoundments in existence on December 15, 1989. However, we disagree that the final rule represents a "radical departure" from the meaning of the CAA. The final rule retains

both the monitoring requirement for "existing" conventional impoundments and the management practices, now designated as GACT, for conventional impoundments constructed after December 15, 1989. The final rule also clarifies its application to non-conventional impoundments and heap leach piles, where there has previously been some confusion. Further, the CAA Amendments of 1990 clearly provide EPA with discretion to promulgate technology-based standards, rather than emission standards, for area sources. In response to Commenter 0167, the purpose of our review under CAA § 112(q)(1) was to ensure that Subpart W conforms to the requirements of § 112(d). In doing so, we did not find it necessary to require industry to adopt wholly new processing technologies. In response to Commenters 0173.11 and 0186, facilities on standby are required to renew their licenses during that period. If the NRC or Agreement State believes that impoundments or heap leach piles managing uranium byproduct material or tailings are not in a condition to remain in that state safely, they can require the facility to begin closure. Further, Subpart W applies during standby periods. The Shootaring Canyon and Sweetwater facilities are required to monitor their impoundments, which were in existence on December 15, 1989. For impoundments constructed after that date, which are not required to monitor, we encourage NRC and Agreement States to consider appropriate actions to limit radon emissions during standby periods. We note that the State of Utah indicates that it would require upgrades to the impoundment should the Shootaring Canyon mill begin operating again (Docket No. EPA-HQ-OAR-2008-0218-0151).

Issue 5: EPA's risk assessment

Summary of Comments Under Issue 5:
Commenters 0158 and 0173.5 criticized EPA's risk assessment on several grounds as it related to the Cotter mill. The commenters point specifically to the meteorological and population data used in the modeling, noting that Cotter collects its own meteorological information and that EPA used the 2000 census instead of the 2010 census. The commenters also believe EPA misjudged distances to the nearest receptors, based on a draft Public Health Assessment (PHA) by the Agency for Toxic Substances and Disease Registry (ATSDR) and suggest this could easily be seen on Google Earth. These commenters and Commenter 0173.8 also find that the risk assessment did not incorporate available radium and radon data from the site, or note other sources of radon. The commenters note that site personnel state that EPA did not contact them to obtain the appropriate information.

Response to Issue 5:
EPA disagrees with the commenters and does not believe the issues raised by the commenters significantly affect the risk assessment (Docket No. EPA-HQ-OAR-2008-0078). EPA contacted the Cotter facility in early 2011 to request information from the site, specifically including the meteorological information. EPA's contractor, SC&A, Inc., sent an email on February 14, 2011, noting that Cotter had indicated it was willing to share meteorological data and requesting any other information, such as radon release estimates, that would improve the risk assessment. SC&A spoke to a facility representative on February 23 and followed up with an email the same day. On March 8, 2011, the facility representative responded that no information would be

