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May 21, 2026

Chairman Ho K. Nieh and Fellow Commissioners
U S Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: *CRCPD Comments on Regulatory Framework for Fusion Machines*
Docket ID: NRC–2023–0071-0056

Dear Chairman Ho K. Nieh,

The *Conference of Radiation Control Program Directors (CRCPD)* appreciates the opportunity to provide comments on the proposed rule for the *Regulatory Framework for Fusion Machines*, as published in the Federal Register on February 26, 2026.

CRCPD represents radiation control programs from states and territories that regulate radiation sources to protect public health and safety. Our membership includes Agreement States and non-Agreement States alike, and CRCPD serves as a forum for consensus development and information sharing on radiation regulatory issues.

After reviewing the NRC's *Regulatory Framework for Fusion Machines* and soliciting input from our members, CRCPD offers the attached comments for your consideration.

CRCPD supports the NRC's efforts to develop regulatory actions that protect public health and safety while ensuring regulatory clarity and consistency across state and federal programs. We trust these comments will assist the Commission and staff in refining the rulemaking.

Thank you for the opportunity to comment. If NRC staff have questions regarding CRCPD's recommendations or would like clarification on specific points, we are available to assist.

Sincerely,

Patrick Mulligan
CRCPD Chairperson

cc: Organization of Agreement States

Specific Requests for Comments

CRCPD provides the following responses to the specific requests for comments in Section IV Specific Requests for Comments of the Federal Register Notice.

1. Should the NRC revise § 30.55(c) and § 20.2201 to change the reporting threshold to a higher activity for tritium? If so, what should be the new reporting threshold for tritium? Please provide the basis for your response.

   *The CRCPD does **not** support revising the tritium reporting thresholds in § 30.55(c) or § 20.2201 to create a universally higher limit. A blanket increase would affect a broad population of non-fusion tritium users and could unintentionally obscure the loss or theft of discrete radioactive components that must remain promptly reportable for safety and security reasons. Even within fusion facilities, applying a single elevated threshold could allow the loss of a specific tritiated component or container to go unreported if its activity falls below an inappropriately high limit.*

   *Instead of a generic regulatory change, CRCPD recommends that tritium reporting thresholds for fusion facilities be established through **license-specific conditions or licensing guidance**. This approach is more appropriate in the near term given the diversity of fusion machine designs and the current scientific uncertainty regarding tritium uptake into vacuum vessels and structural materials. Facility-specific thresholds allow regulators and applicants to address real-world accounting challenges without weakening oversight or security protections.*

   Basis for this position

   - ***Distinction between operational inventory variation and discrete material loss.***
     Fusion facilities may experience operational inventory imbalances from absorption, retention, or in-vessel production. Higher reporting thresholds may be appropriate for these bulk inventory discrepancies. However, the loss or theft of any discrete container or identifiable item containing tritium must remain strictly reportable. A universal increase in reporting limits would blur this distinction and could diminish detection of security-significant events.
   - ***Existing precedent demonstrates a workable model.***
     For example, SHINE's licensing approach incorporated a 250-curie (Ci) threshold for certain operational reporting, while maintaining separate, stringent reporting obligations for any lost discrete container. This demonstrates that tailored, facility-specific conditions can effectively accommodate operational realities without compromising security.
   - ***The 30day 10milliCurie (mCi) reporting criterion for tritium is inappropriate for fusion scale inventories.***
     For fusion systems with large tritium inventories, the § 20.2201(a)(2)(i) threshold to report a missing 10 mCi after 30 days lacks meaningful regulatory value. Normal measurement uncertainty, material absorption into structures, and complex tritium behavior far exceed this quantity. Maintaining this threshold for fusion improperly equates negligible statistical fluctuations with safety-significant losses.
   - ***Consideration of exemptions for fusion facilities.***
     *Given the unique scale and inventory accounting challenges of fusion operations, the NRC should consider granting **specific exemptions** to fusion licensees from the § 20.2201 30day 10mCi reporting requirement for tritium. This would prevent routine*

operational variations from triggering unnecessary reports while still allowing for stringent detection and reporting of discrete material loss.

