Summary of Public Comments Submitted on the Advance Notice of Proposed Rulemaking for 40 CFR 190

General Summary

On February 4, 2014, EPA published an Advance Notice of Proposed Rulemaking (ANPR) which solicited comments on whether the Agency should revise its "Environmental Radiation Protection Standards for Nuclear Power Operations", also referred to as 40 CFR part 190 standards. The comment period closed on August 3, 2014. EPA received 488 discrete comments on the ANPR. We received comments from all sectors including industry, other federal government regulators, state regulators, and academia. The total number of comments received exceeded 24,000, but the majority of these were form letters written by citizens' groups and signed by individual members of the public. The majority of commenters did not provide detailed responses to our questions.

The majority of commenters did not want EPA to "raise" the protection limits (allow more radiation to be emitted from nuclear power operations). Some commenters did not want EPA to change the standards, generally saying that they did not want the standard to go up (to increase permitted exposure limits), and citing the "Petkau effect" and the "bystander effect" (which indicate that more damage occurs from long-term low radiation doses than from short-term high radiation doses). Some commenters wanted the standard to go up (to increase permitted exposure limits), citing the lack of evidence in support of the linear no-threshold model (LNT)[1,2], and studies that indicate there may be a threshold below which radiation will not cause irreparable damage to the cells.

Many comments from members of the public confused our notice to update these standards with the update of the manual of Protective Action Guides (PAGs), a non-regulatory guidance document for emergency response planning.

Responses to Specific Questions

The Agency requested input on six specific issues within the current standard that could be revised.

Issue 1: Consideration of a Risk Limit to Protect Individuals

The first issue solicited comment on whether it was more appropriate to express portions of the standard as a risk limit or as a dose limit. Specifically, we asked:

Should the Agency express its limits for the purpose of this regulation in terms of radiation risk or radiation dose?

[1] HPS cites that below 50 millisieverts, effects of radiation are too small to be observed or non-existent.
[2] Scientists for Accurate Radiation Information cite that the latest atomic bomb data (Ozasa et al, 2012) indicate different curvature from LNT. Dose response curve consistent with Hormesis (Doss, 2012).

Of the specific questions, this one drew the most interest. While most industry individuals and representatives supported a dose standard, there were some who did support a risk standard. Public commenters outside the industry mostly supported a risk standard, but some also supported a dose standard. One commenter thought the risk estimates in "2010 Recommendations of the European Committee on Radiation Risk" were more accurate, stating that if a risk standard is developed, it should be based on these risk estimates as opposed to those developed by the International Commission on Radiological Protection (ICRP).

This issue also elicited confusion on how the Agency would use risk and dose in its standard setting process. Each regulation is developed under a specific law. These legal mandates set direction and limits on congressional intent for establishing and implementing these laws. The Agency is bound by these "boundaries" and must work within the specific mandate when developing regulations. As a result, different environmental regulations may set different dose levels, depending on the law on which they are based. The authority for 40 CFR part 190 is derived from the Atomic Energy Act and "Reorganization Plan No. 3." Some commenters advised that EPA should carefully explain this issue of different risk levels from different statutory authorities in any revised rulemakings.

a. Should the Agency base any risk standard on cancer morbidity or cancer mortality? What would be the advantages or disadvantages of each?

Of the commenters that addressed this issue, a slight majority believed that morbidity was the proper metric as opposed to mortality. Those that believed morbidity was a better metric cited the need to protect not only against death, but also against quality-of-life illnesses.

The commenters who believed that mortality was the better metric cited the existence of better scientific data for cancer mortalities due to radiation, better consistency with regulations established for other pollutants, and the lower uncertainty associated with mortality risk.

b. How might implementation of a risk limit be carried out? How might a risk standard affect other federal regulations and guidance?

Some commenters stated that a risk standard would be difficult to implement, requiring changes in industry-wide procedures, licenses, policies, training, software, etc. They said that the costs would be too high for very little benefit. However, little data supporting this claim was submitted. Some commenters supported a risk-based standard that could be translated into dose and allow for more flexibility.

<u>Issue 2: Updated Dose Methodology (Dosimetry)</u>

The second issue asked whether the dose limit in the existing standard should be updated to new radiation dose methodology. Specifically, we asked:

How should the Agency update the radiation dosimetry methodology incorporated in the standard?

