

**Army**



DEPARTMENT OF THE ARMY

U.S. Army Corps of Engineers  
WASHINGTON, D.C. 20314-1000

May 5, 1992

REPLY TO  
ATTENTION OF

Military Programs

Mr. Wallace E. Stickney  
Director  
Federal Emergency Management Agency  
Washington, D.C. 20472

Dear Mr. Stickney:

*Wallace*

This responds to your letter of March 20, 1992, to The Secretary of the Army, Honorable M. P. W. Stone, regarding the appointment of a Seismic Safety Coordinator. The Department of the Army is supportive of Federal Emergency Management Agency (FEMA) efforts to comply with the regulations of Executive Order 12699 and Public Law 101-614, Sec. 8(a) as they relate to seismic safety of new Federal building construction. The seismic design criteria used by the Army have been and will continue to be maintained current with the national model building codes approved by FEMA through the Interagency Committee on Seismic Safety in Construction (ICSSC).

The Army has several representatives working with ICSSC and will continue cooperation with this committee. As requested, and on behalf of Mr. Stone, I hereby submit the name of Mr. Charles H. Gutberlet, Jr., as the Seismic Safety Coordinator for New Building Construction. He may be contacted as follows:

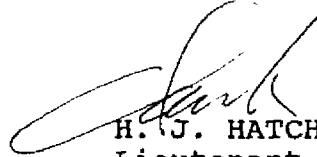
Charles H. Gutberlet, Jr., P.E.  
Directorate of Military Programs  
U.S. Army Corps of Engineers  
20 Massachusetts Avenue, N.W.  
Washington, D.C. 20314-1000  
Telephone (202) 504-4802  
FAX (202) 504-4139

For any future coordination for seismic safety regarding the construction of Civil Works projects (flood control, navigation, and hydroelectric power facilities), the point of contact will be Mr. Lucian G. Guthrie. He may be contacted as follows:

Lucian G. Guthrie, P.E.  
Directorate of Civil Works  
U.S. Army Corps of Engineers  
HQUSACE (CECW-ED)  
Washington, D.C. 20314-1000  
Telephone (202) 272-8673  
FAX (202) 272-8797

The Federal government can lead the way in improving our country's ability to minimize the loss of life and property caused by earthquakes. I continue to pledge my total support to this endeavor.

Sincerely,

A handwritten signature in black ink, appearing to read 'Hatch', written in a cursive style.

H. J. HATCH  
Lieutenant General, U.S. Army  
Commanding



**DEPARTMENT OF THE ARMY**

U.S. Army Corps of Engineers  
WASHINGTON, D.C. 20314-1000

July 14, 1992

REPLY TO  
ATTENTION OF:

Military Programs

Mr. Gary D. Johnson  
Federal Emergency Management Agency  
Office of Earthquake and Natural Hazards  
500 C Street, S.W.  
Washington, D.C. 20472

Dear Mr. Johnson:

The Army's 1992 Progress Report to FEMA on Executive Order 12699  
is submitted as requested.

Sincerely,

A handwritten signature in cursive script, appearing to read "Rich Armstrong".

Richard C. Armstrong, P.E.  
Chief, Engineering Division  
Directorate of Military Programs

Enclosure

1992 PROGRESS REPORT TO FEMA  
ON  
EXECUTIVE ORDER 12699

1. Introduction

The Department of the Army operating through the Corps of Engineers has the responsibility for the design and construction of new facilities. The development and maintenance of design and construction criteria and guidance is the mission of the Directorate of Military Programs.

2. Status of Procedures

The procedures for maintaining the criteria and guidance have not changed since the issuance of EO 12699. The Army standards already met or exceeded the requirements of EO 12699. Changes are not expected to be made to the procedures.

Army criteria for seismic design are based on the Uniform Building Code (UBC) and are revised routinely to agree with the current edition of the model code. The office responsible for maintaining these criteria has membership on the various committees responsible for writing the national requirements and codes. This gives first hand and immediate knowledge of the state-of-the-art technology. One new feature of the seismic program is the establishment of a seismic coordinator. The seismic coordinator acts as point of contact for gathering and disbursing the latest data on seismic information.

3. Progress on Implementation Plan

Since the Army's seismic safety program meets EO 12699 and is successfully functioning it has remained unchanged and needed no implementation. The responsibilities are the same. There has been no effect on budgetary requirements over the previous years and changes are not perceived.

4. Impact on Agency Operations

There has been no impact on the operations of the agency due to the issuing of EO 12699. Training courses and workshops for seismic design have been part of the Army's program for many years. In addition to these activities, information and guidance are issued throughout the organization by means of Engineering Technical Letters (ETL), Engineering Bulletins (EB) and other informational correspondence.

Charles H. Gutberlet, Jr.  
Seismic Coordinator  
Technical Engineering Branch  
Directorate of Military Programs

**Navy**



DEPARTMENT OF THE NAVY  
THE ASSISTANT SECRETARY OF THE NAVY  
(INSTALLATIONS AND ENVIRONMENT)  
WASHINGTON, D. C. 20360-5000

23 JUL 1992

The Honorable Wallace E. Stickney  
Director, Federal Emergency  
Management Agency  
Washington, DC 20472

Dear Mr. Stickney:

This is in response to your letter of June 30, 1992, to the Secretary of the Navy, requesting information on our status of implementing Executive Order 12699, "Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction." The Navy is very interested in the issue of seismic safety and has worked with the other Services over the past 25 years in maintaining Tri-Service seismic design criteria which reflect the current state of the art. I am responding for the Secretary of the Navy


All new Navy buildings are required to be designed and constructed according to our seismic design criteria which fully comply with the Executive Order. Our seismic criteria address both non-essential and essential buildings required to function during and after an earthquake. We assure compliance with Navy criteria by selecting the most technically qualified architect-engineer (A-E) contractors, with experience in seismic design, for preparation of plans and specifications for naval facilities. When selecting A-E contractors for Navy work, prior performance data are reviewed and are considered for determining, prior to award, that a particular A-E contractor will perform in a satisfactory, responsible manner.