2. The NRC is particularly interested in feedback on this proposed approach to amend 10 CFR 20.2008 to provide options for safe waste disposal. Does this approach comprehensively address potential waste generated by fusion machines? Are there other approaches the NRC should consider? If yes, please provide the basis for your response.

The CRCPD supports the proposed amendments to § 20.2008, which establish clearer and more practical pathways for the safe disposal of byproduct material generated by fusion machines. As fusion technologies advance toward commercial deployment, a robust waste management framework is essential to protect public health, safety, and the environment.

While we agree with the NRC's overall direction, we offer the following recommendations to ensure the regulatory approach is comprehensive and fully aligned with emerging fusion waste streams:

- ***Integration with updates to 10 CFR Part 61.***
  The NRC must ensure that the ongoing revisions to Part 61 explicitly account for the radionuclides expected from fusion-specific activation processes. Current waste classification tables—based on early 1980s data—do not fully reflect the isotopic profiles produced by high neutron fluxes in modern fusion devices. Incorporating these isotopes into updated classification and performance assessment frameworks is necessary to ensure that disposal pathways remain technically and regulatory sound.
- ***Addressing concerns related to Greater-Than-Class C (GTCC) waste.***
  Fusion plasma-facing components may generate GTCC-level activation products. At present, no disposal pathway exists for GTCC waste, creating a significant regulatory and operational gap. It may not be feasible for licensees to constrain activation below GTCC levels, particularly where activation values must be derived through modeling rather than direct measurement. The NRC should clearly define a regulatory path for storage and eventual disposal of GTCC waste arising from fusion operations to ensure continuity of operations and long-term waste safety.
- ***Support for extended interim storage and decay.***
  CRCPD supports the proposed guidance in NUREG-1556, Volume 22, which anticipates the need for extended on-site interim storage. This flexibility is essential to allow the decay of short-lived activation products prior to recycling, clearance, or final disposal. Such provisions provide a practical and risk-informed approach during the early stages of fusion deployment.
- ***Ensuring transparency and strong lifecycle controls.***
  It is critical that licensees maintain transparency regarding the composition of their waste streams, expected decay periods, and the methods used to characterize radionuclides. Robust controls—applied from generation through disposal—are necessary to maintain safety, security, and regulatory confidence as fusion waste streams evolve.

The CRCPD believes that resolving these issues—particularly the disposal path for GTCC waste and the integration of fusion-relevant isotopes into Part 61—is essential to establish a complete and durable waste management framework for the fusion sector.

3. What would the benefits be of expanding existing guidance for alternative disposal under 10 CFR 20.2002, "Method for obtaining approval of proposed disposal procedures,'' to specifically address fusion machine waste? Should the NRC develop guidance focused on reusing or recycling low-activity fusion machine waste? Are there alternative approaches the NRC should consider? Please provide the basis for your response.

   The CRCPD agrees that the NRC's proposed amendments to § 20.2008 provide appropriate and flexible pathways for the disposal of low-level waste generated by fusion machine licensees. The dose-based approach—particularly the use of intruder dose criteria for radionuclides not listed in existing waste classification tables—offers the necessary adaptability as fusion technologies introduce materials and activation products not contemplated in the current Part 61 framework.

   Because fusion machines will employ novel materials and produce activation products beyond those included in § 61.55, a performance-based, intruder-dose method is a reasonable and practical mechanism for ensuring protective disposal without requiring continual updates to isotope-specific tables.

   The CRCPD emphasizes, however, that these revisions should be closely coordinated with the NRC's ongoing rulemaking to update 10 CFR Part 61 under Executive Order 14300. Aligning the 20.2008 amendments and associated NUREG-1556 Volume 22 guidance with the final Part 61 revisions will help ensure regulatory consistency, provide licensees with a coherent framework, and better accommodate the unique waste streams of fusion facilities.

4. Should the NRC propose export controls related to fusion machines? Please provide the basis for your response.

   The CRCPD affirms that export controls for fusion machines and associated byproduct materials fall squarely within exclusive federal jurisdiction. These matters remain under the authority of the NRC and other federal agencies and are not delegated to the States. We fully support the NRC's responsibility to ensure that the regulatory framework governing fusion technologies continues to protect the common defense and security of the United States.

