DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004-2901
(202) 694-7000

00-0000079

January 13, 2000

The Honorable David Michaels
Assistant Secretary for Environment,
Safety and Health
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0119

Dear Dr. Michaels:

The Defense Nuclear Facilities Safety Board (Board) letter of July 8, 1999 to the Department of Energy (DOE) indicated that the guidance proposed by DOE to classify safety structures, systems and components by using Evaluation Guidelines was reasonable, provided that the Evaluation Guidelines were not treated as a design acceptance criterion nor used to reduce defense-in-depth measures. This guidance was provided in draft Appendix A to DOE-STD-3009-94, *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports,* and the draft Implementation Guide DOE G 420.1-X, *Nonreactor Nuclear Safety Design Criteria.* The Board's letter also stressed the need for providing appropriately classified confinement systems (e.g., safety class, safety significant) in DOE facilities in accordance with the principles of an Integrated Safety Management System.

Members of the Board's staff commented on this guidance in an enclosure to the Board's letter of July 8, 1999. As a result of cooperative discussions between the staffs of DOE and the Board, comments on the aforementioned documents were satisfactorily resolved as indicated by the enclosed Board's staff letter of December 2, 1999 to DOE.

Members of the Board's staff recently reviewed draft Guide DOE G 420.1-Y, *Guide for the Mitigation of Natural Phenomena Hazards for DOE Nuclear Facilities and Non-Nuclear Facilities.* Productive discussions were held with members of DOE's staff to clarify the application of Performance Categories to the design of confinement systems consistent with the Board's letter of July 8, 1999. The resolution of comments on this document was provided by the enclosed letter of December 16, 1999 to DOE.

The Board is encouraged by the timely response and cooperation evidenced by DOE's staff in this matter. If you have any comments or questions, please do not hesitate to call me.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.

Enclosures

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004-2901
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December 2, 1999

Mr. Mark B. Whitaker, Jr., S-3.1
Departmental Representative to the
Defense Nuclear Facilities Safety Board
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Mr. Whitaker:

This letter provides the results of the Board's staff review of the draft Appendix A to the Department of Energy's (DOE) technical standard, DOE-STD-3009-94, *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports*, and the draft Implementation Guide DOE G 420.1-X, *Nonreactor Nuclear Safety Design Criteria*, both provided by DOE letter dated October 19, 1999. These drafts were the result of the DOE response to the Board letter of July 8, 1999 and discussions between the Board's staff and DOE's staff related to the application of Evaluation Guidelines in the selection of Safety Class Structures, Systems, and Components (SSC). The Board's staff finds the current drafts acceptable for issue with incorporation of the agreed upon resolution of comments noted in Enclosure 1 for Appendix A to DOE-STD-3009-94 and Enclosure 2 for the Implementation Guide to DOE G 420.1-X.

The Board's staff is reviewing the DOE draft Implementation Guide DOE G 420.1-Y, *Guide for the Mitigation of Natural Phenomena Hazards for DOE Nuclear and Non-Nuclear Facilities*, also provided by DOE letter dated October 19, 1999. Results from that review will be provided separately.

If you have any questions or comments, please contact me at (202) 694-7140.

Sincerely,

Ronald W. Barton

Ronald W. Barton
DNFSB Directives Lead

Enclosures

Enclosure 1
Resolution of DNFSB Comments on
Draft Appendix A to DOE-STD-3009-94
forwarded by DOE letter dated October 19, 1999

Changes to Appendix A agreed to between DOE and DNFSB staffs:

1. Section A.2, page A-3: In the penultimate paragraph, change "If EG values are exceeded.." to "If EG values are approached.."

2. Section A.3, page A-4: Add to the penultimate paragraph the following sentences: "However, quick release accidents involving other pathways, such as a major tank rupture which could release large amounts of radioactivity in liquid form to water pathways, should be considered. In this case, real potential uptake locations should be the evaluation point."

3. Section A.3.1, page A-5: Revise item 5) to read; "Assume the availability of passive safety features that are not affected by the accident scenario. For example, in the case of a process vessel rupture, it should be assumed that other vessels not affected by the accident are available."

4. Section A.3.3, page A-7: Replace the 4th sentence in Dose Calculation Location with: "It is DOE practice and expectation that onsite individuals, both workers and public, are protected under the Emergency Response plans and capabilities of its sites."

