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Secretary,
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTN: Rulemaking and Adjudications Staff

DOCKET NUMBER
PROPOSED RULE PR 20
(64FR35090)

Dear Sirs:

**Subject:** **Palo Verde Nuclear Generating Station (PVNGS)**
**Units 1, 2, and 3**
**Docket Nos. STN 50-528/529/530**
**Comments on Release of Solid Materials at Licensed Facilities: Issues Paper**

On June 30, 1999, Federal Register Volume 64, Number 125, Pages 35090 – 35100 announced the Nuclear Regulatory Commission's request for public comment on an Issues Paper related to the release of solid materials at licensed facilities. In response, Arizona Public Service Company (APS) hereby submits the enclosed comments.

This letter does not make any commitments to the NRC.

Please contact Mr. Scott Bauer at (623) 393-5978 if you have any questions.

Sincerely,

Angela Krainik

AKK/SAB/RKB/kg

Enclosure

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PDR PR 20 64FR35090

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# ENCLOSURE

# COMMENTS ON SOLID MATERIAL RELEASE FROM LICENSED FACILITIES: ISSUES PAPER

The APS staff has reviewed the Nuclear Regulatory Commission (NRC) issues paper regarding the release of solid materials from nuclear facilities. Since any rulemaking regarding the release of materials could have a significant impact on the operation of a nuclear facility, the APS staff has prepared comments that are considered important to the successful development of a release or clearance rule. These comments are focused on the benefits of a standard, the rulemaking alternatives, and guidance from national and international radiation protection agencies. While encouraged that a release standard may be forthcoming, the extremely low annual dose factors being considered could create clearance values that are unachievable. The following comments will hopefully provide some insight to some of the problems with current release methodologies and potential problems that might arise from a clearance standard.

**Issue No. 1--Should the NRC Address Inconsistency in its Release Standards by Considering Rulemaking on Release of Solid Materials?**

The issues paper does not describe the current methods for release of solids and non-effluent liquids currently used by NRC licensees. Alternative (1) implies that the NRC reviews each release of solid materials from licensees on a case by case basis. While this may be true for materials with detectable levels of contamination, licensees employ the methodology described in the first sentence in section A.1.3 (b) as the criteria for material release. Licensees develop material release programs to verify the absence of loose or fixed residual radioactivity using state of the art instruments. These instruments are capable of detecting residual radioactivity to values at or below those specified in Regulatory Guide 1.86, Termination Of Operating Licenses For Nuclear Reactors. However, the Regulatory Guide 1.86 values are not considered release limits. If residual radioactivity is detected, the material is not released. Volumetric releases are performed by analyzing representative samples to the environmental lower limits of detection (LLDs[1]). Again, the material is not released if residual radioactivity is detected. As written, the issues paper implies that the evaluation and release of materials by licensees is something new, when licensees actually evaluate and release materials at nuclear facilities every day.

The "no detectable" residual radioactivity release criteria currently used by licensees can produce inconsistent results. Factors such as fluctuations in background, geometry changes, or slight differences in detection levels between instruments can influence the detection of residual radioactivity. These differences often cause confusion regarding proper material release practices and raise questions about the appropriate detection levels. The development of clearance values would eliminate these factors and allow licensees to produce consistent material releases to a known standard.

The NRC's practice of evaluating material releases on a case-by-case basis for releasing residual radioactivity does not provide a logical regulatory framework. Since each case repeats previous efforts, the method is not considered cost beneficial and may lead to inconsistencies. The current method also does not provide clear guidance for all licensees. Since seeking approval for small volumes of materials is considered cost prohibitive, small articles or quantities are generally disposed of as low level radioactive waste.

[1] As specified in NUREG-1301 or the licensees ODCM.

A release standard is needed to provide licensees with measurable limits that reflect the upper bounds for unrestricted releases. Since licensees must demonstrate compliance with the limit, the values must be detectable using cost effective survey techniques. Clearance values that are below the detection threshold of standard field instrumentation would cause an undue regulatory burden on licensees without adding to the protection of the public or environment.

