Department of Energy
Washington, DC 20585

May 16, 1995

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
Suite 700
625 Indiana Avenue, NW
Washington, DC 20004

Dear Mr. Chairman:

This letter provides a summary of the actions of the Department of Energy (DOE) Safety Management review group with regard to DOE seismic safety policy. This group and its assignment were identified in my letter dated February 17, 1995 that also transmitted a copy of the final report of the special team of experts who reviewed DOE seismic safety policy including issues raised by the DNFSB in your April 29, 1994 letter.

The results from the DOE Safety Management group's review of the special team's report and their recommendations to improve the Orders and standards as suggested in your April 29, 1994 letter are provided in the enclosure in the form of responses to the recommendations identified in the February 17, 1995 team report. The responses in the enclosure provide the DOE Safety Management group decisions relative to the review team's recommendations. The appropriate DOE standards working committees will now act on these decisions.

We are planning to implement these decisions as soon as possible, but are also eager to obtain Board comments so the desired implementation measures are achieved. Please contact me (301-903-3465) or Richard Stark (301-903-4407) with questions or comments.

Sincerely,

Richard L. Black

Richard L. Black, Director
Office of Nuclear Safety
Policy and Standards

Enclosure

cc: Dr. George W. Cunningham, DNFSB
Mr. Joseph Arango, EH-9

Response to Recommendations of the Review Team on the Department of Energy Natural Phenomena Hazards Mitigation Order and Standards

The " Report of the Review Team on the Department of Energy Natural Phenomena Hazards Mitigation Order and Standards", February 1995, provided recommendations to DOE. The recommendations have been evaluated by a DOE senior management group comprised of representative of each organization with responsibility for facilities. The group held four meetings over the period February to May, with increasingly focused discussions enabling them to agree on a course of action for each recommendation. The following summarizes the results of their deliberations and provides responses to the eleven "more significant" recommendations in the review team report (pages xii-xiii).

Review Team Recommendation: 1a. "Delete the numerical performance goals in paragraph 12 and base the redefined NPH categories solely on expanded definitions of the functional performance objectives and clarify the distinction between NPH categories 3 and 4."

Response: The need to lessen the role of the numerical performance goals is seen to be driven by : 1) concern that they will be misinterpreted as requirements, engendering protracted arguments about risk quantification for specific facilities; 2) the fact that the interpolation between UBC and reactor performance, however reasonable it may be, is not supported by consensus standards; and 3) the judgment that the performance goals represent an over-commitment for some DOE facilities (particularly existing facilities). Therefore, the Numerical Performance Goals, although clearly identified in DOE Order 5480.28 as targets, will be removed from the Order to lessen the emphasis on these numbers and increase the attention on the functional performance objectives of the NPH categories. The Numerical Performance Goals and their role in developing target hazard levels and engineering design requirements will continue to be discussed in STD-1020. It is important to continue to recognize their role in guiding the development of the engineering requirements that are designed to fulfill the goals, and promoting uniformity in the treatment of all NPH. The functional performance goal definitions in the Order for PC-3 and PC-4 will be expanded to more clearly distinguish the type and function of the SSCs that should be placed in each of these categories. Only the most hazardous facilities with off-site risks comparable to large power reactors (e.g. the upper range of Category A, >250 Mwt per 5480.1a) warrant the additional conservatism of PC-4 requirements.

Review Team Recommendation; 1b. "Establish new minimum standards for each NPH category and targets for additional capacity for NPH mitigation when additional mitigation is cost-effective. The report provides an illustration for how this could be accomplished."

Response: The need to establish new minimum standards is driven by the judgment that the performance goals represent an over-commitment for some DOE facilities (particularly

existing facilities) and the judgment that capability less than the minimum would not meet the intent of the policy. Therefore, the requirements for NPH design will be revised to make it clearer that it is DOE's objective to meet at a minimum the norms of society for protecting against seismic hazards. The norms, whether for new or existing facilities, are established by national consensus standards. The NEHRP guidance for application of model building codes to Federal facilities is providing comprehensive guidance for both new and existing facilities. At a minimum this guidance will be applied to all DOE facilities.

The new minimum requirements will impact design hazard levels and engineering criteria conservatism. They will adopt NPH hazard levels reflecting national consensus standards for all on-site safety considerations. These hazard levels will be based on 10% chance of exceedance in 50 years. Higher hazard levels, up to and including current power reactor requirements, will be adopted for performance category 4 facilities on a case basis, weighing both the facility hazards and the practicality of mitigating them. Some relaxation of margins in the engineering criteria will be permitted as long as best estimate evaluations show that the functional performance objectives are met.

