



Office of Environment,
Health, Safety & Security

U.S. Department of Energy

Natural Phenomena Hazards Program

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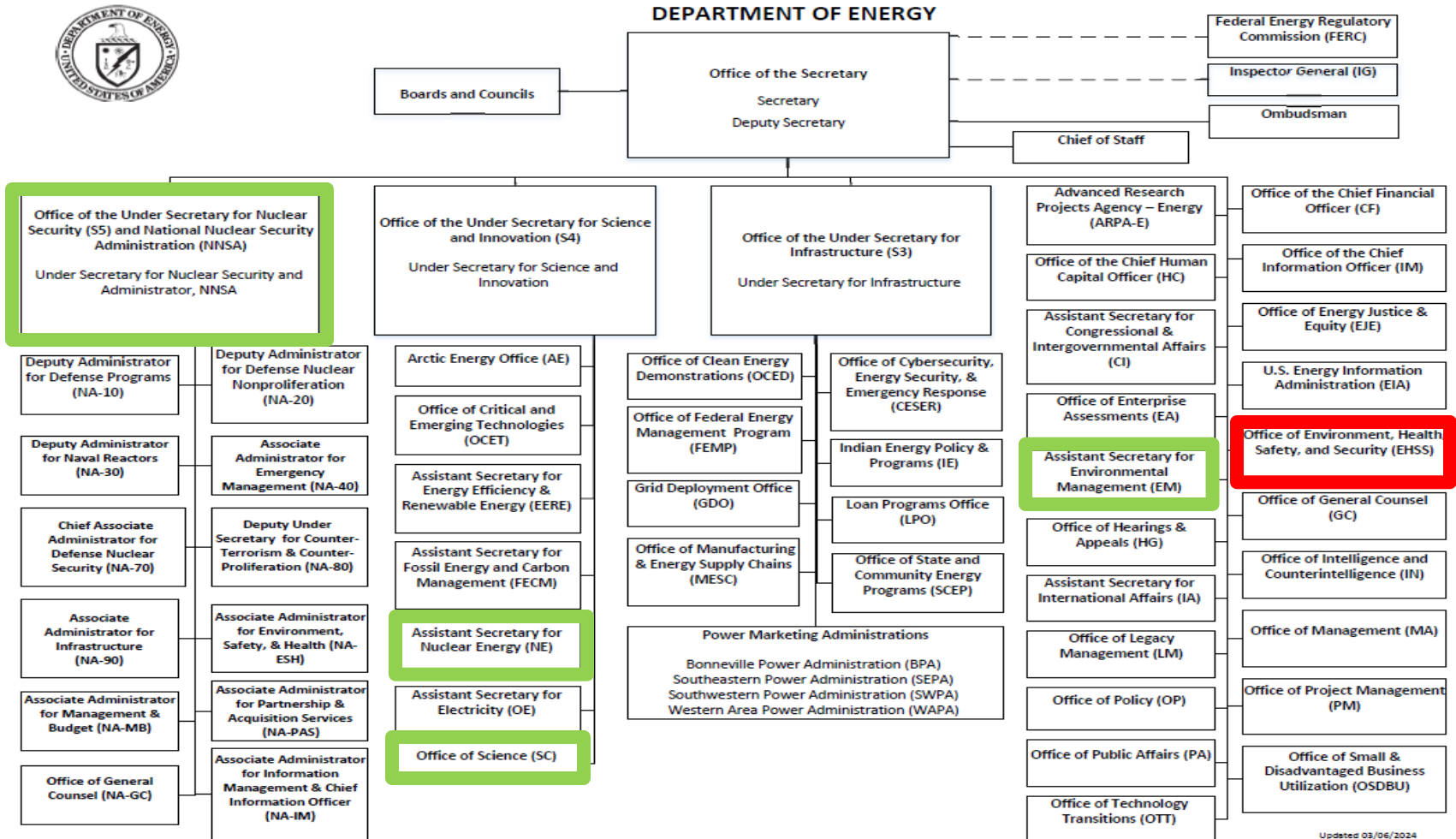
**Office of Nuclear Safety Basis & Facility Design (EHSS-31)
within the Office of Nuclear Safety (EHSS-30)**