The issues paper specifically addresses "solids"; however, all materials should be included. Although solids do account for the majority of materials, low volumes of non-effluent liquids and aggregate solids (soils and sludge) are produced during licensed activities. Currently these materials are analyzed to environmental LLDs and released if no residual radioactivity is detected. As a result of chemical interference, some liquids cannot be analyzed to environmental LLD. Although the overall volume is quite low, they represent potential mixed wastes. Hence, the NRC and Environmental Protection Agency (EPA) need to agree on when radiological regulatory controls end to allow licensees to dispose of chemical waste that cannot meet the "no detectable" residual radioactivity release criteria.

Analyzing the release of materials from regulatory control is complex because the current regulatory framework is flawed. Without a written standard, stating where regulatory controls end, the licensee is left questioning how hard to look. This type of question should not exist in a regulated environment.

**Issue No. 2 -- If the NRC Decides to Develop a Proposed Rule, What are the Principal Alternatives for Rulemaking that Should be Considered, and What Factors Should be Used in Making Decisions Between Alternatives?**

Alternative number 1, which allows for the release of materials for unrestricted use provided the potential dose to the public is maintained below an annual exposure level, is the logical choice for establishing a clearance standard. The ranges specified for potential dose levels[2] are all considered extremely low. It should also be noted that only the 1 mrem/yr and the 10 mrem/yr values fall within the trivial range as defined in International Atomic Energy Agency (IAEA) Safety Series No. 89, Principles for the Exemption of Radiation Sources and Practices from Regulatory Control. The National Council of Radiation Protection and Measurements (NCRP) defines a Negligible Individual Dose as 1 mrem/yr; however, this is not a recommended limit. The NCRP recommends[3] a limit of 100 mrem/yr from all sources other than medical exposures and natural background and 500 mrem/yr for infrequent exposure. The NCRP also recommends limiting the exposure to an individual to 25 mrem/yr from a given source if an assessment of the individuals collective annual exposure is not performed.

The dose limits for members of the public in 10 CFR Part 20 are consistent with the recommendations of the NCRP. 10 CFR 20.1301 requires licensees to operate such that an individual member of the public will not receive more that 100 mrem/yr (500 mrem/yr with special provisions) and no more than 2 mrem in any one hour. These values can be measured using standard instrumentation and monitoring devices. These measurements can be traced to a NIST traceable standard using health physics instrumentation. Depending on exposure times, 0.1 mrem/yr, 1 mrem/yr, or 10 mrem/yr would not be considered measurable dose rates. Instead these

[2] No dose above background, 0.1 mrem/yr, 1 mrem/yr, and 10 mrem/yr

[3] These recommendations are consistent with those provided by the International Commission on Radiological Protection (ICRP) in publication 60.

doses are calculated estimates based on assumptions and computer models.

Limits consistent with the NCRP recommendation can also be found in 10 CFR Part 35.75. 10 CFR Part 35.75 states that a licensee can release an individual who was administered radiopharmaceuticals or radioactive implants provided the total effective dose equivalent to any other individual does not exceed 500 mrem, but must provide the patient with instructions on how to maintain doses to another individual ALARA if an exposure will exceed 100 mrem. In addition, no guidance on the interruption or discontinuation of breast feeding is required until the dose to the breast feeding infant could exceed 100 mrem. While the benefits of releasing a patient can be recognized in terms of recovered wages, productivity, and reduced hospital expenses, the resulting exposures are real and measurable.