Enclosure 2
Resolution of DNFSB Comments on
Draft Implementation Guide DOE G420.1-X
forwarded by DOE letter dated October 19, 1999

Changes to DOE G420.1-X agreed to between DOE and DNFSB staffs:

1. Revise Section 2.1.3, Safety-Significant SSCs, as follows:

"The following paragraphs constitute the definition of safety-significant SSCs. Together with the discussions of defense-in-depth of Section 2.3 of this Guide, they provide guidance for the identification of safety-significant SSCs.

Safety-significant structures, systems, and components (safety-significant SSCs) are structures, systems, and components not designated as safety-class SSCs, but whose preventive or mitigative function is a major contributor to defense in depth (i.e., prevention of uncontrolled material releases) and/or worker safety as determined from hazard analysis.

As a rule of thumb, safety-significant SSC designations based on worker safety are limited to those systems, structures, or components whose failure is estimated to result in a prompt worker fatality or serious injuries (e.g., loss of eye, loss of limb) or significant radiological or chemical exposures to workers. This rule of thumb is neither an evaluation guideline nor a quantitative criterion. It represents a threshold of concern for which safety-significant SSC designation may be warranted. Estimates of worker consequences for the purpose of a safety-significant SSC designation are not intended to require detailed analytical modeling, due to the uncertainties in analyses, especially for facility workers. Considerations should be based on engineering judgment of possible effects and the potential added value of safety-significant SSC designation. Experience has shown that safety-significant SSCs identified through defense-in-depth considerations also provide safety for workers."

2. Glossary: Delete the last sentence of the definition for evaluation guidelines.

3. Section 3.2, Siting Criteria Development: Revise the last sentence of this section to read: "For the purpose of this Guide, a radiological siting criterion of 25 rem, 50-year total effective dose equivalent shall be used, from releases over the course of postulated design basis accidents from uptakes at the site boundary that could be delivered during a one year period."

4. Fire Protection, Section 4.6.1, General Application:

Add the following sentence: "Acceptable methods for fire protection design may be found in DOE-STD-1066-99, "Fire Protection Design Criteria." A reference to this standard should be added to the Department of Energy references in Appendix A. It was agreed that the underlined parenthetical references to Order 470.1 are not valid.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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December 16, 1999

Mr. Mark Whitaker, S-3.1
Departmental Representative to the
Defense Nuclear Facilities Safety Board
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Mr. Whitaker:

This letter provides the results of the Board's staff review of the draft Implementation Guide DOE G 420.1-Y, *Guide for the Mitigation of Natural Phenomena Hazards for DOE Nuclear Facilities and Non-Nuclear Facilities*, provided by DOE letter dated October 19, 1999. This draft was updated to reflect the current industry guidance on natural phenomena hazards and to address the Board's staff comments that were enclosed with the Board's July 8, 1999 letter to DOE.

The Board's staff had timely and productive discussions with DOE's staff related to the application of Performance Categories to the design of safety structures, systems, and components. The Board's staff has no remaining comments to the draft Guide with the incorporation of the agreed upon resolution of comments that are indicated in the enclosed revised pages (10).

If you have any questions or comments, please contact me at (202) 694-7140.

Sincerely,

Ronald W. Barton

Ronald W. Barton
DNFSB Directives Lead

Enclosure

I. INTRODUCTION

A contractor/operator responsible for a DOE nuclear or non-nuclear facility shall design, construct and operate the facility so that the public, the workers, and the environment are protected from the adverse impacts of Natural Phenomena Hazards (NPHs) listed in Appendix C. This document provides guidance for implementing the NPH mitigation requirements in Section 4.4 of DOE Order 420.1, "Facility Safety". It addresses radiological and non-radiological hazards and life-safety issues, including protection of workers from exposure to hazardous materials, from failure of structures, systems, and components (SSCs).