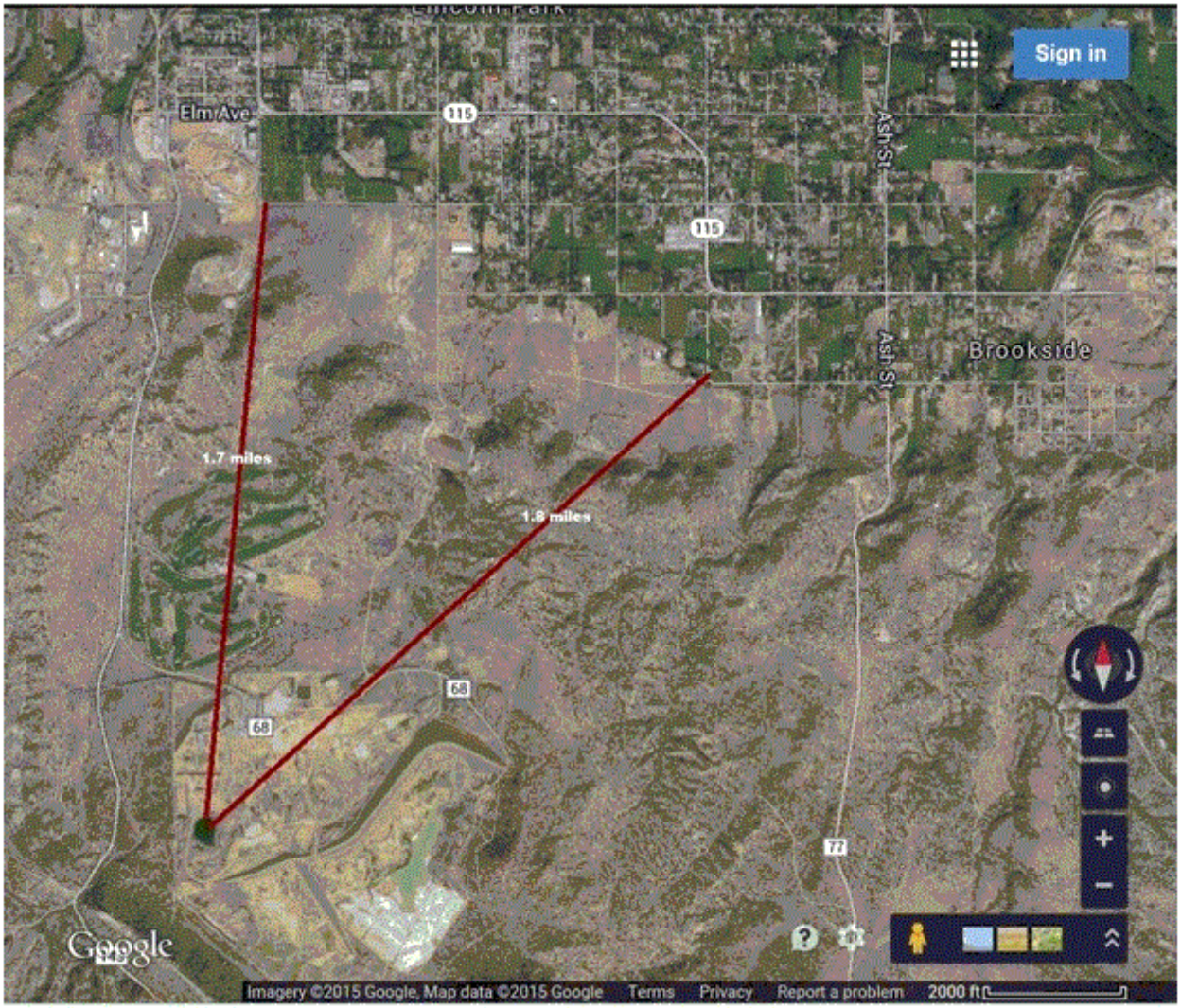
forthcoming, and specifically referenced an open literature report already identified by SC&A for the meteorologic information. See Docket No. EPA-HQ-OAR-2008-0218-0192. The Cotter site is no longer subject to Subpart W because it is undergoing decommissioning and remediation as a Superfund site.

Regarding the population figures, prior to being used in the risk assessment, the Census Bureau data must be processed through a program called SecPop, which was developed by Sandia National Laboratory. The processing is necessary to convert the Census Bureau census tract data into the 0 to 50 mile population surrounding Cotter, or any other site. In order to utilize the 2010 Census Bureau data in the risk assessment, it is first necessary to revise SecPop to include the 2010 data. On October 21, 2013, Sandia National Laboratory released SecPop, Version 4.2.0, which included the Census Bureau 2010 data. Thus, this dataset was not available at the time the risk assessment was conducted. The 2000 SecPop was adjusted by a factor of 1.04 (4%) to account for estimated population growth between 2000 and 2010. This estimate is reasonably consistent with actual population growth. According to the Census Bureau, the population of Cañon City increased from 15,431 in the 2000 Census to 16,400 in the 2010 Census, a growth rate of slightly more than 6%. The population of Fremont County, where Cañon City is located, increased from 46,145 to 46,824 over the same period, a growth rate of about 1.5%. See "American FactFinder" at factfinder.census.gov.

