

Fuel Cycle Safety and Safeguards Interim Staff Guidance - 02

Accident Sequences Resulting in Consequences Below 10 CFR 70.61 Performance Requirements

Issue:

Guidance on addressing hazards that could result in elevated radiological doses below the 70.61 performance requirement thresholds.

Introduction:

The purpose of this interim staff guidance (ISG) is to identify the dominant regulatory requirements for hazards that fall below the thresholds of the performance requirements to clarify that there is no “regulatory gap” for such hazards that result in increased radiological doses.

Discussion:

The Memorandum of Understanding (MOU) between the NRC and the Occupational Safety and Health Administration (OSHA) identifies that the NRC oversees chemical safety issues related to: (1) radiation risk produced by radioactive materials, (2) chemical risk produced by radioactive materials, and (3) plant conditions that affect the safety and safe handling of radioactive materials. 10 CFR 70.62(c) reiterates as a regulatory requirement for conducting an Integrated Safety Analysis (ISA) that identifies (i) radiological hazards related to possessing or processing licensed material, (ii) chemical hazards of licensed material and hazardous chemicals produced from licensed material, (iii) facility hazards that could affect the safety of licensed materials and thus present an increased radiological risk. NRC does not oversee facility conditions that result in an occupational risk from chemical releases which do not involve NRC-licensed materials and do not affect the safe use of licensed radioactive material. Facility hazards is a catch-all for hazards not specifically identified in the regulations that could result in an increased radiological risk. The amount or quantity of increase does not need to be defined since this is only to identify that a particular chemical could impact radiological risk for a given accident sequence.

There are overlapping regulatory requirements that provide coverage for addressing hazards at fuel cycle facilities. The performance requirements in 70.61 include explicit standards for the first two chemical safety issues identified above. The third area of responsibility identified above is specifically evaluated by licensees under the ISA requirements of 70.62(c)(1)(iii). Part 20 requires a radiation protection program commensurate with the scope and extent of licensed activities. The licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA). Part 20 does not require the identification of items relied on for safety. Events caused by NRC-regulated chemicals that result in consequences that exceed the performance requirements for chemical exposure but are still within ALARA are addressed in Part 70.62(c). This requires accident sequences and consequences be identified in the ISA. This is implied as “all” accidents sequences which means that the ISA will include intermediate and high consequence accidents

as well as low consequence accidents. Items relied on for safety need only be identified for intermediate and high consequence accidents. These accident sequences should address the three categories of chemical safety regulated by the NRC, whether or not the dose impacts exceed the radiological consequences in 70.61. Emergency Plans (EPs) are required, as applicable, for licensees under 70.22(i)(1)(ii). In determining whether an EP is required, the applicant completes an evaluation showing that the maximum dose to a member of the public off site due to a release of radioactive materials would not exceed 1 rem effective dose equivalent or an intake of 2 milligrams of soluble uranium or provide an EP for responding to the radiological hazards of an accidental release of SNM and to any associated chemical hazards directly incident thereto. Emergency plans do not require the identification of items relied on for safety. The emergency response activities may overlap with administrative controls, IROFS, identified to mitigate an intermediate or high consequence event.

Regulatory Basis:

10 CFR Part 20 establishes limits for exposures and releases of NRC-licensed materials.

70.22(a)(7) and (8), "Contents of Applications," contains requirements for equipment, facilities, and procedures that will be used by the applicant to protect health and minimize danger to life or property.

70.22(i)(1) requires applicants to submit an emergency plan if the maximum dose to a member of the public offsite could exceed 1 rem effective dose equivalent or an intake of 2 mg soluble uranium to a member of the public offsite.

70.61 specifies performance requirements associated with risks identified by an Integrated Safety Analysis (ISA), and requires licensees and applicants to identify Items Relied on for Safety (IROFS) to mitigate or prevent high or intermediate consequences.

Applicability:

This interim staff guidance (ISG) is applicable to 10 CFR Part 70 fuel cycle facilities and associated Standard Review Plan NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," chapters 3, 4 and 8.