The Department of Energy uses the requirements of the latest model building codes, the Uniform Building Code (UBC), Building Officials and Code Administrators International (BOCA), Southern Building Code Congress International (SBCCI), and national standards (e.g., ASCE 4 - "Seismic Analysis of Safety-Related Nuclear Structures" and ASCE 7, "Minimum Design Loads for Buildings and other Structures", for wind loads) to mitigate the consequences of natural phenomena hazards. The first three model building codes are now being combined as the International Building Code and these will cease to exist individually from year 2000. Initially, DOE standards, guidance, and practices were developed and promulgated by DOE 6430.1A through the DOE General Design Criteria to provide levels of design for: occupant life safety, reduction in loss of government property, functioning of essential operations and confinement of hazardous material. These were later superseded by DOE Order 5480.28 which is now superseded by DOE Order 420.1, Section 4.4.

The NPH Mitigation requirements of Section 4.4 in DOE Order 420.1 are consistent with the DOE Order on Environment, Safety, and Health (DOE 5480.1B), Safety Analysis and Review System (DOE 5481.1B), and the seismic guidance of the National Earthquake Hazards Reduction Program (NEHRP) contained in the NEHRP Provisions (FEMA 302) and the Interagency Committee on Seismic Safety in Construction (ICSSC) Standard RP-4. Recent evaluations under the NEHRP studies indicate that the seismic requirements of DOE for design and evaluation of buildings to be "substantially equivalent" to the NEHRP provisions required by the Executive Order (E.O.) on Seismic Safety for New Construction (E.O. 12699 dated 1-5-90) and in many cases are substantially more conservative for levels of design beyond those judged acceptable for life safety.

For non-nuclear facilities having no hazardous materials, it is acceptable and sufficient to use any of the three model building codes or succeeding unified code IBC 2000 (when issued) ~~found to meet or exceed NEHRP provisions~~. For facilities containing hazardous material, DOE requirements may be more stringent. Furthermore, for seismic requirements for all existing buildings with no hazardous material, ICSSC RP-4 provisions are considered as a minimum as per E.O. 12941.

special conditions present an "exceptionally high risk" to occupants or the public at large. (See ICSSC RP-5.)

IV. GUIDELINES

Adequate design, construction and operational measures to mitigate NPH occurrences have been shown in many cases to yield considerable benefit in terms of risk reduction. However, in view of the large uncertainties in the NPH hazard and the uncertainties in the possible impact on a given facility if a NPH event occurs, achieving the appropriate balance between the expense of mitigation measures and the residual risk is a particularly difficult challenge.

Designing a new facility to be resistant to NPH loads is usually easier and cheaper than backfitting to achieve the same NPH capacity after the structure is completed and in service. In addition to the feasibility of retrofitting, cost-effectiveness (which depends on ~~other~~ factors ~~(~~such as projected service life or the time integral of residual risks) ~~that must~~ shall be weighed in considering upgrade approaches for existing facilities. Each natural phenomena hazard (as listed in Appendix C) which poses a threat or danger to workers, the public, or to the environment by potential damage to systems, structures and components (SSCs) ~~must~~ shall be considered in developing the safety analysis.

DOE has prepared and is updating five supporting standards to implement the NPH requirements of DOE 420.1 and the most current version of these standards shall be adhered to in order to provide desired safety at DOE facilities.

DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*;

DOE-STD-1021-93, *Natural Phenomena Hazards Performance Categorization Criteria for Structures, Systems, and Components*;

DOE-STD-1022-94, *Natural Phenomena Hazards Site Characterization Criteria*;

DOE-STD-1023-95, *Natural Phenomena Hazards Assessment Criteria*;

DOE-STD-1024-92, *Guidelines for Use of Probabilistic Seismic Hazard Curves at Department of Energy Sites.*

~~The use of the word "shall" in these standards and this implementation guide is to be understood as referring to an item or activity that is highly recommended within the context of the guide or standard. The use of "should" is to be understood as referring to a recommended item or activity.~~ Throughout this Guide, the words "shall" and "should" are used to identify actions that need to be accomplished to meet this guidance. The word "shall" denotes actions that must be performed to comply with this Guide. The word "should" is used to indicate recommended practice (DOE-STD-1075-94). The use of "may" is to be understood as referring to an item or activity that can be advised under some circumstances, but for which there is not a professional consensus. The use of "could" is to be understood as suggesting the existence of several possibilities, the selection among which will be specific to the project and not driven by specific safety considerations. These standards and their role in NPH mitigation are discussed below.