   The CRCPD also supports the NRC's ongoing coordination with its federal partners to evaluate whether adjustments to export controls are warranted as fusion technologies progress toward commercialization. Continued federal oversight is essential to prevent the unauthorized diversion of sensitive materials, components, or technical information that could pose national security risks.

5. Does the proposed rule provide adequate clarity on the licensing process, including designated Compatibility Categories, and if not, where is additional clarity needed? Please provide the basis for your response.

   The CRCPD agrees that the proposed rule, supported by draft NUREG1556, Volume 22, provides an appropriate and necessary degree of flexibility for near term demonstration and First-Of-A-Kind (FOAK) fusion machines. By adopting a technology-inclusive, performance-based framework under 10 CFR Part 30, the NRC enables innovation during the early

demonstration phases of diverse fusion concepts without imposing prescriptive requirements that could inhibit development.

The CRCPD believes that designating the entire definition of "byproduct material," including paragraph 3(ii)(A), as Compatibility Category H&S would better maintain alignment with past rulemaking, avoid unnecessary disruption to State regulatory structures, and preserve the flexibility required for Agreement States to implement a compatible and effective regulatory program. In many States, accelerator definitions are embedded across multiple machine-based regulations, and assigning different compatibility levels to these closely linked terms risks creating inconsistencies in State programs. As discussed more fully in our response to Question 6, harmonizing these designations is essential to avoid unintended disruptions to existing State regulatory frameworks and to maintain the flexibility preserved in the 2007 NARM rulemaking.

As the fusion industry transitions from FOAK systems to commercial production and Next-Of-A-Kind (NOAK) deployments, however, the CRCPD believes that additional clarity will be necessary. Specifically, the NRC should develop clear, detailed, model-specific licensing guidance for each established machine line. The basis for this recommendation is as follows:

- ***Consistency within the National Materials Program (NMP).***
  Model-specific guidance is essential to ensure consistent licensing across all Agreement States. States will benefit from sharing and leveraging experiences with these early fusion systems.
- ***Regulatory certainty for industry and the public.***
  Once commercial designs are standardized, machine-specific guidance provides predictable regulatory expectations and strengthens confidence that safety and security requirements are applied consistently nationwide.
- ***Increased efficiency in the licensing process.***
  Clear design-specific frameworks reduce ambiguity for both applicants and regulators, minimizing unnecessary delays as fusion technologies move toward broader commercial deployment.
- ***Improved capture of technical and safety information.***
  Machine-specific licensing guidance will ensure that regulators collect and evaluate the detailed design information necessary for effective oversight, particularly relating to activation products, tritium inventories, and long-term waste management.

In summary, while the current technology-inclusive, performance-based approach is well-suited for this nascent stage of the fusion sector, the CRCPD emphasizes the importance of transitioning to model-specific licensing guidance as fusion technologies mature and standardized production lines emerge. This progression will strengthen regulatory consistency, support industry development, and promote a stable and efficient regulatory environment.

6. Are there unintended consequences or impacts not considered by the NRC by including fusion machines in the definition of ''particle accelerator''? Are there unintended consequences or impacts not considered by the NRC with respect to the proposed compatibility designations of the ''fusion machine'' and paragraph 3(ii)(A) of the 'byproduct

material'' definitions? Please provide a basis for your response.

The CRCPD is concerned that the NRC's proposal to include "fusion machine" within the definition of "particle accelerator," while simultaneously assigning different compatibility designations to these related regulatory terms, may create unintended consequences for State regulatory programs. In many Agreement States, the definition of "particle accelerator" is embedded within multiple machine-based regulatory frameworks. By introducing "fusion machine" into the accelerator definition, but assigning "fusion machine" a Compatibility Category B designation while retaining Category H&S for "particle accelerator," the NRC may inadvertently create internal inconsistencies within State regulatory structures.