Most commenters did not provide a specific response to this question, but simply responded that the most recent scientific data should be used.

a. If a dose standard is desired, how should the Agency take account of updated scientific information and methods related to radiation dose – such as the concept of committed effective dose?

Very few commenters responded to this question. Some industry commenters preferred the use of effective dose, citing ICRP endorsement and saying that the approach is technically sound. Some public members objected to changing from organ-specific doses to effective dose or committed effective dose of 25 millirems/year, saying that this would allow more radiation exposure to the individual. Some support was given to a committed effective dose versus the effective dose, citing the former as being more closely linked to real incidences of cancer.

b. In updating the dose standard, should the methodology in ICRP 60 or ICRP 103 be adopted, or should implementation allow some flexibility? What are the relative advantages or disadvantages of not specifying which ICRP method be used for the dose assessment?

Most specific responses to this question responded that "the most recent scientific data should be used." The respondents who appeared to be familiar with the details of this issue thought that updates to both Federal Guidance Report No. 13 and the ICRP 103 methodology should be available in time to incorporate ICRP 103 methodology into any final amended rule. Some wanted to avoid functional obsolescence of any revisions if the Agency were to proceed with ICRP 60 methodology. A few respondents argued that the Agency should allow flexibility when determining which methodology is to be used.

<u>Issue 3: Radionuclide Release Limits</u>

The third issue solicited comments on whether the portion of the standard that limited releases of specific radionuclides was needed or if it should be changed. Specifically, we asked:

Should the Agency retain the radionuclide release limits in an updated rule and, if so, what should the Agency use as the basis for any release limits?

Most commenters felt that there was a need to revise the radionuclide release limits in 40 CFR part 190.10(b), although differing reasons were provided. Some commenters felt that it was important to keep these limits in some form because they prevented the reprocessing of spent fuel.

a. Is it justifiable to apply limits on an industry-wide basis and, if so, can this be reasonably implemented? Would facility limits be more practicable?

No commenters supported the industry-wide release standard in its current form. Many commenters did not believe that this provision was necessary, stating that the dose protection provision is sufficiently protective enough of the public. Some commenters stated that limits on emissions from a specific facility would be more practicable. One commenter put the current industry-wide limits in this context–

> "…an industry-wide basis would result in the idea that people in Illinois, for example, can be legally subjected to higher local industry releases of regulated radionuclides because people in California tend to receive lower exposure….This possibility would be an egregious error of bioethics and environmental justice."

Of those supporting the concept of limiting releases of certain long-lived and persistent radionuclides, there was consensus support that a facility limit would be more effective.

b. If release limits are used, are the radionuclides for which limits have been established in the existing standard still appropriate and, if not, which ones should be added or subtracted?

Only a few comments addressed this question, with varied responses. Some believed that Krypton-85 (Kr-85) did not need to be regulated because it has a short half-life and is chemically non-reactive. A couple of others believed that tritium (H-3) and carbon-14 (C-14) should be included due to their persistence in the environment.

Issue 4: Water Resource Protection

The fourth issue asked whether either the ground water or surface waters needed separate provisions in order to protect these resources. Specifically, we asked:

How should a revised rule protect water resources?

This issue received the second largest number of comments, with more commenters supporting some form of water protection standard. There was also a number of commenters who stated that a water protection standard is not needed because an all-pathways standard that includes water is fully protective of the public, or because industry and NRC initiatives are adequately addressing water protection[3].

a. If a ground water protection standard is established in the general environment outside the boundaries of nuclear fuel cycle facilities, what should the basis be and how should it be implemented?

Of the commenters that supported a ground water protection standard, many believed that the Maximum Concentration Limits (MCLs) of the Safe Drinking Water Act

[3] In addition to the industry's Ground Water Protection Initiative, some cited another industry effort, the Underground Piping and Tanks Integrity Initiative, as evidence that industry is adequately addressing the ground water contamination issue without regulatory action.

(SDWA) were the appropriate limits as they were the basis for protecting the public from radionuclides in drinking water. Some stated that all aquifers were potential sources of drinking water and should be protected to these levels. A smaller set of commenters believed that the drinking water MCLs should not be used because newer risk levels have not been incorporated into several of the MCLs.

b. Are additional standards aimed at limiting surface water contamination needed?

