

## SUMMARY OF PUBLIC COMMENTS ON SPECIFIC QUESTION POSED IN PROPOSED RULE

Eight organizations commented on various aspects of the proposed revisions to 10 CFR Part 72. Comments were divided in addressing the specific question posed by the Commission in the proposed rule regarding the appropriate mean annual probability of exceedance (MAPE) for the design earthquake ground motion (DE). While the industry organizations supported the proposed DE at a MAPE of  $5E-4$  (2,000 year return period), the State organizations stated that the rationale in draft regulatory guide DG-3021 did not provide a sufficient quantitative technical basis for the proposed MAPE. They suggested MAPE values varying from  $4E-4$  (2,500 year return period) to  $1E-4$  (10,000 year return period) use for nuclear power plants (NPPs)).

All of the commenters agreed with the proposal to address uncertainty by requiring the use of a probabilistic seismic hazard analysis (PSHA) or suitable sensitivity analysis for independent spent fuel storage installations (ISFSIs) or U.S. Department of Energy (DOE) monitored retrievable storage installations (MRSs) in the western U.S., not co-located with an NPP, and in areas of known seismic activity in the eastern U.S.

All commenters supported the concept of requiring general licensees to evaluate both dynamic loads and static loads for ISFSI and MRS cask storage pads and areas. Section 72.212(b)(2)(i)(B) will be revised, as shown in the proposed rule, to require general licensees to address the dynamic loads of the stored casks in addition to the static loads.

Some of the more contentious public comments (and NRC responses) that relate to the specific question for public comment posed by the Commission in the proposed rule regarding the appropriate MAPE value for the DE are discussed below. A more comprehensive discussion of all the public comments are in the final rule.

### **Comment:**

One commenter stated that a DE at a MAPE of  $5E-4$  (2,000 year return period) is not defensible. The commenter said that there are numerous standards that already use a DE at a MAPE of  $4E-4$  (2,500 year return period), including DOE Standard 1020-2000. The commenter noted that DOE's standard is inextricably tied to meeting performance and risk goals. Further, the commenter indicated that certain buildings, such as hospitals, must meet a DE at a MAPE of  $4E-4$  (2,500 year return period), as must interstate bridges in the State of Utah. The commenter stated that, at a minimum, a standard lower than these cannot be adopted.

### **Response:**

The NRC disagrees with the commenter that the proposed standard for the DE at a MAPE of  $5E-4$  (2,000 year return period) is lower than the DOE Standard DOE-STD-1020-2002, or the other standards, such as the International Building Code (IBC-2000 Code).

According to the DOE Standard DOE-STD-1020-2002, ISFSIs can be classified as Performance Category 3 (PC-3) facilities. For PC-3 facilities, the seismic design forces for the

DE are initially determined at 90 percent of the DE at a MAPE of  $4E-4$  (2,500 years return period). This brings the DE levels to approximately a MAPE of  $5E-4$  (2,000 year return period), specified in the earlier DOE 1020 standard, DOE-STD-1020-94. The Foreword of the DOE-STD-1020-2002 explains the change in the return period as follows:

“It is not the intent of this revision to alter the methodology for evaluating PC-3 facilities, nor to increase the performance goal of PC-3 facilities, by increasing return period for the PC-3 from a 2,000-year earthquake to a 2,500-year earthquake. Rather, the intention is more for convenience to provide a linkage from the NEHRP maps and DOE Standards”.

Therefore, use of the reference probability of  $5E-4$ /yr (2,000 year return period), for the ISFSI or MRS facility DE, would be consistent with that used in the DOE Standard DOE-STD-1020, for similar type facilities.

For the IBC-2000 Code, the commenter is incorrectly comparing the ISFSI or MRS DE at a MAPE of  $5E-4$  (2,000 year return period), with the Maximum Considered Earthquake (MCE) at a MAPE of  $4E-4$  (2,500 year return period). The DE, according to the IBC-2000 Code, is two-thirds of the MCE, which is equivalent to a DE at a MAPE of  $1.1E-3$  (909 year return period) earthquake in the western United States, and a DE at a MAPE of  $7E-4$  (1,430 year return period) in the eastern United States. Thus, the DE for the ISFSI or MRS facility included in DG-3021 at a MAPE of  $5E-4$  is greater than the IBC Code DE design level.

The NRC agrees that hospital building structures and bridges having critical national defense functions are designed for the DE at a MAPE of  $4E-4$  (2,500 year return period). These structures are generally occupied by a significant number of people. Therefore, these structures are designed for loads greater than those for traditional buildings to limit building deformations, and to minimize human losses due to an earthquake. The ISFSI or MRS facility, on the other hand, has a relatively small number of people occupying the Canister Transfer Building at any one time.

#### **Comment:**

Two commenters stated that the seismic design standard (MAPE of  $5E-4$  (2,000 year return period)) is less protective than the seismic standard for municipal solid waste landfills in California (maximum credible earthquake (MCE) of  $4E-4$  (2,500 year return period)), and the International Building Code (MCE of  $4E-4$  (2,500 year return period)), both of which are more stringent than the proposed rule. One commenter is concerned that a DE at a MAPE of  $5E-4$  (2,000 year return period) may not provide an adequate margin of safety to protect the public.