In the case of both new and existing facilities upgrading from the minimum requirements would be accomplished on a cost beneficial basis, but the evaluations for new and existing facilities would have a different focus. Cost/benefit would be assessed for any changes in the as-built configuration of the existing facilities beyond changes needed to meet the new minimum requirement. For new facilities, deviation from the target capacity would require cost/benefit justification. It is expected that the cost of providing significant margin above the minimum will be less expensive in new facilities than in existing facilities and therefore target requirements should be met for new facilities. The cost/benefit analyses for both new and existing facilities are anticipated to be only one of several key factors considered in the decisions related to design of the SSCs for NPH mitigation and only when the costs become significant enough to merit this attention.

Review Team Recommendation: 2. "Develop improved guidance for applying the NPH Order and standards to existing facilities. Such guidance would aid analysts in evaluating the susceptibility of the facility to unacceptable NPH induced damage. The guidance should address prioritizing and making retrofit decisions, and should be in conformance with the Executive Order on application of NEHRP guidance to existing facilities, and, for decisions involving major resources, should consider use of multi-attribute utility models similar to the Laboratory Integration and Prioritization System (LIPS)."

Response: The need to address existing facilities is driven by: 1) the commitment in Order 5480.28 to develop a plan for existing facilities within one year of approval of the last standard (i.e. STD-1023); 2) the criteria in Order 5480.28 [Section 10.a(4)(a)] that trigger a reevaluation for an existing facility; 3) the 5480.23 SAR process; 4) the Executive Order 12941 of December 1994 that requires government-wide assessment of the cost of upgrading existing facilities to the life safety standards set in ICSSC RP-4; and 5) the facility specific and generic seismic concerns that have been raised by the DNFSB.

The difference between the current DOE requirements for existing facilities and the seismic capacity of the facilities is expected to be large. The large cost required to fully address these differences would compete for available resources and preclude rehabilitating more than a small fraction of the existing facilities in any given year. Further, the current DOE requirements are probably excessively demanding when applied to existing facilities. Therefore, improved guidance for managing the systematic reduction of the hazards associated with existing facilities will be developed based on experience gained from several ongoing projects and other projects yet to be identified. The objective of this approach is to build on the technical experience that is available while continuing to give attention to specific facilities. The pilot facilities will be selected to address the highest potential risks. The selected facilities will be evaluated for seismic capacity, designs for strengthening vulnerable SSCs will be developed, and mitigation improvements will be evaluated for cost/benefit. Specific decisions on the pilot facilities will serve to support development of generic guidance. Separately, DOE's facilities identified for the NEHRP sample will afford a broader cross-section of the remaining facilities for consideration of their potential needs for seismic strengthening.

Review Team Recommendation: 3. "Develop a better procedure than the current approach in STD-1021 for assigning SSCs to NPH categories. The metric used must be a reasonably accurate indicator of the real hazard posed by SSC failures during a natural phenomenon event. The report contains an example of how this could be implemented through the Safety Analysis Report process."

Response: STD-1021 provides guidance on how to categorize SSCs for NPH design. It was prepared prior to the guidance on SAR preparation now available in STD-3009. STD-1021 will therefore be revised to more closely integrate the assignment of SSCs to NPH categories based on their importance to safety identified through application of the Safety Analysis Process. The revisions will result in guidance that ensures that the assignment of SSCs to NPH categories is SAR driven. The product of this effort will be an NPH categorization process that assigns NPH categories to SSCs based on the level of the NPH event hazard and the function the SSC performs in controlling or mitigating that hazard (i.e. accident consequences) during NPH events.

Review Team Recommendation: 4. "Extend the SAR process, including the use of Process Safety Management, the identification of Safety Class and Safety Significant SSCs, and the improved NPH categorization process to non-reactor [sic, should be "non-nuclear"] hazardous facilities (e.g. those with chemicals or explosives)."

Response: The SAR Order, 5480.23, addresses non-nuclear hazards in nuclear facilities with the same systematic process applied to the nuclear hazards in these facilities. The 5480.23 SAR process is not applied to facilities that involve chemical hazards only. The Process Safety Management (PSM) methods developed by the commercial chemical industry are currently being implemented to assure safety in DOE non-nuclear hazardous facilities. The PSM methods have been recognized as a valuable adjunct to safety methods used in the nuclear industry and these have also been integrated into the SAR process for

non-reactor nuclear facilities. The DOE non-nuclear hazardous facilities are similar to those in commercial industry, such as chlorine water treatment plants, storage of commercial explosives etc. The DOE methods for assuring safety of these facilities, including design for NPH mitigation effectively implement national standards. These current practices provide adequate guidance for assuring safety in non-nuclear facilities.