DOE/NRC Natural Phenomena Hazards Meeting
October 29-30, 2024

Outline

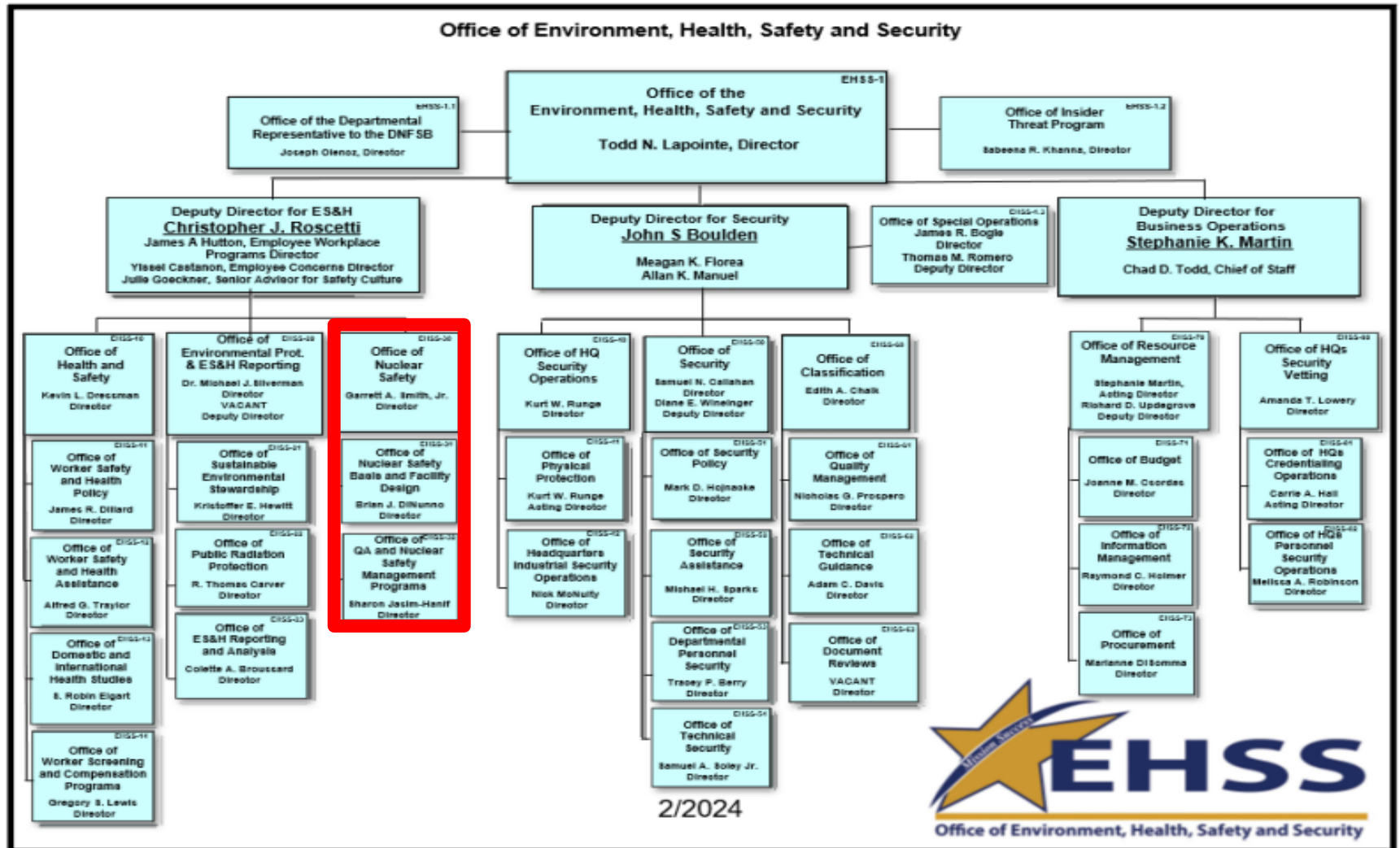
- DOE and EHSS Organization / EHSS-31
- NPH Program Overview
- Policy Documents
 - DOE Order 420.1C, *Facility Safety*
 - DOE Standard 1020-20XX, *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*
 - DOE Handbook 1220-20XX, *Natural Phenomena Hazards Analysis and Design Handbook for DOE Facilities*
 - DOE Handbook 1545-20XX (Formerly EH/0545), *Seismic Evaluation Procedure for Equipment in U.S. DOE Facilities*
- Policy Revision Schedule
- Contacts