IV.1 Graded Approach

A key element of DOE NPH mitigation requirements is the use of a graded approach. DOE facilities are sufficiently diverse to warrant a graded approach (e.g., some are office buildings, while others contain substantial inventories of hazardous material). Such an approach recognizes the diversity of objectives for NPH protection, the diversity of facilities, and the diversity of measures that are appropriate to ensure suitable NPH protection. When properly developed and implemented, a graded approach optimizes the allocation of effort and resources.

The nuclear SAR process yields ~~precisely~~ the insights into the preventive and mitigative functions of the SSCs that are necessary for determining appropriate NPH categories. The design sequence for new facilities and the evaluation sequence for existing facilities should proceed from hazard categorization, through SAR preparation, and then to final NPH categorization of SSCs into Performance Categories (PCs). As discussed in DOE G 420.1-X, the design process is an iterative one with safety analysis.

1. The link between the SAR process and NPH categorization must be driven by the graded approach. The grading process needs to be thought of in terms of three different concepts: (1) life safety, (2) mission (e.g., damage limitation for essential facilities), and (3) hazardous material safety. With regard to life safety and mission, ample guidance and precedents exist in current building codes and in the NEHRP provisions to determine which SSCs are important to these functions and to distinguish between the need for design criteria for life safety versus the need for design criteria for an essential facility. The DOE NPH Standards refer to the UBC (being superceded by IBC 2000) and also provide a comprehensive picture of the life safety or mission reliability achieved with any choice of hazard level and importance factor. USGS (1996), Seismic Hazard Curves are now available and should be considered when implementing DOE-STD-1023-95. PC-1 facilities shall be designed as per Seismic Use Group I and PC-2 facilities as per Seismic Use Group III in IBC 2000 with ~~appropriate~~ associated importance factors. With respect to the hazardous material grading scale, however, little consensus guidance exists, so a substantial part of the categorization guidance in DOE-STD-1021-93 is devoted to this subject.

The concept of Performance Categories with corresponding target probabilistic performance goals has been developed to assist in applying the graded approach to NPH design and evaluation. Each SSC in a DOE facility is assigned to one of five performance categories depending upon its safety importance. Each performance category is assigned a target performance goal in terms of the probability of unacceptable damage due to natural phenomena. The unacceptable level of damage is related to the safety function of the SSCs during and after the occurrence of NPH. The target performance goals given in Table 1 Appendices B & C of DOE-STD-1020-94 have been prescribed to be substantially equivalent with (1) the goals of model building code provisions for SSCs in PC 1 and PC 2 and, (2) the goals intended by commercial nuclear power plant seismic criteria for SSCs in PC 4. DOE-STD-1020-94 (Appendix B & C) also provide details about the graded performance of SSCs in various performance categories including the extent of expected damage, deformation, cracking and yielding of SSCs in PC 1 to PC 4.

Table 1. Target Performance Goals for each SSC Category

Performance Category	PC-0	PC-1	PC-2	PC-3	PC-4
Target Performance Goal (Probability per year of exceeding damage limits)	none	$1x10^{-3}$	$5x10^{-4}$	$1x10^{-4}$	$1x10^{-5}$

The relative probabilities and consequences of potential damage or failure of SSCs making up DOE facilities are accounted for by providing several sets of NPH design/evaluation provisions with increasing conservatism (i.e., producing a decrease in probability of damage or failure to perform intended safety function). Mean annual exceedance probabilities for various PCs to accomplish these target performance goals for different NPHs is given in DOE-STD-1020-94. This graded approach provides a different level of NPH provisions for each performance category, as described below:

(1) PC 0 SSCs are those for which no consideration of natural phenomena is necessary, i.e., where natural phenomena hazards are not an issue;

(2) For PC 1 SSCs, the primary concern is preventing major structural damage, collapse or other failure that would endanger personnel (life safety). Repair or replacement of the SSC or the ability of the SSC to continue to function after the occurrence of the hazard is not considered. - Design/evaluate as Seismic Use Group I of IBC 2000.

