



Webinar on Environmental Radiation  
Protection Standards for Nuclear Power  
Operations

**WELCOME!**

# Webinar Structure

- Technical presentation followed by questions and answers.
- Phones on mute so that everyone can hear presentation.
- Please submit questions in the Q&A pod at bottom left screen.
- Comments in chat room should be courteous.





# ANPR for Revising Environmental Radiation Protection Standards for Nuclear Power Operations— 40 CFR Part 190

Brian Littleton, US EPA  
May 28, 2014  
Public Webinar

# Presentation Outline

Background

Development of the Advance Notice of Proposed Rulemaking (ANPR)

Issues for Public Comment

Summary

Questions?



# Background

## EPA and Nuclear Power

- EPA's regulation at 40 CFR 190 limits emissions to the environment from nuclear power plants and fuel facilities.
- EPA does not directly oversee nuclear power plants.
- The Nuclear Regulatory Commission (NRC) licenses and oversees nuclear power plants.
- NRC implements EPA's standards.



# Background

## ***Why issue an Advance Notice of Proposed Rulemaking (ANPR)?***

EPA reviewing its standards to determine if revisions are needed.

ANPR issued to collect public information and input only.

No changes to the standards are currently being proposed in the ANPR.



# Background

40 CFR Part 190 establishes environmental radiation protection standards for nuclear power operations

- Applies to U milling, U conversion & enrichment, U fuel fabrication, nuclear power plants, & reprocessing facilities involved in electricity production.
- Applies to normal operations only, not emergencies.
- Does not apply to U mining, spent nuclear fuel disposal, and transportation of the fuel or wastes.



# Why Look at 40 CFR 190?

Regulation promulgated in 1977 and has not been reviewed since

Renewed interest in nuclear power

NRC is interested in updating its regulations





# Issues Identified in a Preliminary Review of the 40 CFR Part 190 Standards

Advances in radiation risk and dosimetry science

Issues associated with 190.10 (b)

Lack of a water protection provision

Spent nuclear fuel storage

New nuclear technologies



# 40 CFR 190 contains two main radiation protection provisions

## Public Dose limits (ICRP-2 based)

- 25 mrem/yr whole body, 75 mrem/yr to thyroid, and 25 mrem/yr to any other organ

## Radionuclide Release limits

- Annual limits on quantities of radioactivity entering the environment per Gigawatt electricity produced; primarily for reprocessing
  - 50,000 curies Kr-85
  - 5 millicuries I-129
  - 0.5 millicuries combined Pu 239 & other alpha emitters



# Rationale for Existing (1977) Standards

Standards for the nuclear power industry should include:

- Total radiation dose to populations
- Maximum dose to individuals
- Risk of health effects attributable to these doses including future risk from the release of long-lived radionuclides to the environment
- The effectiveness and costs of technology available to mitigate these risks through effluent control



# Rationale for (1977) Dose Limits

- Dose limits designed to limit population and individual exposures near fuel cycle facilities.
- Standards set a total dose received from the fuel cycle as a WHOLE and from ALL pathways.
- Limits assume a potential for health effects at all levels of exposure (Linear Non-Threshold or LNT Concept).



# Issue Summaries

***General Question – How should the Agency update the requirements for radiation protection from nuclear power operations?***

## Specific Issues for Comment

- Consideration of a Risk Limit to Protect Individuals
- Updated Dose Methodology
- Radionuclide Release Limits
- Water Resource Protection
- Spent Nuclear Fuel Storage
- New Nuclear Technologies



# Issue 1 – Should the Agency use radiation risk or dose in the regulation?

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

- Dose has traditionally been used for developing radiation protection standards to either workers or the public.
- Agency uses lifetime risk to determine acceptable levels of public protection
  - $10^{-4}$  to  $10^{-6}$
- Could risk be used as the radiation protection standard?