U.S. Department of Energy Organizational Chart



Updated 03/06/2024

EHSS Organizational Chart



EHSS-31

Mission and Functions

Develops and maintains nuclear safety policy, requirements, and guidance for the Department in the areas of:

Nuclear Safety
Basis

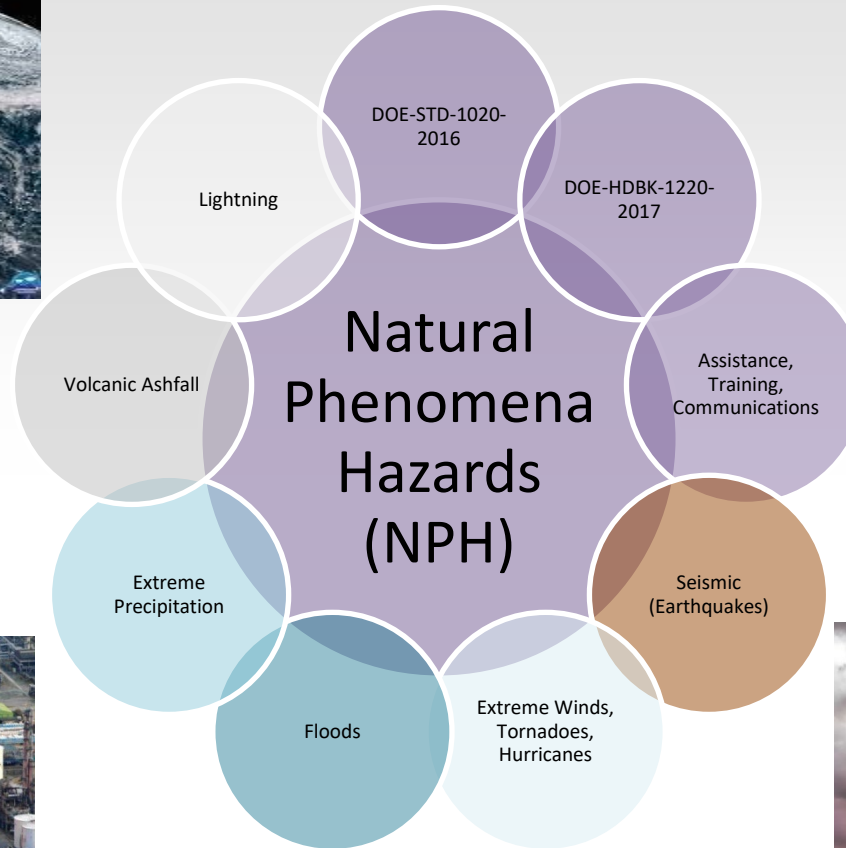
Nuclear Safety
Facility Design

Fire Protection
Program

**Natural
Phenomena
Hazards (NPH)
Program**

Nuclear Safety
Research and
Development
(NSR&D) Program

Natural Phenomena Hazards (NPH) Program



NPH Program Overview

- DOE Office: Office of Nuclear Safety (EHSS-30)
- Mission: Develop & maintain requirements and guidance found in DOE Directives, standards, and handbooks for DOE facilities subjected to NPHs.
- Driver: DOE Order (O) 420.1C, *Facility Safety* establishing facility and programmatic requirements for DOE, including NNSA
- Requirements Direction & Guidance in Design: 1. Seismic, 2. extreme straight-line wind, tornado, hurricane, 3. flood, seiche, tsunami, 4. lightning, 5. precipitation, and 6. volcanic hazards
- How: Provides clarification, understanding, interpretation, training, communications & support to facilitate effective implementation of DOE's NPH policy documents to assure public & worker health & safety and environmental protection



DOE-O-420.1C

Facility Safety

Attachment II, Chapter 4: NPH Mitigation

- Establish facility design, construction, and operations requirements for NPH events

Applies to:

- Government-owned and leased nuclear and nonnuclear facilities and sites
- New and Existing facilities
- Major modifications to existing facilities based on periodic NPH assessments and upgrade requirements

Requirements:

- General
- NPH Design Criteria: DOE-STD-1020-2016
- NPH Accident Analysis
- Periodic Review
- Seismic Detection
- Post-NPH Event Procedures

U.S. Department of Energy
Washington, D.C.