The term "dose-based" regulation is somewhat misleading. Computer models can produce estimated exposures, but the assumptions used to develop the models and input parameters must be realistic. If these values are unrealistic or overly conservative, a dose-based regulation loses credibility. For example, an input of 1 Bq/g produced a 25 mrem/yr output for one agency's model, but only 0.0048 mrem/yr from another agency's model (NUREG-1640 vs. IAEA Safety Series 111-P-1.1 models for transporting steel contaminated with Co-60)[4]. However, if both drivers were monitored using thermoluminescent dosimeters, their measured annual dose would be indistinguishable from background. Hence, careful planning and good engineering judgment is essential to producing realistic clearance values.

In accordance with IAEA Safety Series 89, derived clearance values should be based on the average dose to the member of a critical group, not the maximally exposed individual. This provides some assurance that clearance values are realistic and not driven by a hypothetical worst case scenario, which has an extremely low probability of occurring.

Generic clearance values should not be viewed as a limit but as a method for demonstrating compliance with the limit. The materials with residual radioactivity at or below the clearance value would require no further consideration or evaluation. Since clearance values are established using generic assumptions with respect to the materials future use, a licensee should have the ability to evaluate materials that exceed a generic clearance value based on site specific conditions. This process would afford the licensee the opportunity to correct or adjust a limiting assumption used during the development of the generic value that did not apply to the specific release scenario. Therefore, it is recommended that a regulatory guide also be developed to provide guidance on how to comply with the standard. The regulatory guide should include the generic values and methods of calculating site specific values. An approved computer code, similar to RESRAD-Recycle, would be beneficial for standardized analysis of site specific reuse or recycle values.

The consideration of clearance standards set by other countries is important to reduce the potential for trade conflicts. A review of each agencies models, including assumptions and input values, is important because the limiting scenario may not be based on realistic assumptions[5]. A review of NUREG-1640, Radiological Assessments for Clearance of Equipment and Materials from Nuclear Facilities, EPA Technical Support Document[6] and IAEA Safety Series 111-P-1.1, Application of

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[4] Specific Comments on NUREG-1640 are being submitted separately.

[5] ANSI N13.2, Surface and Volume Radioactivity Standards for Clearance

[6] EPA TSD – Evaluation Of The Potential For Recycling Of Scrap Metals From Nuclear Facilities, draft review, March 19, 1997

Exemption Principles to the Recycle and Reuse of Materials from Nuclear Facilities, indicated that each standard had these types of problems. For example, the transportation scenarios in NUREG-1640 assume an annual exposure duration of 1000 hours. Although the authors attempted to justify the 1000 hours, it is not an accurate reflection of a realistic exposure time. The time does not account for realistic annual scrap volumes or factors such as non-driving times when the scrap is being loaded and unloaded.

Similar assumptions are made by the IAEA when producing its limiting model for energetic gamma emitting nuclides – the use of large equipment made from recycled steel. The case involves an industrial size lathe made from 100 percent cleared steel assuming no dilution or partitioning factors[7]. The lathe operator is assumed to work 2000 hrs/yr at a distance of 1 meter from the lathe. A lathe operator milling stock for 2000 hours in a year is overly optimistic and lacks good judgment. The EPAs most limiting model for external exposures is also a lathe operator and makes the same poor assumptions by using a dilution factor of 1 and an unrealistic exposure time of 1750 hours. These are considered examples of calculating doses to the maximally exposed individual rather than the average dose to a member of the critical group.

ANSI Standard N13.12, Surface and Volume Radioactivity Standards for Clearance (1999) and the European Commission (EC) values for volumetric releases of principle gamma emitters commonly found at pressurized water reactors were generally in good agreement. ANSI N13.12 was considerably more conservative for electron capture and low energy beta emitters, radium, thorium and transuranics. Also, the surface screening values listed in the ANSI standard did not agree with the EC values. This discrepancy stems from the ANSI standard assuming a 1 $cm^2/g$ surface to mass ratio. For steel, this would assume steel items are 18-gauge sheet steel with a nominal thickness 0.05 inches (0.127 cm). While this might be a good assumption for office furniture, it is a poor assumption for power plant equipment. Pipe supports, rebar, pipes, pump blocks, valves, beams, angle iron, handrails, nuts and bolts, etc., are examples of steel items having nominal thickness much greater than 0.05 inches. For concrete, the surface-to-mass ratio would be 0.04 cm2/g assuming a typical 4 inch thick slab. Therefore, the ANSI standard's 1 $cm^2/g$ surface to mass ratio does not produce realistic surface clearance values.