This mismatch in compatibility designations could result in State regulations that are no longer harmonious across related machine-regulation sections, particularly where byproduct material requirements intersect with machine-based licensing frameworks. States may be placed in the position of needing to reconcile conflicting mandates: incorporating a Category B element in one definition while maintaining Category H&S flexibility in another closely connected definition. This would undermine uniformity and could require States to modify long established regulatory constructs in ways not anticipated by the NRC.

The CRCPD is also concerned with NRC staff's proposal that paragraph 3(ii)(A) of the definition of "byproduct material," which references "fusion machine," be designated as Category B solely because the term "fusion machine" itself was assigned Category B. This approach is inconsistent with the reasoning presented in the preamble. The preamble includes a detailed discussion supporting retention of the particle accelerator definition—and, by extension, machine related byproduct material definitions—as Category H&S, reflecting the regulatory principles established in the 2007 NARM final rulemaking. The 2007 NARM preamble emphasized the need to preserve State flexibility due to longstanding State authority over accelerator regulation and the integrated nature of machine regulatory frameworks.

For these reasons, assigning paragraph 3(ii)(A) a Category B designation does not seem consistent with the underlying logic of the 2007 NARM final rule.

Cumulative Effects of Regulation

CRCPD provides the following responses to the specific request for comments in Section VIII. Cumulative Effects of Regulations of the FRN:

1. In light of any current or projected CER challenges, would the proposed effective date of 30 days after the date of publication of a final rule provide sufficient time to implement the new, proposed requirements? Please provide a rationale for your response.

   The CRCPD believes that a 30-day effective date may be challenging even for the NRC to implement effectively, given the scope and pace of ongoing regulatory reforms. For Agreement States—who must revise their own regulations to remain compatible—the challenges are even greater. Accordingly, the CRCPD requests that Agreement States be provided the standard three-year implementation period, which is especially important given the many concurrent rulemakings now underway. Our concerns are based on several factors:

   - ***Concurrent Major Rulemakings Under Executive Order 14300.***
     The NRC is simultaneously undertaking significant regulatory reforms—including major revisions to 10 CFR Parts 20, 37, and 61 —which place substantial, overlapping demands on State regulatory programs. These efforts overlap with this rulemaking and significantly increase the burden on both the NRC and Agreement States.

   - ***CRCPD Development of Suggested State Regulations (SSRs).***
     Beyond updating their own regulations, many Agreement States rely on CRCPD's Suggested State Regulations (SSRs) as the foundation for adopting or revising their radiation control rules. The CRCPD will need adequate time to develop and update SSRs that reflect the final fusion rule. This step is essential for national consistency. However, even with a three-year implementation period, completing this work will be challenging. Some states incorporate SSRs by reference and others may not be able to start their formal rulemaking processes until the SSRs are finalized, and many State regulatory processes involve lengthy administrative, legislative, or public-comment steps that may extend beyond the available timeframe.

   - ***Licensing Fees and Review Effort.***
     Agreement States will need fee structures that reasonably reflect the significantly greater technical effort required to review, inspect, and regulate fusion machines compared to conventional medical accelerator programs on which many existing state fee schedules are based. Experience from states that have already reviewed proof-of-concept fusion systems demonstrates that fusion facilities require substantially greater expertise and regulatory effort in areas such as neutron activation, tritium accountability, shielding analysis, activation product characterization, and high-energy radiation environments. Because the current rulemaking and recent NRC fee rule do not establish fusion-specific program codes or provide benchmarks regarding the anticipated scope of regulatory oversight, the CRCPD recommends that the NRC develop dedicated fusion machine program codes and provide additional guidance regarding expected licensing and inspection resource demands to assist Agreement States in developing appropriate and sustainable fee structures and staffing models.

- ***Availability of Licensing and Inspection Guidance.***
  While the regulations themselves might be administratively adoptable within 30 days, it is unlikely that all necessary guidance documents—such as those for offsite dose evaluations, inspection procedures, and emergency planning—will be finalized and available in time to support a smooth transition.

- ***Personnel Training and Technical Readiness.***
  Oversight of fusion machines requires specialized training in unique hazards, including high-energy neutron environments and tritium management. Completing this training within 30 days presents a challenge. NRC support of training needs for state regulators is critical to closing this gap and ensuring consistent implementation.