ORDER

DOE O 420.1C

Approved: 12-4-2012
Chg 1 (PgChg): 2-27-2015
Chg 2 (MtuChg): 7-26-2018
Chg 3 (LtdChg): 11-14-2019

SUBJECT: FACILITY SAFETY

1. **OBJECTIVE.** To establish facility and programmatic safety requirements for the Department of Energy (DOE), including the National Nuclear Security Administration (NNSA), for:
 - a. Nuclear safety design criteria;
 - b. Fire protection;
 - c. Criticality safety;
 - d. Natural phenomena hazards (NPH) mitigation; and
 - e. Cognizant system engineer (CSE) program.

Facility safety requirements for explosive, chemical, and industrial hazards are contained in other DOE rules and directives.

2. **CANCELLATIONS.** This Order (O) cancels: DOE O 420.1C Chg. 2, *Facility Safety*, dated 7-26-08; and DOE O 5480.30 Chg. 1, *Nuclear Reactor Safety Design Criteria*, dated 3-14-01.

Cancellation of a directive does not, by itself, modify, or otherwise affect any contractual or regulatory obligation to comply with the directive. Contractor Requirements Documents (CRDs) that have been incorporated into a contract remain in effect throughout the term of the contract unless, and until, the contract or regulatory commitment is modified to either eliminate requirements that are no longer applicable or to substitute a new set of requirements.

3. **APPLICABILITY**

- a. **Departmental Applicability.** This Order applies to all DOE elements with responsibility for design, construction, management, operation, decontamination, decommissioning, or demolition of government-owned or government-leased facilities and contractor-leased facilities used for DOE mission purposes.

The NNSA Administrator will ensure that NNSA employees comply with their respective responsibilities under this directive. Nothing in this Order will be construed to interfere with the NNSA Administrator's authority under section 3212(d) of Public Law (Pub. L.) 106-65, *National Defense Authorization Act for Fiscal Year 2000*, to establish Administration-specific policies, unless disapproved by the Secretary.

AVAILABLE ONLINE AT:
www.directives.doe.gov

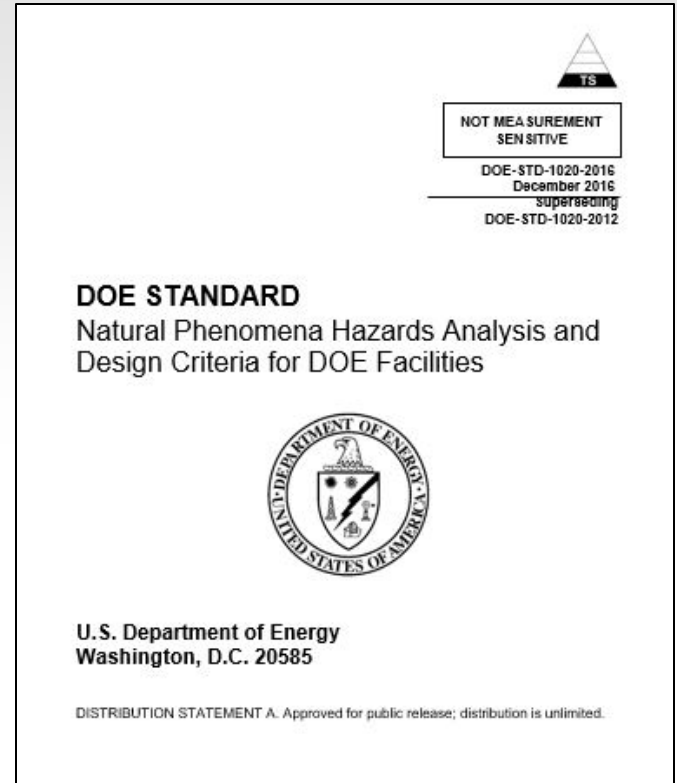
INITIATED BY:
Office of Environment, Health, Safety and Security