Very few commenters addressed whether surface water needed additional limits. There was some support for the Agency taking a closer look at this issue. However, this was a very vibrant issue in the webinars for the ANPR, with the public asking for more information.

Issue 5: Spent Nuclear Fuel and High-Level Radioactive Waste Storage

The fifth issue asked if any changes were needed in the existing standard to clarify that storage of spent nuclear fuel and high-level radioactive waste was a covered activity if conducted at nuclear power operations facilities. Specifically, we asked:

How, if at all, should a revised rule explicitly address storage of spent nuclear fuel and high-level radioactive waste?

This issue did not receive extensive comments. A slight majority believed that no changes were needed to the current standards, and that it was clear that spent fuel storage did need to be included in assessing whether a facility met the current standards. Some commenters believed that changes were needed to either address dry cask storage provisions, or require dry cask storage in lieu of having large spent fuel pools filled with fuel.

Is it necessary to clarify the applicability of 40 CFR part 190 versus 40 CFR part 191 to storage operations? Should the Agency clarify the scope of 40 CFR part 190 to also cover operations at separate facilities (off-site) dedicated to storage of spent nuclear fuel (i.e., should we clarify the definition of the "nuclear fuel cycle" to include all management of spent nuclear fuel up until the point of transportation to a permanent disposal site)?

Almost no commenters brought up the distinction between 40 CFR part 190 versus part 191. The remaining specific question was addressed above by the general responses. One group of commenters preferred the term "used nuclear fuel" to the currently used term of "spent nuclear fuel and high-level radioactive waste." Some commenters wanted assurance that a dose standard for 40 CFR part 190 would not be additive to a spent fuel storage dose (40 CFR part 191) for reactor sites that store spent fuel.

Issue 6: New Nuclear Technologies

The last issue solicited input as to whether the existing standards needed to be updated to account for new nuclear technologies. Specifically, we asked:

What new technologies and practices have developed since 40 CFR part 190 was issued, and how should any revised rule address these advances and changes?

This issue received the fewest comments, with only a couple of commenters believing that standards were needed to specifically address new technologies. A few members of the public supported a broad statement that standards were needed for all new technologies, but offered no specifics. A couple of commenters believed that standards were needed for non-uranium fuel cycle facilities.

a. Are there specific new technologies or practices with unique characteristics that would dictate the need for separate or different limits and do these differences merit a reconsideration of the technical basis for 40 CFR part 190?

There were only a couple of comments on this specific question. Of these commenters, none believed that any emerging nuclear technologies warranted a new set of standards. One commenter cited that the dose limit would be protective of the public regardless of which new technologies were deployed.

b. Should the Agency develop standards that will proactively apply to new nuclear technologies developed in the future, and if so, how far into the future should the Agency look (near-term, mid-term, etc.)?

This question was not addressed by most commenters. Some commenters stated that the US will not pursue other fuel cycles. A few commenters stated that if reprocessing were to be pursued in the US, NRC should develop specific requirements for this technology.

c. ***In particular, do small modular reactors pose unique environmental concerns that warrant separate standards within 40 CFR part 190?***

No commenters expressed concern about small modular reactors.

Other Topics Receiving Comments

There were some comments that do not fall into the above categories:

- One commenter requested clarity on EPA's goal in this effort. Is the goal of the Agency to provide strong protection to the public and the environment? Or is the goal to protect humans and nature to the extent feasible, given continuing operation of the commercial nuclear industry?

- Some constituencies want EPA to take actions that are outside our legal authority: on-site emissions monitoring at plants, and usurpation of other NRC roles and responsibilities.
- A number of commenters believed that these standards should apply to coal fired power plants as well, or that the Agency was not doing enough to limit radiation exposures from coal plants.
- One commenter believed that EPA should take a more active role in communicating risks.
- One commenter believed that identifying long-lived and persistent radionuclides for discharge limits is a question of environmental justice in as our actions today jeopardize future generations.
- Some commenters stated that the 40 CFR 190 update effort should be coordinated with the NRC's 10 CFR 20 effort to avoid inconsistencies.
- A few commenters have developed regulatory schemes to regulate the total radiation risk that a plant represents versus focusing on specific radionuclides. The trade-offs may be more Kr-85, but less Cs-134, Cs-137, and I-131. Their reasoning: if the total risk is lower, what difference does the specific radionuclide make?