2. If CER challenges currently exist or are expected, what should be done to address them? For example, if more time is required for implementation of the new requirements, what period of time is sufficient? Please provide a rationale for your response.

   Given the considerations discussed above, the CRCPD recommends that Agreement States be granted at least the standard three-year implementation period and that the rule's effective date for States be aligned with the availability of final guidance, SSR updates, and the completion of essential training programs. This approach will support a consistent, efficient, and technically sound implementation across the National Materials Program.

3. What other (NRC or other agency) regulatory actions (e.g., orders, generic communications, license amendment requests, inspection findings of a generic nature) influence the implementation of this proposed rule's requirements? Please provide a rationale for your response.

   For fusion facilities that use tritium and conduct groundwater monitoring, the current limits established under the US Environmental Protection Agency (EPA) Safe Drinking Water Act (SDWA) are based on older dosimetric methodologies that do not reflect the most current scientific understanding of radiation risk. Transitioning to updated Dose Conversion Factors (DCFs) would ensure that public health standards incorporate modern dosimetry and are aligned with contemporary technical analyses.

   There is a clear need for the EPA and NRC to harmonize the dosimetric models used in their respective regulatory frameworks. Such alignment would provide a consistent and scientifically defensible basis for environmental protection and would support the NRC's performance-based approach, which emphasizes the use of up-to-date technical information to accurately assess potential doses to the public and the surrounding environment.

4. What are the unintended consequences, and how should they be addressed? Does this proposed rule create conditions that would be contrary to this proposed rule's purpose and objectives? Please provide a rationale for your response.

   See CRCPD's response to NRC's specific request for information question #6 above.

5. Please comment on the NRC's cost and benefit estimates in the regulatory analysis that supports this proposed rule.

The CRCPD notes that any cost and benefit estimates in the regulatory analysis are incomplete unless they fully account for the regulatory fees or the significant CRCPD and State-level costs associated with implementing this rule. Without fusion-specific NRC fees or program codes, neither the NRC nor Agreement States can determine the true cost of licensing, inspecting, and regulating fusion machines. As a result, the CRCPD does not see how the NRC can reliably estimate the overall economic impact of the proposed rule.

Fusion systems require substantially more technical review effort than typical accelerators, yet the regulatory analysis does not address the increased fees or resources needed to support this work. Many Agreement States base their own fee schedules directly on NRC fees or use them as a benchmark; the absence of fusion-machine fee structures leaves States without a foundation to recover their actual regulatory costs.

Additionally, the cost analysis must properly account for the costs incurred by CRCPD in developing SSRs and State regulatory costs associated with aligning machine-based regulations with the proposed federal rule. In many States, radiation-generating machine regulations—including definitions, registration requirements, inspection protocols, and administrative procedures—are deeply interconnected with byproduct material frameworks. Integrating "fusion machine" into these structures will require States to modify long-established regulatory frameworks, update administrative rules, revise internal procedures, and potentially conduct statutory changes. These efforts can involve substantial staff time, legal review, public-comment processes, and stakeholder engagement—none of which are captured in the NRC's analysis.

A complete cost–benefit assessment must include

- *fusion-specific NRC fee categories and program codes, and*
- *the full range of State regulatory costs associated with updating both radioactive materials regulations and machine-regulation frameworks.*

Without these elements, the regulatory analysis does not reflect the true cost of implementing the proposed rule across the National Materials Program.

Additional Comments on Draft Licensing Guidance (NUREG-1556 Volume 22)

Unsealed and Sealed Byproduct Material

The CRCPD offers the following comments on the isotope listing requirements in Section 8.5 of draft NUREG-1556, Volume 22, to ensure that the guidance remains comprehensive, technology-inclusive, and practical for near-term fusion licensing:

1. *Inclusion of Non-D-T Fuel Cycles (isotope-listing requirements in Section 8.5)*
   The draft guidance appears to assume a deuterium-tritium (D-T) fuel cycle and provides limited direction for alternative fusion concepts such as proton-boron (p-B11). Although the proposed rule acknowledges non-D-T configurations, the licensing guidance remains centered on tritium.