DOE-STD-1020-20XX

Purpose

Three (3) Main Purposes:

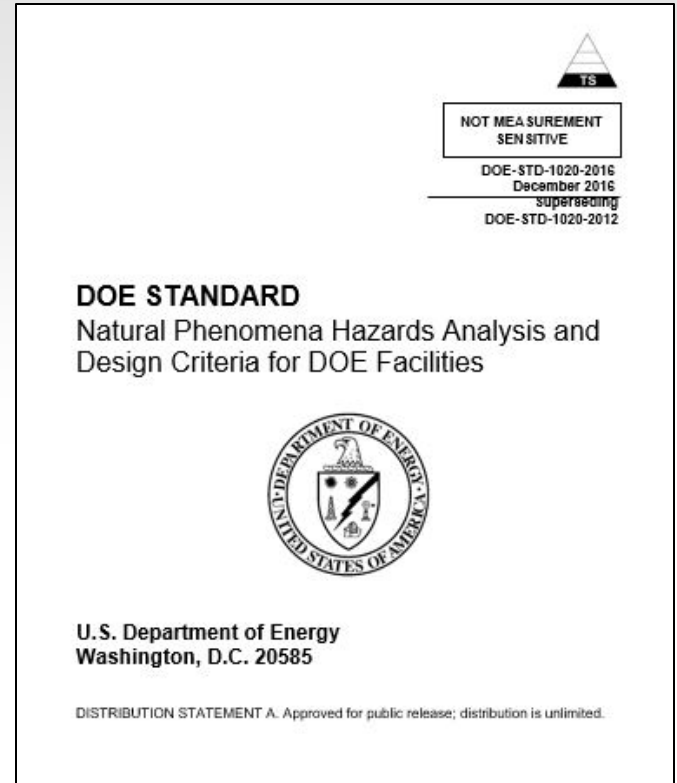
- Provide criteria and guidance for meeting the natural phenomena hazard (NPH) requirements of DOE Order (O) 420.1D, *Facility Safety* (Attachment II, Chapter 4);
- Ensure that structures, systems, and components (SSCs) in DOE facilities will perform assigned safety functions during and after design basis NPH events; and
- Provide requirements and guidance in the use of industry building codes and voluntary consensus standards in meeting NPH requirements.



DOE-STD-1020-20XX

Application and Scope

- Applicable to all government-owned and government-leased nuclear and non-nuclear facilities and sites.
- Apply to new facilities, major modifications of existing facilities, and modifications of existing facilities triggered by periodic NPH assessments.
- Provides analysis and design of SSCs affected seismic events, extreme winds, floods, lightning, precipitation, and volcanic eruptions.
- (d) Other NPH phenomena not considered include drought, fog, frost, extreme temperatures, landslides, subsidence, surface collapse, uplift, and waterspouts. The general approach of this Standard should also be applied to these phenomena.



DOE-STD-1020-20XX

Structure of Standard

Organization:

Section 1. Introduction

Section 2. General Criteria for NPH Design

Section 3. Seismic Design

Section 4. Extreme Straight-Line Wind, Tornado, and Hurricane Design

Section 5. Flood, Seiche, and Tsunami Design

Section 6. Lightning Design

Section 7. Precipitation Design

Section 8. Volcanic Eruption Design

Section 9. Evaluation and Modification of SSCs in Existing Facilities

Section 10. Quality Assurance and Peer Review

DOE-STD-1020-20XX

References

[Executive Orders \(EO\)](#)

[Code of Federal Regulations \(CFR\)](#)

[DOE Directives, Standards, Guides, Handbooks, Technical Standards](#)

[ANSI/ AISC - American Institute of Steel Construction](#)

[ANSI/ ANS - American Nuclear Society](#)

[American Society of Civil Engineer \(ASCE\)](#)

[American Society of Mechanical Engineers \(ASME\)](#)

[National Institute of Standards and Technology \(NIST\)](#)

[National Fire Protection Association \(NFPA\)](#)