(3) PC-2 SSCs are meant to assure the operability of essential facilities (e.g., fire house, emergency response centers, hospitals) or to prevent harm to in-facility workers by preventing or mitigating the release of hazardous materials within facilities. Such SSCs may include local confinement components (e.g., drums, packaging, and gloveboxes), local HEPA filters, air flow

control systems (e.g., ventilation and dampers), hazardous material detection (e.g., room air monitors), alarms, evacuation structures (e.g., corridors, stairwells, and doors) and evacuation equipment (e.g., paging systems and emergency lighting). PC 2 SSCs should be allowed (3) PC-2 SSCs are meant to assure the operability of essential facilities (e.g., fire house, emergency response centers, hospitals) or to prevent physical injury to in-facility workers. When safety analyses determine that local and limited confinement of low-hazard materials is required for worker safety, PC-2 designation should be used for the SSCs involved. In these cases, PC-2 designation may apply to SSCs such as drums, packaging, gloveboxes; local HEPA filters; air flow control systems (ventilation and dampers); and room air monitors, alarms, corridors, stairways and doors, pagers systems and emergency lighting important to evacuation. relatively minor structural damage from design basis natural phenomena events. This is damage that results in minimal interruption to facility operations and that can be easily and readily repaired Design of PC-2 SSCs should result in limited structural damage from design basis natural phenomena events to ensure minimal interruption to facility operation and repair following the event. The PC 2 performance is analogous to although more stringent than the design criteria for essential facility (e.g., hospitals, fire and police stations, centers for emergency operations) in the model building codes. - Design/evaluate as Seismic Use Group III of IBC 2000.

(4) PC 3 SSCs are those for which failure to perform their safety function could pose a potential hazard to public health, safety and the environment because radioactive or toxic materials are present and could be released from the facility as a result of that failure. PC 3 SSCs would prevent or mitigate criticality accidents, chemical explosions, and events with the potential to release hazardous materials outside the facility. Design considerations for these categories are to limit facility damage as a result of design basis natural phenomena events so that hazardous materials can be controlled and confined, occupants are protected, and functioning of the facility is not interrupted. Design considerations for these categories are to limit facility damage as a result of design basis natural phenomena events so that hazardous materials can be controlled and confined, occupants are protected, and the functioning of the facility is not interrupted. When safety analyses determine that local confinement of high hazard materials is required for worker safety, PC-3 designation may be appropriate for the SSCs involved. PC 3 NPH provisions are consistent with those used for reevaluation of commercial plutonium facilities with conservatism in between that of model building code requirements for essential facilities and civilian nuclear power plant requirements.

(5) PC 4 SSCs are also those for which failure to perform their safety function could pose a potential hazard to public health, safety and the environment because radioactive or toxic materials are present in large quantities and could be released as a result of that failure. However, PC 4 SSCs are designated as "reactor like" in that the quantity of hazardous materials and energetics is similar to a large Category A reactor (>200 MW_t). These types of SSCs are associated with facilities with quantities and forms of hazardous materials, and sufficient energy sources, that could produce significant off-site effects unless the SSCs withstand NPH effects.

The SAR results provide an essential element in identifying specific SSCs for which a failure could result in a release as large as the potential release from a large reactor. Design considerations for this category are to limit facility damage from design basis natural phenomena events so that hazardous materials can be controlled and confined, occupants are protected, and essential functions of the facility are not interrupted. PC 4 seismic provisions are similar to those used for reevaluation or design of civilian nuclear power plants, where off-site release of hazardous material must be prevented.

DOE-STD-1021-93, ***Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components***, provides guidance to facility designers or safety evaluators to aid in determining which NPH performance category to assign to a specific system, structure, or component in a DOE facility. It treats the concepts of facility hazard classification, SSC safety classification, and performance categorization. The standard does not attempt to define what constitutes a "safety function" in each type of facility, but refers the user to other DOE guidance on this subject. Performance categories should be selected by engineers with knowledge of systems, safety requirements, and facility operations in a manner that DOE safety policies are met. Economic or programmatic considerations may require use of more stringent goals for specific SSCs (i.e., they may be placed in a higher performance category). The performance categorization is to be derived from hazard analysis and what SSCs are required to mitigate NPH hazards. For nuclear facilities the SAR results provide an essential element in categorizing SSCs. For existing non-reactor nuclear facilities, DOE-STD 3009 should be used in conjunction with Standard 1021 and the SAR for performance categorization. Also refer to DOE G 420.1-X for further discussions on this subject.

IV.2 NPH Design

(1) Objectives.