ATSDR's 2010 Draft PHA identified the distance from the "restricted area" to the nearest home. For the risk assessment it was necessary to use the distance from the release point (the impoundment that is the source of radon) to the nearest home.

Table 15 in the risk assessment shows that within the 2-mile (3.2 km) and 5-mile (8.0 km) radii, about 1,000 and 22,000 people were estimated, respectively (the commenter stated that there are 6,000 residents to the north and west alone within 2 miles of the facility, and 20,000 within 5 miles). We followed the commenter's suggestion, went to Google Maps, and looked for streets of residents north of the mill. As the image below shows, within 1.7 to 1.8 miles north of the mill's impoundment, there are no identifiable streets of residents. West and west-north-west of the mill (e.g., Eagle Drive, Shiloh Drive) the map shows new developments. Individuals in these areas were evaluated in the risk assessment (page 21), which found that an individual living 1 to 2 kilometers north of the site was the RMEI (reasonably maximally exposed individual), as opposed to individuals located to the west or west-north-west of the site. Also, at 22,000, the total population estimated within a 5-mile radius is slightly greater than the 20,000 people that the commenter suggests should be used.

The reason for the greater discrepancy in the estimated population within 2 miles is unclear. Using the commenter's population values, a population density in the 0 to 2 mile zone of about 480 people per square mile was calculated, and in the 2 to 5 mile zone, a density of about 210 people per square mile. As can be seen in the Google image below, there does not appear to be twice the population density close to the site as there is farther from the site.



Regarding the radon release estimates, Table 18 of the risk assessment shows measured values for radon flux from the primary and secondary impoundments as reported by the Cotter facility from 1999 to 2009. Radon releases were then calculated from these flux measurements. Commenter 0158 provided documents that purport to show available data that EPA has not considered. The commenter's Attachment 3, Table RF-1 ("Mean Radon Flux – Primary and Secondary Impoundments," page 47) presents the same data contained in Table 18 of the risk assessment. The commenter's information does not contain measurements on total radon releases. The measured fluxes from the impoundment provide the appropriate comparison to the Subpart W emission standard for pre-1989 impoundments, and allow for calculation of releases to serve as the basis for the risk assessment (see Table 19 of the risk assessment for results of the analysis of the Cotter site). Subpart W does not apply to other sources of radon that may be present at the site, such as ore piles.

Issue 6: Justification for EPA's rulemaking

Summary of Comments Under Issue 6:
Several commenters questioned the necessity of EPA's rulemaking. Commenters 0172.4 and 0172.10 believe Subpart W represents an example of burdensome dual regulation and highlight the agreements between EPA and NRC that led EPA to rescind subparts T and I in 1994 and 1995, respectively. Commenters 0162, 0172.1, and 0172.13 find the risks addressed by Subpart W to be sufficiently low as to not justify Subpart W. Commenter 0172.1 raises the linear no-threshold (LNT) model, which posits that any radiation exposure carries some risk of health effects, and that the risk is proportional to the exposure, as "only a construct" that "may or may not reflect reality." This commenter also suggests that workers who are required to maintain impoundments may face greater risk of physical injury. Commenter 0172.13 notes that the original impetus for controlling uranium processing wastes was to protect members of the public who could come into direct contact with those wastes. Now that a protective regulatory system is in place, the commenter does not see a need to control individual sources within the fenceline, as is done by Subpart W. The commenter also notes that the difference in natural background radiation is far larger than the incremental exposures addressed by Subpart W.

Response to Issue 6:
In 1986 and again in 1989, EPA found the risks from radon emissions from uranium processing wastes to be sufficiently high as to require controls under the Clean Air Act. The current review under CAA § 112(q)(1) is being conducted to ensure that Subpart W conforms to the requirements of § 112(d). The Agency is not re-evaluating the decision to promulgate Subpart W, nor have we evaluated the potential for rescinding it. The preamble to the final rule discussed areas where NRC requirements may be relevant to Subpart W. In response to Commenter 0172.1, requirements to maintain impoundments have been in place since the original Subpart W rulemaking in 1986, and are also found in NRC rules. The merits of the LNT model are not at issue in this rulemaking.