   The CRCPD recommends that the NRC include an attachment or appendix outlining specific considerations for non-D-T fuel cycles to ensure consistent regulatory expectations for developers using alternative fusion reactions.

2. *Comprehensive Treatment of Tritium Forms (isotope-listing requirements in Section 8.5)*
   Section 8.5 focuses primarily on gaseous (HT) and liquid (HTO) tritium, but fusion machines may contain tritium in a broader range of physical and chemical states. These include organically bound tritium (OBT), tritium in getter beds, surface- or material-bound tritium, and solid-phase hydrides.

   Because safety controls, monitoring requirements, and dose behavior vary significantly by the form of tritium present, the CRCPD recommends that the NRC expand the guidance to explicitly address all major tritium forms encountered in fusion systems. Clarifying these distinctions is essential for determining appropriate engineering controls, environmental and effluent monitoring instrumentation, and bioassay program requirements.

3. *Practicality of Listing Activation Products (Atomic Numbers 84–96)*
   For near-term fusion machines, listing every potential activation product individually—particularly radionuclides with atomic numbers 84–96—may not be practical.
   The CRCPD bases this recommendation on the following considerations:
   - Many activation products are identified through modeling and exist only in trace quantities that cannot be directly measured.
   - There is no default exempt quantity for alpha-emitting isotopes, per 10 CFR 30.71, Schedule B.
   - Precedent exists for grouping such isotopes under total activity limits, as demonstrated in the SHINE licensing process.
   - Grouping activation products for atomic numbers 84–96, similar to the existing approach for the 3–83 range, would provide a more workable and efficient oversight structure for incidentally activated materials with unpredictable impurity profiles.

Physical Inventory

The CRCPD recommends that the NRC provide additional technical clarity in Section 8.10.3 (Item 10: Physical Inventory) of draft NUREG-1556, Volume 22, to ensure that material-accounting expectations for fusion facilities are clear, risk-informed, and operationally practical. Similar to the considerations raised in Section 8.5 regarding isotope listings, further detail is needed to address the unique characteristics of activation products and their management within fusion systems. The

CRCPD offers the following recommendations:

1. *Clarification on Decay Correction Requirements*
   As with isotope inventories, activation-product activities change over time. The guidance should specify whether inventories must include periodic decay correction (e.g., annually) so that possession limits accurately reflect the actual on-site activity. Clear expectations for decay correction will ensure consistent and technically defensible accounting practices across licensees.

2. *Definition of Scope and Purpose of Inventory Protocols*
   Section 8.10.3 should clearly distinguish the inventory requirements for unsealed materials—such as tritium fuel—from those applicable to activation products. This includes activation products that have been removed from the machine, designated as waste or contamination, and stored in specialized areas such as shielded bunkers. Clear delineation of these categories will support regulatory consistency and align with the isotope-grouping concepts addressed in Section 8.5.

3. *Distinguishing Structural Activation From Discrete Activated Components*
   As with the practicality concerns raised for listing isotopes individually, the CRCPD recommends distinguishing between fixed structural activation (e.g., activated shielding or vessel walls) and removable discrete components that may contain activated material. Consistent with State experience regulating cyclotrons, a detailed accounting of discrete removed objects is far more important for safety and security than attempting to inventory fixed structural activation, which is often modeled and cannot be directly handled.

4. *Clarification of Acceptable Inventory Methodologies*
   Similar to the modeling approaches used to identify activation products in Section 8.5, "physical inventory" for activated components should not imply direct physical verification when such components cannot be safely handled. The NRC should specify whether a records-based or modeling-based inventory method is acceptable for components whose activation levels are determined by calculation. This clarification will help ensure that inventory practices remain practical and consistent with radiological protection principles.

Providing additional clarity in these areas will help ensure that physical-inventory practices are applied consistently with the isotope-listing guidance, are risk-informed, and focus regulatory oversight on the most significant radiological hazards within fusion facilities.

Packaging

The CRCPD recommends that the NRC expand the guidance in Section 8.10.8 (Transportation) and Appendix I (Model Procedures for Receiving and Opening Packages) to address the unique licensing, safety, and storage considerations associated with Type B packages used for high-activity tritium. These packages operate under specialized Certificates of Compliance (CoCs) and safety restrictions that are not sufficiently detailed in the current draft of NUREG-1556, Volume 22.