Technical Review Guidance:

NRC radiation protection regulations, 10 CFR Part 20, apply to normal operations and expected occurrences. An emergency plan is required for some fuel cycle facilities as identified in 10 CFR 70.22. The emergency plan covers the types of accidents that might occur at a facility based on that facility's activities. In performing ISAs in accordance with 10 CFR 70.62, licensees identify potential accident sequences, and they designate IROFS to mitigate or prevent accidents that can result in consequences that exceed the performance requirements.

10 CFR Part 20 and 70.22 contain regulatory requirements for radiation protection and emergency management, respectively. These regulations provide the bases for review requirements contained in chapters 4 and 8, respectively, of NUREG-1520. In particular, they address the regulatory approach to hazards that could result in radiological consequences

below the performance requirements. This approach to regulating these types of chemical hazards is, fundamentally, performance based in that it holds the licensee responsible for the safe storage and handling of chemicals. 10 CFR Part 70 Subpart H is based on risk, while 10 CFR Part 20 is based on consequences.

In determining how to evaluate an “increased radiological risk,” the reviewer should be looking at facility hazards that could have an impact on the safety of licensed material. The quantity of the increased risk is needed only to identify whether the consequences of the accident exceed the performance requirements. Otherwise, the amount of increase is immaterial since the reviewer should only be reviewing the ISA to ensure that accidents with an increased radiological risk are evaluated by the licensee as a facility hazard. This is also true for low consequence accidents that fall below the performance requirements. All potential accidents whether the consequence is determined to be low, intermediate or high are evaluated in the ISA. However, the licensee is not required to identify items relied on for safety for low consequence accident scenarios.

Some accident scenarios may involve a hazard which is not explicitly regulated by NRC. At some facilities, chemicals not regulated by NRC, physical hazards, and other phenomena may be facility hazards that can affect the safety of licensed material, and thus present an increased radiological risk. For example, a corrosive gas or fume that is not normally mixed with licensed material might cause failure of a container holding licensed material. Similarly, a pressurized gas bottle containing nitrogen may fail and become a physical projectile capable of breaching a nearby glovebox that contains licensed material. In these instances, if the radiological consequences resulting from a postulated event do not exceed the 10 CFR 70.61 radiological performance requirements, then no IROFS are required to control these hazards. If, however, an NRC staff reviewer judges that the likelihood of these events is not unlikely, then these hazards should be brought to the attention of the radiation safety reviewer to ensure the applicant/licensee will comply with the requirements of Part 20.

During the conduct of an ISA review of low consequence accidents, a review may raise concerns as to whether an existing program such as a radiation protection plan, emergency plan or environmental protection plan would actually address the low consequence accident. If the methodology for conducting the ISA is carried through for these low consequence accidents and the ISA Summary is found acceptable the reviewer will be able to complete the Safety Evaluation Report for approval of the ISA Summary. However, the concerns with respect to low consequence accidents should not be ignored. These concerns should be provided to the Project Manager and other reviewers as appropriate as insights for future reviews of license amendments, plan revisions and potential inspection activities.

Recommendation:

This ISG should be used as an addendum to NUREG-1520 to clarify portions of chapters 3, 4, and 8.

References:

U.S. Code of Federal Regulations, Title 10, Part 70, “Domestic Licensing of Special Nuclear Material,” U.S. Government Printing Office, January 1, 2003

U.S. Code of Federal Regulations, Title 10, Part 20, "Standards for Protections Against Radiation," U.S. Government Printing Office, January 1, 2003

Memorandum of Understanding between NRC and OSHA relating to NRC-Licensed Facilities, December 23, 1988

NRC Memorandum to Carl J. Paperiello, Subject: Regulatory Authority Over Chemical Hazards at Fuel Cycle Facilities, dated March 10, 2003

NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, March 2002

NUREG-1718, "Standard Review Plan for the Review of an Application for a Mixed Oxide (MOX) Fuel Fabrication Facility," U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, August 2000

Approved: _____ Date: _____
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