SSCs should be designed, constructed and operated to withstand the effects of natural phenomena as necessary to ensure the confinement of hazardous material, the operation of essential facilities, (as described in discussions on PC-2 on pages 7 & 8) the protection of government property, and the protection of occupants of DOE buildings. The design and evaluation process should consider potential damage and failure of SSCs due to both direct natural phenomena effects, including common cause, and indirect natural phenomena effects, including interaction with other SSCs.

Interaction. The design and evaluation process shall consider potential damage and failure of SSCs due to both direct natural phenomena effects (including common cause) and indirect natural phenomena effects due to the response of other SSCs (interaction). Examples of interaction include: (I) failure of an SSC which falls on an SSC important to safety or mission; (ii) impact damage due to displacements of adjacent SSCs; (iii) displacements of adjacent SSCs

(ii) Siting.

Site planning ~~must~~ shall consider all consequences of natural phenomena hazards. For example, seismicity, geological hazards, and soil failure hazards ~~must~~ shall all be considered. Siting of structures over active geologic faults, in areas of instability subject to landslides, or where soil liquefaction is likely to occur ~~should~~ shall be avoided. In addition, structures shall not be sited within flood plains where flood water depth and other flood effects at an annual probability of exceedance equal to or greater than the performance goal can adversely affect structural performance unless protection is provided (e.g., levees, or dikes). Special attention shall be given to sites potentially subject to flooding from upstream dams or reservoirs including earthquake caused failures.

(2) Existing Sites.

For an existing site, if there are significant changes in natural phenomena hazard assessment state-of-the-art or site-specific information, the natural phenomena hazard assessments shall be updated. If SSCs of Performance Categories 3 and 4 are constructed or installed at an existing site which previously only had Performance Category 1 and 2 SSCs and/or which did not have a site-specific NPH assessment, a site-specific natural phenomena hazard assessment shall be performed. A review of the state-of-the-art of natural phenomena hazard assessment methodology and of site-specific information shall be conducted at least every 10 years. The review should include recommendations to the Cognizant Secretarial Officers (CSOs) on the need for updating the existing NPH assessments based on identification of any significant changes in methods or data. If no change is warranted from earlier assessment, then this only needs to be documented.

(3) DOE Approval.

The hazard assessment for new sites or the reassessment and recommendations for existing sites, as available, ~~should~~ shall be submitted with the implementation plan as described in STD-1082-94.

IV.5 Seismic Detection

Facilities or sites which have SSCs in PC 2 (with hazardous material), PC 3 or PC 4 should have instrumentation such as strong motion detectors or other means to detect and record the occurrence and severity of seismic events. In those cases, where safety analysis ~~indicates~~ identifies the need for rapid ~~evacuation, seismic~~ response reactions, annunciation of seismic event should be considered for personnel evacuation or other vital mitigative actions. For a large site, several representative facilities spread over the site shall have such instrumentation.

IV.6 Post-Natural Phenomena Procedures

Facilities or sites which have SSCs in PC 2, PC 3, or PC 4 shall have procedures to inspect the facility for damage due to a severe natural phenomena event, to place the facility into a safe configuration when damage occurs, and to document and report such damage.

V. IMPLEMENTATION

Contractors ~~should~~ shall submit implementation plans to DOE. Most contractors will have prepared implementation plans that meet the requirements of DOE Order 5480.28 and these will be considered acceptable. DOE will work with contractors in the development of any new plans and will seek mutual agreement on how and when to achieve compliance. However, DOE will act to fulfill its obligation to ensure the safe operation of its facilities and, if agreement cannot be reached with a contractor, DOE will exercise its authority to modify submitted plans to include actions and schedules appropriate for achieving compliance in a reasonable manner. Moreover, DOE will review implementation of the plans and, if necessary, require appropriate modifications to an approved plan. Specific guidance on the preparation of the implementation plan is provided in DOE STD-1082-94. The implementation plan shall be integrated with the safety review process required in Section 6 of DOE Order 420.1. However, actions required under Executive Orders 12699 and 12941 ~~must~~ shall proceed as per the requirements of the Executive Orders.

V.1 Implementation Steps

(1) Establish performance categories for SSCs using DOE STD 1021.

(2) Perform site-specific studies of site characteristics using the methods given in DOE STD 1022, or evaluate existing data for site characteristics related to NPH and augment with site-specific studies where needed in accordance with DOE Standard 1022.