# Issue 1 – Should the Agency use radiation risk or dose in the regulation?

## ***Comments requested on:***

- Should the Agency express its limit for the purpose of this regulation in terms of radiation risk or radiation dose?
- Should the Agency base any risk standard on cancer morbidity or cancer mortality? What would be the advantages or disadvantages of each?
- How might implementation of a risk limit be carried out? How might a risk standard affect other federal regulations and guidance?
- What are the cost considerations of moving to a risk standard?



## Issue 2 – How Should the Agency use Updated Dosimetry Methodology?

***If the Agency continues to use a dose limit, how should the Agency update the radiation dosimetry methodology incorporated in the standard?***

- Existing standard is based on ICRP-2 dose methodology
- Since the late 1980s EPA radiation standards have used “effective dose” instead of “critical organ”
- Updated dosimetry is now available allowing the calculation of dose to ‘sub-populations’ (children)
- Revised risk estimates are now available





## Issue 2 – How Should the Agency use Updated Dosimetry Methodology?

### ***Comments requested on:***

- 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?
- 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?



## Issue 3 – Radionuclide Release Limits

***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?***

- Regulatory limits were focused on commercial reprocessing of spent fuel being widely conducted
- Based on collective dose concept, attributing very small doses to large populations
- Implementation concerns with enforcing any ‘potential’ non-compliance



# Issue 3 – Radionuclide Release Limits

## ***Comments requested on:***

- Should the Agency retain the concept of radionuclide-specific release limits to prevent the environmental build-up of long-lived radionuclides? What should be the basis of these limits?
- 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?
- 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?



## Issue 4 – Water Resource Protection

### ***How should a revised rule protect water resources?***

- Environmental contamination through water pathway was not believed to be a major contributor.
- Experience has indicated that the likelihood of ground water contamination is much greater than previously believed.
- Environmental problems could linger on long past the operational phase of facilities.



## Issue 4 – Water Resource Protection

### ***Comments requested on:***

- 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?
- Are additional standards aimed at limiting surface water contamination needed?



## Issue 5 – Spent Nuclear Fuel Storage

### ***How, if at all, should a revised rule explicitly address storage of spent nuclear fuel?***

- Spent fuel is stored at facilities in much greater quantities and for much longer durations.
  - Ability of these wastes to contribute to higher public doses.
- Applicability of standards with respect to the environmental standards for management and storage of spent fuel not clear.



# Issue 5 – Spent Nuclear Fuel Storage

## ***Comments requested on:***

- How, if at all, should a revised rule explicitly address on-site storage operations for spent nuclear 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)?



## Issue 6 – New Nuclear Technologies

***What new technologies and practices have developed since the 1977 rule was issued, and how should any revised rule address these advances and changes?***

- Other nuclear energy fuel cycles exist besides “Uranium Fuel Cycle”
- Do small modular reactors pose unique environmental considerations?
- How close are these new technologies to feasible implementation?





# Issue 6 – New Nuclear Technologies

## ***Comments requested on:***

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



# Summary

- EPA plans to revise its environmental radiation protection requirements to nuclear power operations – 40 CFR Part 190.
- Our current efforts are seeking input on 6 critical issues.
- We are open to, and will accept comments on other facets of the standards.



# Public Outreach and Input

We are holding a 180 day comment period for the ANPR, which closes August 3, 2014

See our website for audio and slides from previous webinars on specific questions.

([www.epa.gov/radiation/laws/190](http://www.epa.gov/radiation/laws/190))



# Thank you!

**Statements submitted during this webinar are not considered as “official comments”**

Comments can be submitted by:

- Going to [www.regulations.gov](http://www.regulations.gov) and following directions
- Submitting comments via email to: a-and-r [docket@epa.gov](mailto:docket@epa.gov)
- Mail to EPA Docket Center, Env Rad Prot Standards for Nuclear Power Operations
- Hand Deliver to EPA Docket Center at 1301 Constitution Ave, NW Wash DC during normal work hours

## Questions?