[Structural Engineering Institute \(SEI\) of the ASCE](#)

[U.S. Nuclear Regulatory Commission Documents \(NUREG\)](#)

[American Concrete Institute \(ACI\)](#)

[International Building Code \(IBC\)](#)

DOE-STD-1020-20XX

Revision Scope

- Tentative Revision Scope:
 - Coordination with DOE-O-420.1D Revisions
 - Improvements and Clarification to Facility Condition Assessments and 10-Year NPH Assessment)
 - Ongoing coordination with EO-13717 (ICSSC RP-10-22)
 - Alignment with updated industry standards and voluntary consensus codes:
 1. IBC-2024
 2. ANSI ANS 2.3, 2.26, 2.27, 2.29, 2.34, and 3.11
 3. ASME NQA-1, 2024 Version
 4. ASCE 4-16 and ASCE/SEI 43-19
 5. ANSI/AISC N-690-2018
- Other Considerations:
 - Scope of SSCs (Safety-related, SSCs with CW consequences)
 - CW consequences (Coordination with STD-3009-2014)

DOE-HDBK-1220-2017

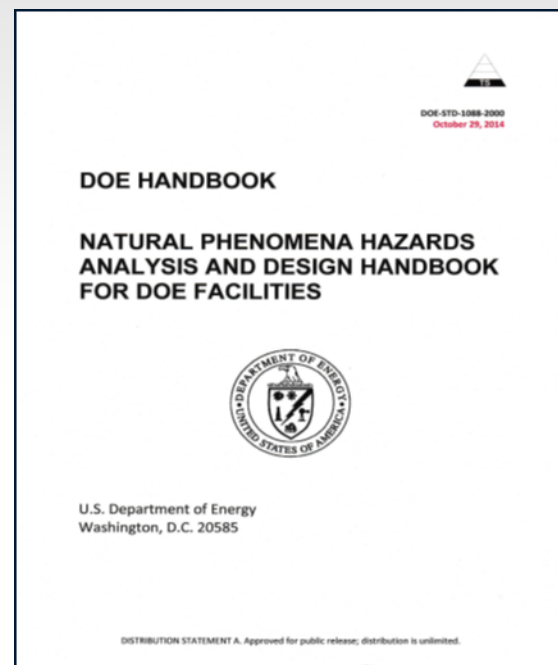
Purpose and Application

Purpose:

- Companion document to DOE-STD-1020-2016
- Captures & updates useful and applicable technical information from DOE-STD-1020-2002, DOE-STD-1020-2012 & DOE Guide 420.1-2.
- Identifies good practices & implementation aid to meet the Standard's requirements and guidance.
- General technical advice on NPH topics

Applies to:

- Same as DOE-STD-1020-2016
- Format and organization is same as the Standard



DOE-HDBK-1545-20XX

Formerly DOE/EH-0545,
Seismic Evaluation Procedure for Equipment in U.S. DOE Facilities.

Purpose:

- Provides facility managers, safety professionals, and engineers with a practical procedure for evaluating the seismic adequacy of equipment and distribution systems in existing DOE facilities built before current standards.
- Comprises of a detailed technical approach, generic procedures, and documentation guidance which can be used to verify the seismic adequacy of mechanical and electrical safe shutdown equipment in DOE facilities.
- Provides technical updates since its issuance in 1997 and convert the report into a Handbook to clearly identify criteria and guidance for enhancing the seismic safety of facilities.

DOE-HDBK-1545-20XX

Formerly DOE/EH-0545,
Seismic Evaluation Procedure for Equipment in U.S. DOE Facilities.

Revision Scope:

- Based on revision 3A of SQUG GIP,
- Consistency with current DOE policy orders, and standards (DOE-STD-1020-2016 seismic design categories and other terminology), and
- Updating references to relevant industry standards where additional SQUG guidance exists
- Coordination with latest ASCE 4 and ASCE 43
- Retain legacy seismic evaluation methods and approaches

Policy Revision Schedule

Policy Document	Revision Timeline
DOE Order 420.1C → D	Ongoing
DOE Standard 1020-2016	Early 2025
DOE Handbook 1220-2017	TBD
DOE Handbook 1545-20YR	Active 2024

Contacts

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