1. *Licensing Restrictions and CoC Conditions*
   CRCPD recommends that the NUREG explicitly state that licensees must comply with all CoC-specified conditions, including those specific to tritium service. Many Type B packages used for tritium impose strict requirements for:
   - storage configuration and allowable decay heat;

- maximum hold time and temperature limits;
- leakage-rate testing, pressure checks, and surveillance intervals.

The guidance should also clarify that a Type B package with an expired or missing CoC may not be used for shipment, and any remaining onsite package must be managed under storage-only conditions and associated license commitments.

2. *Prohibition on Shipment Without a Valid CoC*
   CRCPD recommends that the NRC explicitly state that shipment of a Type B package without a valid CoC is prohibited, including attempts to return the package to a vendor. This point is especially critical for the high-risk transfer of multi-curie tritium inventories used in fusion fuel-cycle operations.

3. *Long-Term Onsite Storage Requirements*
   Type B packages are certified for transport, not necessarily long-term storage. Several tritium models are not designed for extended confinement of tritium gas. CRCPD recommends that the NUREG address:
   - conditions under which long-duration onsite storage is permissible;
   - expectations for periodic surveillance (e.g., routine wipe testing for removable tritium or leak-rate checks);
   - methods to ensure continued confinement integrity when packages remain onsite for prolonged periods.

4. *Tritium-Specific Hazards and High-Risk Transfers*
   Because fusion facilities may receive large tritium inventories in Type B containers before transferring them to handling systems, guidance should emphasize:
   - readiness checks prior to opening;
   - appropriate engineered controls (e.g., gloveboxes, vacuum transfer systems);
   - radiological controls tailored to tritium gas behavior, including ventilation and real-time monitoring.

5. *Need for Dedicated Technical Guidance or Cross-Reference*
   Given the complexity of tritium Type B packaging, CRCPD recommends that NRC either:
   - expand Volume 22 to include tritium-specific Type B packaging guidance; or
   - reference an existing or new technical guide addressing:
     - interfaces between 10 CFR Part 30 and 10 CFR Part 71;
     - unique tritium-related CoC conditions;
     - emergency procedures for package leakage or abnormal conditions during receipt.

CRCPD urges the NRC to revise Section 8.10.8 and Appendix I to provide clear, consistent expectations for licensees handling tritium Type B packages. These updates are essential to support safe, compliant operations and to ensure uniform regulatory interpretation as large-quantity tritium shipments become increasingly common within the commercial fusion industry.

Reporting of Events

The CRCPD recommends that the NRC expand the guidance related to 10 CFR 30.50 (Reporting of Events) to require that licensees explicitly identify the specific safety systems and equipment

subject to these reporting requirements.

Given the technology-inclusive and performance-based nature of the proposed framework, the equipment necessary to prevent unplanned releases or mitigate radiation hazards will vary significantly between different fusion designs (e.g., Magnetic Confinement vs. Inertial Confinement). To ensure regulatory clarity and consistent implementation, the CRCPD suggests the following:

1. *Identification of Safety-Significant Equipment***:** Licensees should be required to provide a list of safety equipment and components that, if they fail to function as designed, would trigger a report under 10 CFR 30.50. This list should include systems identified in 10 CFR 30.32(k), such as access control interlocks, radiation monitors, vacuum vessel integrity components, and tritium confinement systems.

2. *Nexus to Radiological Safety:* Clearly identifying these systems upfront ensures that both the licensee and regulatory inspectors have a common understanding of which equipment failures constitute a reportable event under 10 CFR 30.50(b)(2) (failure of equipment to function as designed).

3. *Operational Clarity:* This approach prevents ambiguity during high-stress events or power failures, where determining whether a specific component failure is "safety-significant" can be challenging without pre-established criteria.

By requiring a pre-identified list of safety equipment, the NRC will foster greater regulatory certainty and ensure that events impacting the integrity of a fusion facility's primary safety functions are reported and evaluated promptly.