However, two other commenters stated that the rigor of the seismic evaluation criteria and the conservatism of the seismic design requirements significantly exceed those in modern conventional building codes. One of the commenters stated that the annual probability of unacceptable seismic performance for a dry cask ISFSI designed to a DE at a MAPE of  $5E-4$  (2,000 year return period) will be substantially less than that of an essential or hazardous facility designed to the modern conventional building code for which the DE was established at 67 percent of the MCE of  $4E-4$ . Another commenter stated that the level of safety for a dry cask

storage facility designed to a DE at a MAPE of 5E-4 (2,000 year return period) provides at least twice the level of safety attained by facilities designed under the International Building Code.

**Response:**

The NRC disagrees with the commenters that the seismic design standard (MAPE of 5E-4) is less protective than the seismic standard for municipal solid waste landfills in California (Code of Regulations Section 66264.25(b), and the International Building Code -2000 (IBC-2000). The California standard requires the municipal waste landfills to be designed to withstand the maximum credible earthquake (MAPE of 4E-4) of the IBC-2000 without decreasing the level of public health and environmental protection. The cask and the cask transfer building at an ISFSI or MRS facility, designed to a DE at a MAPE of 5E-4, has the capacity to withstand earthquakes of greater magnitude than the one associated with the MAPE of 4E-4. This is because of the conservatism in the seismic evaluation criteria of NRC's NUREG-1536 and NUREG-1567, which significantly exceed those in modern conventional building codes. Additionally, the risk of the ISFSI or MRS facility to public health and safety is lower than the risk for hazardous waste and municipal solid waste landfills because the spent nuclear fuel is contained within a sealed steel cask in an isolated facility away from the public, with a controlled boundary at a minimum distance of 100 m. Landfills, on the other hand, may be open and in close proximity to public areas.

**Comment:**

Three commenters stated that the proposed rule provided no basis or quantitative analysis to justify lowering the DE to any particular value. One of these commenters indicated that absent any quantitative evidence justifying a particular value, the conservative, precautionary approach of requiring ISFSIs and MRSs to meet the same design standard as a nuclear power plant is most appropriate. One of these commenters noted that the adequacy of the MAPE should be addressed with respect to the change in the design earthquake ground motion. The commenter stated that this could be addressed by using the higher proposed MAPE versus what is currently required and then determining if the change in the level of risk of a release is significant or not.

**Response:**

The DE level proposed in the draft regulatory guide was selected based on the fact that the ISFSI or MRS risk is lower than that of an NPP and on the fact that this level is consistent with the hazard levels used in the nuclear industry for similar facilities. Details of the NRC's analyses for establishing the DE level are provided in the report, "Selection of Design Earthquake Ground Motion Reference Probability". This report may be accessed through the NRC's Public Electronic Reading Room on the Internet at <http://www.nrc.gov/reading-rm/adams.html>. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's PDR reference staff at 1-800-397-4209, 301-415-4737, or by email to [pdr@nrc.gov](mailto:pdr@nrc.gov).

**Comment:**

A commenter requested a rule to establish a definitive design basis earthquake at a return period level [the return period of an earthquake is an inverse of the MAPE of the earthquake] greater than 2,000 years that is tied to defined risk and performance goals.

**Response:**

The NRC does not agree that we must establish a definitive design basis earthquake by rule. The current regulations in § 72.122(b)(2)(i), require that the structures, systems, and components of an ISFSI or MRS must be designed to withstand the effects of natural phenomena, such as earthquakes, without impairing their capability to perform their intended design functions. For earthquakes, these requirements are then supplemented by the requirements at §§ 72.102, 72.103, and 72.122 for detailed site investigations and appropriate consideration of the most severe of the natural phenomena and associated probability of occurrence, including consideration of uncertainties, in the prediction of earthquakes. This approach is consistent with the NRC's philosophy of using risk-informed, performance-based regulations. In a risk-informed, performance-based approach, the design of the ISFSI or MRS facility is based on an assessment of the radiological risk (potential for adverse consequences) due to an earthquake. Thus, specifying a value for the reference probability in the rule would preclude applicants from considering structures, systems, and components with risks other than the risk associated with the specified reference probability.

**Comment:**

A commenter stated that Draft Regulatory Guide DG-3021 "is short on firm standards" because, although it recommends a DE at a MAPE of  $5E-4$ , it also allows an applicant to demonstrate that the use of a higher probability of exceedance value would not impose any undue radiological risk to public health and safety. Thus, the draft guidance, in the commenter's view, "leaves open the possibility of an even lower standard for seismic sites." Another commenter defends the guidance that an applicant could propose a higher probability of exceedance value as being an exemption to what the commenter sees as the norm being established in DG-3021.

**Response:**

Section 72.103(f)(2)(i) of the rule requires that an applicant include a determination of the DE for the site, considering the results of the investigations required by paragraph (f)(1) and addressing uncertainties through an appropriate analysis, such as a PSHA or suitable sensitivity analyses. Regulatory Guide 3.73 (formerly DG-3021) states that a mean annual probability of exceeding the DE of  $5E-4$  is recommended to be used in conjunction with the PSHA for determining the DE. As the commenter notes, the draft guidance also indicated that "[t]he use of a higher reference probability will be reviewed and accepted on a case-by-case basis." This statement was made in recognition of the fact that a regulatory guide does not establish legally-binding requirements. An alternative reference probability would not be an exemption from a requirement, but would be an alternative proposal which would need to be demonstrated to be acceptable. Thus, it is conceivable that an applicant could propose a

higher MAPE value that the NRC staff would then have to consider. Although this is necessarily the case for recommendations suggested in guidance documents, the NRC did not mean to imply that it viewed an applicant's ability to make the necessary safety case for a higher MAPE as being a likely prospect. To avoid any such implication, that sentence has been removed from the final guidance.