(3) Perform natural phenomena hazard assessment of the site in accordance with DOE Standard 1023. Include consideration of using recently issued USGS (1996) seismic hazard information, and the SSHAC (1997) report.

(4) Design and construct new SSCs or evaluate existing SSCs. Specified annual probabilities of exceedance for natural phenomena hazards to establish loadings, deterministic design methods for response evaluation, permissible response levels, load combination rules, design detailing requirements, and quality assurance and independent peer review requirements are provided in DOE Standard 1020. The Standard provides sufficient documentation to:

1) communicate the process, the rationale, and the results of the NPH evaluation;

2) present information that can be evaluated during peer reviews; and
3) provide traceability and a basis for future assessments.

Provisions for seismic design and evaluation of high-level waste storage tanks and related SSCs ~~may~~ could be obtained from the BNL Seismic Design and Evaluation Guidelines (BNL 52361, Rev. 10/95).

Establish a prioritized schedule for reevaluation and upgrade of existing facilities when there is a significant degradation in the safety basis for the facility, or when Executive Order 12941 requires that this be done. A prioritization program will direct initial efforts to facilities which are of greatest importance in terms of safety, mission, and cost. A screening program will enable relatively rapid initial evaluations to be conducted such that areas of greatest vulnerability to natural phenomena effects can be identified and addressed. Areas where SSCs might not be vulnerable to natural phenomena effects due to inherent ruggedness or benign site conditions can be identified and eliminated from further consideration.

V.2 Implementation at New and Existing Facilities

(1) New Sites

In addition to the nuclear safety requirements of the DOE Order 420.1, Executive Order 12699 provides requirements for protecting life safety for seismic hazard.

(2) Existing Sites

Required actions depend on the status of site characterization and NPH assessment. In addition to the nuclear safety requirements of the DOE Order 420.1, Executive Order 12941 provides requirements for protecting life safety for seismic hazard.

(3) New SSCs

In addition to the nuclear safety requirements of the DOE Order 420.1, Executive Order 12699 provides requirements for protecting life safety for seismic hazard. Thus this Guide is to be used in conjunction with the ICSSC Implementation Guide for new facilities (ICSSC RP-2.1-A).

(4) Existing SSCs

The implementation plan for evaluation and upgrade of existing SSCs shall be completed and submitted to the CSO.

meet the same performance goal and damage consequences) during natural phenomena hazard events. See Table 1.

Probabilistic Method is a technique which uses distributions of parameters (including uncertainty and randomness) to perform an analysis. Results are expressed in terms of probabilistic distributions which quantify uncertainty.

Public All individuals outside the DOE site boundary.

Reactor Unless it is modified by words such as containment, vessel, or core, the means the entire nuclear reactor facility, including the building/structure, equipment, and associated areas devoted to the operation and maintenance of one or more reactor cores. Any apparatus that is designed or used to sustain nuclear chain reactions in a controlled manner, including critical and pulsed assemblies and research, test, and power reactors, is defined as a reactor. All assemblies designed to perform subcritical experiments which could potentially reach criticality are also considered to be reactors. Critical assemblies are special nuclear devices designed and used to sustain nuclear reactions. Critical assemblies may be subject to frequent core and lattice configuration change and may be used frequently as mockups of reactor configurations. Therefore, requirements for modifications do not apply unless the overall assembly room is modified, a new assembly room is proposed, or a new configuration is not covered in previous safety evaluations (i.e., Safety Analysis Reports, Safety Analysis Report Addenda, or Technical Safety Requirements).

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or otherwise disposing of substances into the environment. This includes abandoning/discarding any type of receptacle containing substances or the stockpiling of a reportable quantity of a hazardous substance in unenclosed containment structures.

Risk The quantitative or qualitative expression of possible loss that considers both the probability that an event will occur and the consequence of that event.

Safety Analysis A documented process: (1) to provide systematic identification of hazards within a given DOE operation; (2) to describe and analyze the adequacy of the measures taken to eliminate, control, or mitigate identified hazards; and (3) to analyze and evaluate potential accidents and their associated risks.

Safety Analysis Report (SAR) A report that documents the adequacy of safety analysis to ensure that a facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations.