Natural Phenomena Hazards

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Overview

Status:

- DOE’s Natural Phenomena Hazards (NPH) Program
- Draft DOE STD-1020-YR, *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*
- Draft DOE HDBK-1220-YR, *Natural Phenomena Hazards Analysis and Design Handbook for DOE Facilities*
DOE NPH Program

- **DOE Office:** Office of Nuclear Safety (AU-30)
- **Mission:** Develop & maintain requirements, standards and guidance for DOE facilities exposed to NPHs.
- **Driver:** Established through DOE Order (O) 420.1C, Facility Safety.
- **Direction & guidance:** Seismic, extreme wind, tornado, precipitation, flood, volcanic + lightning hazards.
- **How:** Provides assistance, training, communications & support to facilitate effective implementation of DOE’s NPH standards to assure public & worker health & safety.
DOE NPH Requirements

DOE Standard (STD) 1020-YR (Requirements)
RevCom 05/16-07/16---270 cmnts

DOE Handbook (HDBK) 1220-YR (Supplemental Guidance)
RevCom 09/15-11/15---107 cmnts
# Table of Contents

Chapter 1. Introduction
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Chapter 3. Seismic Design
Chapter 4. Wind, Tornado, and Hurricane Design
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Chapter 8. Volcanic Eruption Design
Chapter 9. Evaluation and Modification of SSCs in Existing Facilities
Chapter 10. Quality Assurance and Peer Review
DOE STD-1020
Revision Scope

Purpose. Provides criteria and guidance in NPH analysis and design of structures, systems, and components (SSCs) for:

- Implementing requirements of DOE O 420.1C, Facility Safety, and to ensure SSCs perform safely under NPH effects.
- Use of industry building codes and voluntary consensus standards encouraged by 1995 National Technology Transfer & Advancement Act

Revision Scope. Summary of changes:

- Correct errors & omissions
- Changes consistent with DOE NPH Handbook
- Accommodate changes DOE-STD-1189-201X and DOE O 420.1C, Chg. 1 (Appendix A.1, Safety System Design Criteria, Table A-1)
- 10 Yr NPH Assessment Review Implementation Report
- Align with updated industry standards and voluntary consensus codes. Endorse updated EO requirements.
- Align with updated DOE standards and documents.
EO Requirements

National Mitigation Framework:
Directs Federal departments & agencies to take specific action to reduce the loss of life and property by lessening the impact of disasters:

- EO 13717 (Federal Seismic Risk Management STD, 2/2/2016)
  - Recommended Practice - 10 (IBC-2015)
  - Interagency Committee on Seismic Safety in Construction (ICSSC)
- EO 13960 (Federal Flood Risk Management STD, 10/8/2015)
  - Higher vertical elevation of flood base level
  - Amendments to EO 11988, Floodplain Management (1977)

National Windstorm Impact Reduction Program

- To achieve major measurable reductions in the losses of life and property from windstorms through a coordinated Federal effort, in cooperation with other levels of government, academia, and the private sector, aimed at improving the understanding of windstorms and their impacts and developing and encouraging the implementation of cost-effective mitigation measures to reduce those impacts.
- New Tornado Hazard Mapping Methodology will develop new maps needed for tornado-resistant design of buildings, which will be submitted to the ASCE Performance-Based Design for Wind technical committee for eventual adoption in ASCE 7-22
Building Codes/Consensus STDS

- IBC 2015
- ASCE/SEI 7-10 (Design Loads)
- ANSI/ANS 2.26-2010 (Seismic Design Categorization)
- ANSI/ANS 2.27-2008 (Seismic Design Characterization)
- ANSI/ANS 2.29-2008 (Probabilistic Seismic Hazard Assessment)
- ASCE/SEI 43-05 (Seismic Design)
- ASCE/SEI 4-98 (Seismic Loads)
- ANSI/ANS-2.3-2011 (Tornado, Hurricane, & Wind)
- ANSI/ANS-3.11-2015 (Meteorological)
- ACI 349-13 (Concrete Structures)
- ANSI/AISC N690-12 (Steel Structures)
Comment resolution process identified areas for improvement and drove revision and reorganization of the proposed Standard to better clarify DOE's NPH requirements. A summary of the major changes include:

- **General:**
  - Consolidation of ‘shall’ statements to minimize the rephrasing of requirements from industry standards and repeating requirements within this Standard.

- **Section 2 (General Criteria and Guidance for NPH Design):**
  - Focus on the design process to proceed in a sequence of activities, starting with the identification of scope of structures, systems and components (SSCs) based on the Documented Safety Analysis (DSA) and on NPH design analysis.
  - Clarity on requirements for nuclear vs. non-nuclear facilities.
  - Revision to Criteria and Guidance for Establishing NPH Design Categories for Safety SSCs based on unmitigated consequences to the co-located worker and public.
  - Criticality safety consistent with DOE STD 3007-YR (Criticality Safety Evaluations)
Summary of major changes continued:

- **Sections 4, 5 & 7 (wind, flood precipitation design):**
  - Transfer of useful relevant details and guidance to the NPH Handbook, particularly related to the extreme straight-line wind, tornado, hurricane, flood, seiche, tsunami and precipitation.

- **Sections 9 (major mods & periodic evaluation):**
  - Schedule guidelines provided for conducting the ten-year review of the NPH assessment.
  - Added guidance on aging “beyond planned design lifetime” facilities
NPH Summary

Next Steps:

- **Issue:**
  - DOE-STD-1020-20YR
  - DOE-HDBK 1220-20YR
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http://www.energy.gov/ehss/natural-phenomena-hazards-program