Below are OMB questions/comments on the TSD (EIA), and responses.

Global Comments

- EPA's Cancer Guidelines, which provide guidance on developing and using cancer risk assessments, state that the objective of analyzing epidemiological data is to develop a dose-response for cancer incidence. The Cancer Guidelines further state that, because survival rates vary with different types of cancer, it is good to adjust mortality figures to reflect the relationship between incidence and mortality. Has EPA done such an analysis for radon? If not, we'd like to understand the rationale for not doing such an analysis.

Response - In BEIR VI (NAS 1999), the National Academy of Sciences (NAS) has performed an analysis to determine the cancer relationship between incidence and mortality for radon. BEIR VI points out that the vast majority (98%) of the additional cancers from exposure to radon are expected to be in the lung. For 1994, the U.S. Department of Health and Human Services (DHHS) estimated that there were 172,000 cases of lung cancer, and 153,000 lung cancer fatalities (DHHS 1995). Because of the high fatality rate of lung cancer, NAS concluded that the radon cancer morbidity would only slightly (i.e., ~12%) exceed its mortality. EPA has relied on the NAS analysis in the past (e.g., EPA 2003).

In 2013, DHHS published additional lung cancer incidence and fatality data. For 2010, there were an estimated 220,690 cases of lung cancer and 158,248 deaths, giving a morbidity to mortality ratio of 1.39.

Footnotes were added in Section 1.3 and to Table 14, indicating that all risks are presented as mortality risks, if it is desired to estimate the morbidity risk, simply multiply the mortality risk by 1.39.

- Can EPA explain why the FGR 13 risk factor is the most appropriate factor to use? Is there anything more recent than this 1999 value?

Response - Since Federal Guidance Report 13 (FGR 13, EPA, 1999) was published in 1999, research into the risk from exposure to radiation has continued. Among the scientific documents that have been published since 1999, two of the most comprehensive are National Academy of Sciences' (NAS') BEIR VII report (NAS 2006) and the International Commission on Radiological Protection (ICRP's) Publication 103 (ICRP 2007). The EPA is aware these publications, as well as others, and continues to evaluate their impact on risk coefficients. In April, 2011, EPA published revised estimates of cancer incidence and mortality risks due to low doses of ionizing radiation for the U.S. population, as well as their scientific basis (EPA 2011). Prior to its publication, the EPA's Science Advisory Board (SAB) reviewed the draft (EPA 2010), and in the final report, the EPA took into account the recommendations made by SAB. The revised risk estimates will be applied to update the radionuclide risk coefficients in a revised FGR 13, however, it is anticipated to take at least two to three years to complete the FGR 13 revision (EPA 2013).
As the table below demonstrates, although the risk coefficients have evolved since 1999, their numerical values have not changes significantly during that time period, particularly the mortality risk coefficient, as the following statement from EPA 2011 shows: "In general, the new EPA

mortality estimates do not differ greatly from those in FGR-13; remarkably, for all sites combined, the estimates changed by less than 2% for both males and females."

	FGR-13 (1999)	BEIR VII (2006)	ICRP 103 (2007)	EPA (2011)
	(per Gy)	(per Gy)	(per Sv)	(per Gy)
Mortality	Table 7.3	Table ES-1	Table A.4-18	Table 3-18
Males	0.0462	0.041	0.0459	0.0469
Females	0.0683	0.061	0.0639	0.0689
Combined	0.0575	—	0.055	—
Morbidity	Table 7.6	Table ES-1	Table A.4-18	Table 3-17
Males	0.0651	0.08	0.156	0.0955
Females	0.103	0.13	0.183	0.135
Combined	0.0846	—	—	—

Specifically for radon and its progeny, ICRP Publication 115 (ICRP, 2010) recommended use a risk coefficient of 5×10^{-4} per Working Level Month (WLM), where WLM is an exposure from breathing air containing a specified concentration of short-lived radon progeny. Publication 115 goes on to state that the effective dose from inhalation of radon progeny ranges from about 10 to 20 mSv per WLM depending on the exposure scenario. When these two statements are combined together, the risk from radon and its progeny can be expressed as ranging from 0.025 to 0.05 Sv^{-1}. EPA 2011 was added as a reference and the following footnote was added to Section 4.2: Since FGR 13 was published, several organizations have produced updated radiation risk estimates. EPA 2011 reviewed the update risk estimates and concluded that the new mortality estimates do not differ greatly from those in FGR-13.

EPA (Environmental Protection Agency), 1999. "Cancer Risk Coefficients for Environmental Exposure to Radionuclides." Federal Guidance Report 13. EPA Report 402-R-99-001, Washington, DC: U.S. EPA.
EPA/SAB (Environmental Protection Agency, Science Advisory Board), 2010. "SAB Review of Draft 'EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population'." EPA-SAB-10-001, January 5, 2010.
EPA (Environmental Protection Agency), 2011. "Radiogenic Cancer Risk Models and Projections for the U.S. Population." EPA Report 402-R-11-001, Washington, DC: U.S. EPA. April 2011.
EPA (Environmental Protection Agency), 2013. "Blue Book: EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population." http://www.epa.gov/rpdweb00/assessment/ blue-book/. Updated: August 22, 2013. Accessed: September 23, 2013.
ICRP (International Commission on Radiological Protection), 2007. "The 2007 Recommendations of the International Commission on Radiological Protection." ICRP Publication 103. Ann. ICRP 37 (2-4).
ICRP (International Commission on Radiological Protection), 2010. "Lung Cancer Risk from Radon and Progeny and Statement on Radon." ICRP Publication 115, Ann. ICRP 40(1).
NAS (National Academy of Sciences), 2006. "Health Risks from Exposure to Low Levels of Ionizing Radiation. BEIR VII Phase 2." Washington, DC: National Academy Press.

- Comments sent to EPA on 7/18 also apply to this document. Therefore, we request that EPA make changes to this document as appropriate to address the comments sent on 7/18.

Acknowledged

- EPA is proposing to regulate the heap leach extraction process. As EPA appropriately described, the heap leach treatment processes uranium ore in such a manner that the uranium content is removed. Licensing and regulatory authority over this process rests with the NRC pursuant to the Atomic Energy Act (AEA).

Please see our response to this question in Interagency Comments Under EOs 13563 and 12866 on NESHAP Subpart W NPRM

- We recommend that EPA update its cost impact analysis and technical basis to accurately reflect the decreasing trend in the uranium market price. For example, EPA anticipates that the market value of uranium will be approximately $65, whereas the actual market value is less than $40.

Response - The cost and economic impact estimates described in Section 6.2 and 6.3 are based on industry data compiled in 2010-2011. Therefore, some of the analytical input values would differ somewhat if they were updated to reflect the latest information available. For example, the current long-term market price of uranium is approximately 17 percent lower than the $65 estimate that is used in the analysis (Cameco, 2013). The uranium mining industry is currently experiencing a volatile period resulting from the aftereffects of the Fukushima nuclear disaster. In particular, uranium demand has suffered from nearly all of Japan's workable reactors remaining offline since the March 2011 earthquake and tsunami triggered multiple meltdowns at the Fukushima Dai-ichi plant. Given the atypical post-Fukushima uranium market situation of the last couple of years and the prospects for a return to more normal market activity in the mid-term future,[1] we have decided not to update the analysis to incorporate the latest industry data. The results of the analyses described in this section are judged to be realistic estimates of the mid- to long-term impacts of the proposed Subpart W NESHAP.

Specific Comments

- Page 5 of the TSD: Please clarify the statement that an emission limit is not necessary to protect public health?

Response - This statement has been expanded and revised as follows: By requiring that conventional impoundments be designed, constructed, and operated to meet one of two 40 CFR 61.252(b) work practices (i.e., phased disposal and continuous disposal), adoption of an emission limit (e.g., 20 pCi/(m^2-sec)) is not necessary to protect public health.

- Page 34 states "[a]dditionally, moving to seven-spot patterns versus five-spot patterns greatly increased the control of mobilized solutions and the metals that they contained." The NRC's experience in Wyoming has been that licensees generally use five-spot patterns, and they've seen very little use of seven-spot patterns. If this statement on page 34 is based on operations in Texas, that aspect should be included.

[1]These prospects include: the conclusion of the U.S.-Russia program that annually removes 24 million pounds of ex-military highly enriched uranium from the market via down-blending for use as U.S. nuclear fuel; the 60 nuclear power plants that are currently under construction throughout the world; efforts to reduce climate change emissions; and expectations that Japan will slowly begin restarting its 50 nuclear plants.

Response - The statement was based on information provided in the Irigaray Project Environmental Report (WMC 1977) and Final Environmental Statement (NRC 1978). Both documents state that five-spot and seven-spot well patterns were tested at Irigaray, Johnson County, Wyoming, in 1975 and 1977, respectively. Based on this testing, it was concluded that "Because of limited injection flows and economic considerations, the adopted well configuration for the proposed plant and probably for future Irigaray mine sites is the seven spot pattern" (WMC 1977, page 18). However, in response to OMB's comment, further research showed that "These [seven-spot] patterns were later converted to five-spot patterns during operations in the 1980's and 1990's. Future development at Irigaray and Christensen Ranch will use a combination of [five- and seven-spot] patterns." (COMIN 1996, page 3-8) This, plus the NRC's recent Wyoming experience (as pointed out by OMB), shows that there is no longer a basis for the above statement. Consequently, that sentence has been deleted.

COMIN (COGEMA Mining, Inc.) 1996, "Submittal of Supplemental Information for the Renewal of Source Material License SUA-1341, Irigaray and Christensen Ranch Sites and Request for Performance Based License," January 5, 1996.

NRC (U.S. Nuclear Regulatory Commission) 1978, "Final Environmental Statement Related to the Wyoming Mineral Corporation, Irigaray Uranium Solution Mining Project (Johnson County, Wyoming)," Docket No. 40-8502, NUREG-0481, September 1978.

WMC (Wyoming Mineral Corporation) 1977, "Environmental Report, Irigaray Project, Johnson County, Wyoming," July 29, 1977.

- Table 9 on page 36 is not correct. For example, in this table, EPA identifies Hydro Resources as an operating facility. Hydro Resources has a license, but no construction activities have occurred at the site and the site is not operational. This table also omits operating facilities (e.g., Uranium One Willow Creek and Christensen Ranch). We recommend that EPA verify this information with Texas.

Response - On August 7, 2013, the Energy Information Administration released 2013 2nd quarter data on the In-Situ-Leach Plant Owner, Plant Name, County and State locations, and Development/Operating Status. Table 9 and Table 10 have been revised to reflect this EIA data. The text was also revised to be consistent with the tables. The EIS report was added to the list of references.

- Table 10 on page 36 is not correct. For example, the ownership information for Christensen Ranch is incorrect. The current owner for Christensen Ranch is Uranium One and the facility has been operating since late 2010 / early 2011. Uranium One Moore Ranch was licensed in late 2010 and thus doesn't fit within the category of facilities listed in Table 10. Also, the NRC is no longer expecting an application for Wildhorse Energy West Alkalai Creek.

Response - On August 7, 2013, the Energy Information Administration released 2013 2nd quarter data on the In-Situ-Leach Plant Owner, Plant Name, County and State locations, and Development/Operating Status. Table 9 and Table 10 have been revised to reflect this EIA data.

The text was also revised to be consistent with the tables. The EIS report was added to the list of references.

- On page 40, EPA identified Homestake as an ISL facility. Homestake operated as a conventional uranium mill and uses evaporation ponds to dispose of liquid byproduct material. Homestake is in the process of decommissioning.

Response - Agreed, "Homestake ISL facility" changed to "Homestake Uranium Mill Site ," as it is referred to in Baker and Cox, 2010.

- We recommend that page 42 be revised because solvent extraction can also be used to heap-leach uranium ore, depending on ore grade; a similar comment was made on the draft proposed rule.

Response - Figure 11 has been replaced with simpler, clearer, more generic depiction of the heap leach process, from NUREG-1350, Volume 25. The 5 step description of the heap leach process that appears above Figure 11 was also changed to be more consistent with the description provided in NUREG-1350. NUREG-1350 was added to the list of references.

- The second sentence of footnote 6 on page 92 should be deleted because it is not accurate. Congress did not enact the subject legislative language for the reason mentioned. Further, this language is extraneous to this issue at hand.

Response - Sentence deleted from footnote 6.