Based on the problems associated with each standard, the NRC should not simply adopt a previously established standard. The values produced in each standard should be compared and the differences resolved. Any unrealistic assumptions should be corrected to create derived clearance values based on the average dose to a member of a critical group and not the maximally exposed individual. During the staff's review, only the clearance values from the EC were available; however, based on adjustments to some conservative assumptions made by the NRC, EPA and IAEA, the EC volumetric clearance values appear to be the most realistic. If the release standard is derived from models or scenarios that lack good engineering judgment, the resulting clearance values will overestimate the dose to the average member of the critical group and cause the clearance values to be unnecessarily low. Since clearance values rely on assumptions and models, careful consideration and review of all input parameters must be performed to ensure the output values are credible, measurable, and represent the average dose to a member of the critical group

The alternate course of action described in section A.2.2(3) is not considered a reasonable alternative. To dispose of materials as low level radioactive waste simply because the article was

[7] IAEA-TECDOC-855 and IAEA Safety Series No. 111-P-1.1

used in an area where radioactive materials are used or stored would create an undue regulatory burden on licensees. By simply using an article in a radiological controlled area does not make it a hazard to workers or members of the public. This option lacks sound judgment and is considered inconsistent with other sections of Title 10 of the Code of Federal Regulations.

**Issue No. 3--If NRC Decides to Develop a Proposed Rule Containing Criteria for Release of Solid Materials, Could Some Form of Restrictions on Future Use of Solid Materials be Considered as an Alternative?**

Alternate course of action A.2.2 (2) would not prove feasible as a stand-alone option but it could prove beneficial for materials that exceed the limitations of A.2.2 (1) and that have a high recycling value. Since the limiting dose to a member of the public is based on assumptions, implementing controls that would increase mixing, reduce exposure times, or establish control over the end products use could produce materials that are within an acceptable standard. While A.2.2 (2) would require positive controls, it has the potential to recover resources that otherwise would be lost by burial as low level waste.

**Issue No. 4--If NRC Decides to Develop a Proposed Rule, What Materials Should be Covered?**

The release of materials from licensed facilities is not limited to solids, such as steel or concrete. Licensees must evaluate all materials that may have become contaminated as a result of licensed activities. Therefore, a clearance standard should provide a method for evaluating the release of all types of materials for reuse, recycle, and disposal. The evaluations performed during the development of a standard for solid materials should help in the development of appropriate values for other materials. PVNGS would recommend that a complete clearance standard be issued to reduce any possible confusion and regulatory inconsistency.

The following is a list of common materials that are evaluated and released by licensees during normal plant operation in addition to metals and concrete:

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| Clothing | Two Way Radios | Chain |
| Personal Items | Smoke Detectors | Boroscopes |
| Chemistry Reagents | Soils/Sludges | Plumbing Snakes |
| Aerosol Cans | Grease | Dunnage |
| Hand Tools | Charcoal | Oil |
| Power Tools | Dry Resin | Paints and Solvents |
| Asphalt | Ropes | Welding Rods |
| Extension Cords | Hoses and Tubing | Nylon Slings |
| Batteries | Measuring & Test Equipment | |

**Conclusion**

A clearance standard is needed to provide regulatory consistency. The clearance levels should not be considered limits but methods of ensuring members of the public are protected from excessive exposures from the release of materials. The standard should be based on sound engineering judgment to ensure that average dose to a member of a critical group does not exceed the trivial range and remains within the normal background fluctuations encountered by members of the public.