Issue 7: Technical corrections and suggestions

Summary of Comments Under Issue 7:
A number of commenters offered information to correct or clarify statements in the proposed rule (Commenters 0144, 0151, 0153, 0154, 0173.2, 0173.2). Commenter 0144 identified several points for clarification in our discussion of uranium recovery facilities, including their technical operations and licensing status. Commenter 0151 provided a correction on the operating status of the Shootaring Canyon mill. Commenter 0153 provides additional information on impoundments at the White Mesa Mill and on the wastes and other potential sources of radon at the Shootaring Canyon mill. The commenter also addresses terminology related to license termination and non-conventional impoundments, as well as regulatory responsibilities. Commenter 0154 offered several suggestions to address consistency of terminology.

Response to Issue 7:
We appreciate the commenters providing these suggestions or points of clarification. The preamble to the final rule does not reproduce the detailed operating descriptions and facility histories presented in the proposal, which were the subject of comments by Commenters 0144 and 0151. Facility licensing and operating status is updated in the discussion of impacts to small businesses in Section VI.C of the preamble to the final rule.

Commenter 0154 suggested modifying several definitions to provide consistency in use of the term "conventional impoundment," but also to address terms in the existing definitions such as "dewatered," "dried," and "trenches or other disposal areas." The final rule provides more consistency in use of the term "conventional impoundment" (for example, replacing the term "tailings impoundment"), but we have not made all the related changes requested by the commenter. We have not adopted the commenter's other suggestions. We believe the experience in implementing Subpart W for more than two decades indicates that the potential for confusion is low.

Commenter 0153 states that we neglected to mention Cells 1 and 2 at the White Mesa Mill, which are "existing" impoundments for disposal of uranium byproduct material or tailings. We did not mention Cell 2 because it was taken out of service in 2008, and is no longer operating for purposes of Subpart W. It is being monitored. We did mention Cell 1 as a pre-1989 impoundment used as an evaporation pond (i.e., as a non-conventional impoundment). According to Energy Fuels, Cell 1 has only been used to manage liquids, and no solid materials have been placed in it. Further, in its response to EPA's § 114 letter, Denison Mines (then the owner of the White Mesa Mill) stated that Cell 1 would not be used for disposal and would be removed upon closure. Should White Mesa put Cell 1 into use as a conventional impoundment, it would be subject to the radon flux standard and monitoring requirements.

Commenter 0153 also wishes us to note that most of the material in the conventional impoundment at Shootaring Canyon consists of "equipment and wastes from the cleanup of the Hydro-Jet Heap-Leach operation (NRC Docket No. 40-7869)," rather than ore processed at the mill. The commenter also believes we should recognize that ore and contamination represent significant additional sources of radon at Shootaring Canyon. We appreciate this information, but it does not affect the status of the impoundment at the mill. Regardless of the material brought from outside the mill, the impoundment is considered subject to Subpart W until it enters the closure process. Subpart W does not address ore, contaminated soils, or other sources of radon.

Finally, Commenter 0153 finds the terminology "non-conventional impoundment" confusing and suggests we find an alternative. The commenter believes this term gives the misleading impression that "conventional impoundments" are only at "conventional mills" and "non-conventional impoundments" must not be at "conventional mills." We disagree. Non-conventional impoundments may be found at any type of uranium recovery facility, including conventional mills. We selected this term because these impoundments are, in terms of a liquid/solid ratio, nearly the complete opposite of "conventional" impoundments.

Section 13 – Out of the Scope of the Rulemaking

The comments that have been listed in this section have been categorized as outside of the general scope of the rulemaking. Many of the comments refer to ongoing enforcement actions or potential enforcement actions that could be brought by either EPA or a State agency. They have been defined as out of scope because this rule provides standards for operating uranium recovery facilities. In many instances EPA has either discussed enforcement issues with various stakeholders outside of the rulemaking process or we have directed stakeholders to State agencies that have been authorized to run the Subpart W program in their particular State.