Review Team Recommendation: 5. "Provide more specific guidance for incorporating defense in depth into the most hazardous non-nuclear facilities, based on the actual hazards posed by these facilities. "

Response: Defense in depth is a safety technique that is generally used to assure high functional reliability and is not specific to NPH mitigation. It has been a subject of discussion with the DNFSB and they mentioned it in their letter on NPH mitigation. It is our judgment that the guidance currently included in STD-3009 concerning application of defense in depth is adequate. This guidance was not available when Order 5480.28 was developed.

Review Team Recommendation: 6. "Formalize the process for independent selection and review of the DBE/EBE for NPH Category 4 with a centralized DOE function to better assure site-to-site consistency."

Response: It is recognized that selection of the DBE/EBE earthquake for the most hazardous facilities involves expert judgment supported by extensive site and facility assessment. Although current requirements include peer review of the evaluation and selection process they do not necessarily ensure a site-to-site consistency. Therefore, the NPH Coordinating Committee within DOE Headquarters will review the DBE/EBE selections for the most hazardous facilities, e.g. facilities that include Category 4 SSCs. This committee includes the expertise necessary to confirm that DBE/EBE selections are being made on the basis of consistent site-to-site application of STD-1022 and STD-1023.

Review Team Recommendation: 7. "Provide guidelines for how to assess the suitability of SSCs for continued operation or use following an earthquake of noticeable magnitude but less than the DBE. The guidelines should include consideration of the role of on-site seismic instrumentation as well as the design and construction practices used in the facility."

Response: Prior planning may expedite restart of important facilities following an earthquake by identifying means for damage assessment and safety assurance. Therefore, a review of current practice, including the role of seismic instrumentation, for restart or reuse of facilities that have experienced severe earthquakes will be completed. The EPRI guidelines for restart of power reactor designs that do not include an OBE in their design are included in the review. The means for assuring life safety in buildings that may have experienced some damage are also being considered. The objective of the review is to

determine if there is a need to provide additional guidance for post-earthquake restart of SSCs that have been designed on the basis of allowing limited inelastic response to the DBE.

Review Team Recommendation: 8. "Expand STD-1020 to provide improved evaluation guidance and seismic design requirements for mechanical and electrical equipment, particularly for existing facilities.

Response: Current guidance in STD-1020 follows the experience of the commercial industry and identifies three methods for qualification of equipment: analysis, testing and SQUG. We will continue to rely on this experience and also the experience from facilities that have experienced severe earthquakes for guidance on how to assure survival of mechanical and electrical equipment that is important to safety. We expect the NEHRP and UBC to both provide improved guidance in this regard. We intend to continue to follow this experience and use the information and national consensus standards developed to address this area. New information applicable to both new and existing facilities will be incorporated as it becomes available with limited revisions to STD-1020.

Review Team Recommendation: 9. "Review further the requirements for seismic qualification testing of components (these are more stringent than national standards for commercial nuclear plants) to assure that this is a cost-effective requirement."

Response: The DOE guidance for component seismic qualification testing of PC-3 and PC-4 equipment at a higher required response spectrum (RRS) than that required by the NRC was based on demonstrating that the performance goals are met. Consistent with our objectives of reducing the emphasis on these goals and using consensus standards, the next revision of STD-1020 will include a footnote or additional guidance in the section "Evaluation by Testing", Page 2-20, to the effect that if this guidance leads to new testing beyond that completed for NRC qualified equipment then further evaluations should be performed. It is not intended that equipment already qualified for the NRC be requalified. Qualification of unique DOE equipment should be accomplished using the most cost effective manner possible. Testing at the higher RRS should only be done when the additional margin can be achieved without significant additional cost.

Review Team Recommendation: 10. "DOE should support an effort to investigate the potential for incorporating all or portions of the DOE NPH standards into future national standards."

Response: Activities have been initiated with the American Nuclear Society to proceed with possible development of national standards to address the requirements in DOE-STD-1020, 1021, 1022, and 1023. The four DOE NPH standards were accepted at an April 1995 meeting of the Nuclear Power Reactor Safety Committee (NUPSCO) as the initial basis for standards development and will be revised as needed to gain

consensus The NUPSCO committee will seek the support of the ASCE or other standards organizations as appropriate This activity is expected to lead to the issue of ANSI standards in those areas where a consensus standard can be developed.

Review Team Recommendation: 11. "To ensure that the NPH standards remain current and cost-effective, DOE should continue active participation in the ICSSC (NEHRP implementation coordination) and should share information with DOD periodically."

Response: It is our intention to not only continue our required participation in ICSSC but to maintain contact with other national organizations, such as the Building Seismic Safety Council that are developing the NEHRP requirements. We have also found that our independent discussions with other agencies such as DOD are very useful and we plan maintain these communications.