Other comments in this category were listed because they spoke directly to a uranium recovery facility that is no longer in operation. Subpart W is an operating standard and therefore generally not applicable to facilities no longer in operation. Additionally, in this final rule we have added depth to definitions regarding operation and closure so there is no mistake when a facility or unit is in operation.

Further, some comments called EPA to task for requirements that are specifically the jurisdiction of the Nuclear Regulatory Commission or an Agreement State. Finally, some comments are wholly unrelated to EPA's proposed Subpart W rule.

Issue 1: Enforcement

Summary of Comments Under Issue 1:
Many commenters referred to situations where enforcement is either taking place or has not been pursued to the commenters' satisfaction. Commenters 0131 and 0132 refer to civil action taken by the Grand Canyon Trust against the White Mesa Mill for violations of Subpart W. Commenters 0153, 0155, 0183 and 0184 also assert that White Mesa is in violation of the limit on impoundments in Subpart W. Commenters 0131 and 0153 believe the full enforcement record for the uranium recovery industry should be considered in the Subpart W rulemaking. Commenter 0150 finds the State of Utah "not well suited to regulate radon emissions." The commenter believes facilities in violation are "being let off the hook" by our rulemaking. Commenter 0153 agrees that the state has not enforced violations, and also criticizes EPA. Commenter 0160 also urges EPA to take a stronger enforcement stance.

Response to Issue 1:
Enforcement issues are not within the scope of this rulemaking. The final rule will clarify some issues that are cited as grounds for enforcement. We find that Commenter 0131 has not correctly cited a statement from the proposed rule. The commenter asserts, "EPA states that it evaluated information, *including facility compliance histories*, in order to reach the conclusion that the radon flux standard should be abandoned" (emphasis added). In fact, the statement reads, "We also reviewed *the regulatory history* of Subpart W and the *radon measurement methods* used to determine compliance with the existing standards" (79 FR 25393, emphases added). We did not say we had reviewed facility compliance histories. Our proposal did, however, state that we believed the conventional impoundments in existence on December 15, 1989 could meet the GACT requirements we proposed for these units, based on their size and construction. After considering public comments, we find that initial conclusion to be incorrect. Therefore, we are retaining the radon flux standard and monitoring requirements for those older conventional impoundments. See Section 5 of this document.

Issue 2: Contamination

Summary of Comments Under Issue 2:
Commenter 0145 refers to the "toxic radioactive legacy" left by uranium mining. Commenter 0164 also cites health impacts in communities near the Monticello mill site. Commenter 0168 also refers to the "toxic legacy of irresponsibly operated and inadequately reclaimed uranium mills" in Utah and urges EPA to apply stringent regulation to the White Mesa Mill. Commenter 0173.6 cites the Cotter facility as "the prime example of lingering contamination," which UMTRCA was intended to prevent. Commenter 0161 asks who will maintain the impoundments, in particular the non-conventional impoundments, after closure if the facility is abandoned. Commenter 0155 highlights groundwater contamination at the White Mesa Mill and questions whether impoundments have the liners required by Subpart W.

Response to Issue 2:
We share the commenters' concern over environmental contamination. However, these comments do not fall within the scope of the Subpart W rulemaking.

Issue 3: Cotter

Summary of Comments Under Issue 3:
Commenter 0158 describes the failure of Cotter to maintain a water cover on its impoundments, and the failure of EPA and state regulators to enforce the monitoring requirements. Commenters 0142 and 0173.8 both refer to the method Cotter used to calculate background radon levels at the perimeter of the facility as inadequate and untested, and assert that both EPA and the state have been unwilling to examine it. Commenter 0167 also believes EPA has not adequately enforced requirements at the Cotter facility.

Response to Issue 3:
The Cotter facility is undergoing decommissioning and remediation under Superfund, so is no longer subject to Subpart W. Whether Cotter maintained its impoundments properly, or federal and state agencies provided proper oversight of the facility, is outside the scope of the Subpart W rulemaking.

Issue 4: Monitoring

Summary of Comments Under Issue 4:
Commenter 0153 provided a number of comments related to Method 115, including language to change and recommendations on what the regulated community should and should not be able to do.

Response to Issue 4:
Prior to the rulemaking, as we were evaluating regulatory options, we evaluated whether Method 115 remains appropriate for sampling radon emissions from conventional impoundments for purposes of Subpart W. We determined that it does (Docket No. EPA-HQ-OAR-2008-0218-0122). We eventually proposed to eliminate monitoring for all impoundments. We therefore did not propose to modify Method 115 or the guidance associated with its use, and such comments are not within the scope of the current rulemaking. We requested comment only on potential methods for monitoring radon emissions from liquid surfaces, for which Method 115 is not appropriate. After considering public comment, we are retaining the radon flux standard and monitoring requirements for conventional impoundments in existence on December 15, 1989.

Issue 5: Miscellaneous

Summary of Comments Under Issue 5:
Commenter 0153 believes the NESHAP guidance needs to be updated. Commenter 0153 believes the risk assessment should consider health effects other than cancer. Commenters 0143

and 0152 recommend ensuring consistency between Subpart W and 40 CFR part 192. Commenter 0153 expresses concern for manufacturers of radon measurement devices if the monitoring requirement is eliminated. The same commenter expresses the view that cyclic economic conditions will never allow the uranium recovery industry to operate profitably, therefore the facilities should be required to decommission immediately. Commenter 0153 believes EPA must consider newer technologies for extracting uranium, such as borehole mining or ablation. Commenter 0167 asserts that EPA has not been forthcoming about posting non-privileged records, as required by the settlement agreement resolving *Colorado Citizens Against Toxic Waste and Rocky Mountain Clean Air Action v. Jackson*, Civ. Action No. 08-cv-1787 (D. Colo.).

Response to Issue 5:
These comments do not address the proposed Subpart W rule and are therefore outside the scope of the Subpart W rulemaking.

Appendix A: Index of Commenters

(The main Docket Number is EPA-HQ-OAR-2008-0218;
The number in the first column is the item number within the main docket,
e.g., 0099 is actually EPA-HQ-OAR-2008-0099)

Docket Number	Commenter
0099	Sarah Fields, Uranium Watch
0101	Bill Thompson, National Tribal Air Association
0104	Frank Filas, Energy Fuels Resources (USA) Inc.
0105	Sarah Fields
0106	Sarah Fields
0107	John W. Cash, Ur-Energy
0114	Steven Le
0131	Bill Thompson, National Tribal Air Association
0132	Tribal Environmental Policy Center
0140	Jennifer Thurston
0141	Shelley Schneider, Nebraska Department of Environmental Quality
0142	Kay M. Hawklee
0143	Johnnie Head and Candace Head-Dylla, Bluewater Valley Downstream Alliance
0144	Richard Blubaugh, Powertech (USA) Inc.
0145	Christopher Lish
0149	Margaret Regan
0150	Kathy Van Dame, Wasatch Clean Air Coalition
0151	Rusty Lundberg, Utah Department of Environmental Quality, Division of Radiation Control
0152	Earthworks
0153	Sarah Fields, Uranium Watch, also on behalf of Living Rivers, Grand Canyon Trust, Greenaction for Health and Environmental Justice, Information Network for Responsible Mining, Advocacy Coalition of Telluride, Clean Water Alliance,

	Western Nebraska Resources Council, Western Colorado Congress, Sierra Club Nuclear Free Campaign, and Tallahassee Area Community.
0154	David C. Frydenlund and Frank FIlas, Energy Fuels Resources (USA) Inc.
0155	Celene Hawkins and H. Michael Keller, Ute Mountain Ute Tribe
0156	Jennifer Thurston, Information Network for Responsible Mining (INFORM)
0157	Rein Van West, Western Colorado Congress
0158	Sharyn Cunningham
0159	Jonathan Downing, Wyoming Mining Association
0160	Anonymous
0161	Mary Crowe Costello
0162	Oscar Paulson, Kennecott Uranium Company
0163	Emlyn Drake
0164	Nathan Sosa
0165	Michael Welling, Organization of Agreement States Executive Board
0166	Stephen B. Etsitty, Navajo Nation Environmental Protection Agency
0167	Travis E. Stills on behalf of Colorado Citizens Against Toxic Waste, Grand Canyon Trust, and the Rocky Mountain Chapter of Sierra Club
0168	Anne Mariah Tapp, Grand Canyon Trust
0169	Katie Sweeney, National Mining Association
0170	David C. Frydenlund and Frank FIlas, Energy Fuels Resources (USA) Inc. [identical to 0154]
0172	September 3, 2014, public meeting (Denver, CO)
0172.1	Thomas Johnson
0172.2	Frank Filas, Energy Fuels
0172.3	Sarah Fields, Uranium Watch
0172.4	Anthony Thompson, National Mining Association
0172.5	Christopher Pugsley, National Mining Association
0172.6	Katie Sweeney, National Mining Association
0172.7	Oscar Paulson, Kennecott Mining

0172.8	Sarah Fields, Uranium Watch
0172.9	Steve Brown, SENES Consultants
0172.10	Anthony Thompson, National Mining Association
0172.11	Douglas Chambers
0172.12	Kimberly Morrison, Energy Fuels
0172.13	Steve Brown, SENES Consultants
0172.14	Sarah Fields, Uranium Watch
0173	September 4, 2014, public meeting (Denver, CO)
0173.1	Scot Bakken, Energy Fuels
0173.2	Sarah Fields, Uranium Watch
0173.3	Travis Stills, Energy and Conservation Law
0173.4	Richard Blubaugh, Power Tech
0173.5	Sharyn Cunningham, Colorado Citizens Against Toxic Waste
0173.6	Kay Hawklee
0173.7	Sarah Fields, Uranium Watch
0173.8	Sharyn Cunningham, Colorado Citizens Against Toxic Waste
0173.9	John Cash, Ur-Energy
0173.10	David Frydenlund, Energy Fuels
0173.11	Sarah Fields, Uranium Watch
0183	Phil Pearl
0184	David Erley
0185	Sarah Fields, Uranium Watch, and on behalf of INFORM and Living Rivers
0186	Sarah Fields, Uranium Watch, and on behalf of INFORM and Living Rivers
0187	Sarah Fields, Uranium Watch, and on behalf of INFORM and Living Rivers
0188	Sarah Fields, Uranium Watch, and on behalf of INFORM and Living Rivers

Appendix B: List of Acronyms and Abbreviations

AEA	Atomic Energy Act
ALARA	As low as reasonably achievable
ATSDR	Agency for Toxic Substances and Disease Registry
BID	Background information document
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CCAT	Colorado Citizens Against Toxic Waste
CFR	Code of Federal Regulations
Ci	Curie, a unit of radioactivity equal to the amount of a radioactive isotope that decays at the rate of 3.7×10^{10} disintegrations per second.
DOE	U.S. Department of Energy
EIA	Economic impact analysis
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FR	Federal Register
GACT	Generally Available Control Technology
HAP	Hazardous Air Pollutant
ISL	In-situ leach uranium recovery, also known as in-situ recovery (ISR)
LAACC	Large Area Activated Charcoal Canister
mrem	millirem, 1×10^{-3} rem – a unit of radiation exposure
MACT	Maximum Achievable Control Technology
MOU	Memorandum of Understanding
NESHAP	National Emission Standard for Hazardous Air Pollutants
NRC	U.S. Nuclear Regulatory Commission
NTAA	National Tribal Air Association
OMB	Office of Management and Budget
pCi	picocurie, 1×10^{-12} curie
Ra-226	Radium-226
Rn-222	Radon-222

Radon flux	A term applied to the amount of radon crossing a unit area per unit time, as in picocuries per square centimeter per second ($pCi/m^2/sec$).
RCRA	Resource Conservation and Recovery Act
SC&A	S. Cohen & Associates, Inc.
Subpart W	National Emission Standards for Radon Emissions from Operating Mill Tailings at 40 CFR 61.250-61.256
SWIPR	Subpart W Impoundment Photographic Reporting
tpy	tons per year
U_3O_8	uranium oxide, also known as “yellowcake”
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978
U.S.C.	United States Code