The construction contractor has the responsibility to control the quality of the work and present for our acceptance only work that complies with the contract drawings and specifications. Significant quality control procedures and documentation are required to assure that work meets the requirements of the contract. The Navy is responsible for performing quality assurance throughout the life of the contract and for inspecting all construction prior to final acceptance and payment. During construction, quality assurance reviews are the means by which the Navy fulfills its responsibility in assuring that the contractor's quality control system is functioning and through reviews, surveillance, and tests assures the completed product complies with the contract. The Naval Facilities Engineering Command also has in-house seismic expertise within its Engineering Field Divisions and in the Chief Engineer's office at their headquarters, which can be consulted if project circumstances warrant.

The procedural manual for leasing buildings is being updated to require compliance with current Navy seismic criteria in lieu of local building codes when leasing newly constructed buildings.

A copy of this letter was sent to Mr. Gary D. Johnson of your agency to provide information requested under separate letter to our seismic safety coordinator, Mr. Howard Nickerson. Any additional information required on this matter can be obtained by contacting Mr. Nickerson at (703) 325-0048.

Sincerely,



JACQUELINE E. SCHAFER

Copy to:  
Mr. Gary D. Johnson, FEMA



**Department of Education**



UNITED STATES DEPARTMENT OF EDUCATION  
OFFICE OF ELEMENTARY AND SECONDARY EDUCATION

JUL 17 1992

Honorable Wallace E. Stickney  
Director  
Federal Emergency Management Agency  
Washington, D.C. 20472

Dear Mr. Stickney:

Thank you for your recent letter to Secretary Alexander. Your request for information on the status of implementation of Executive Order 12699, "Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction," has been referred to me for reply.

Architectural and Engineering services for direct Federal or federally assisted construction projects administered by this Department are provided by the Office of Engineering Services (OES), Public Health Service, through an interagency agreement. It is our understanding that OES will provide technical assistance and assurance of compliance with seismic design and construction standards in the same manner as they are currently providing such services concerning other Federal life/safety and handicapped access standards. In addition, our office is in the process of consulting with OES in order to evaluate what type of regulations or other seismic safety guidance may be needed in order to ensure adequate and compatible results.

Please be assured that information will be provided to the Interagency Committee on Seismic Safety in Construction (ICSSC) as requested.

Sincerely,

Charles E. Hansen *for*  
Director  
Impact Aid Program

**Department of Energy**



**The Secretary of Energy**  
Washington, DC 20585

April 24, 1992

The Honorable Wallace E. Stickney  
Director  
Federal Emergency Management Agency  
Washington, D.C. 20472

Dear Mr. Stickney:

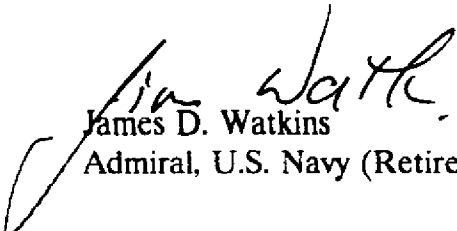
Your letter of March 20, 1992 regarding Executive Order 12699 on seismic safety of new Federal building construction enlisted our assistance in ensuring that all Department of Energy (DOE) programs affected by this Order have, in fact, started.

We offer our full and continuing support to the Federal Emergency Management Agency (FEMA) effort to gather information on the status of implementation of the Executive Order as part of FEMA's report on the National Earthquake Hazards Reduction Program (NEHRP). Since the Order was issued on January 5, 1990, DOE has provided an interim report (letter dated September 23, 1991, J.E. Fitzgerald, DOE, to Dr. R. W. Wright, Interagency Committee on Seismic Safety in Construction) on its impacts and implementation to the NEHRP Coordinating Committees.

The DOE staff have previously reviewed the Guidelines and Procedures for Implementation of the Executive Order on Seismic Safety of New Construction. We agree that implementation of the Order would be facilitated by appointment of a DOE Seismic Safety Coordinator charged with providing the necessary leadership and coordination. To this end, we are appointing James Hill, Office of Environment, Safety and Health (EH), as the DOE Seismic Safety Coordinator. He can be contacted at DOE Germantown on (301) 903-4508. Mr. Hill, the EH Natural Phenomena Hazards Mitigation Program Manager, is already coordinating DOE's ongoing implementation of Executive Order 12699 and DOE's participation in the NEHRP as DOE's member of the NEHRP Interagency Committee on Seismic Safety in Construction.

You have my assurance that we will continue to cooperate with FEMA on this important seismic safety matter.

Sincerely,

  
James D. Watkins  
Admiral, U.S. Navy (Retired)



**Department of Energy**  
Washington, DC 20585

July 15, 1992

Mr. Wallace E. Stickney  
Director  
Federal Emergency Management Agency  
Washington, D.C. 20472

Dear Mr. Stickney:

I was asked by the Secretary to respond to your June 30, 1992, request regarding the status of the Department of Energy's (DOE) implementation of the January 5, 1990, Executive Order (E.O.) 12699, "Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction." We also wish to inform you of our plans for providing the detailed information and data on implementation of E.O. 12699.

We are pleased to note, as reported earlier to the Interagency Committee on Seismic Safety in Construction (ICSSC) of the National Earthquake Hazards Reduction Program (NEHRP), that the Department has required, since the early 1950s, the use of the seismic requirements of the most current Uniform Building Code of the International Congress of Building Officials. In addition, increased seismic loads and construction quality are placed on facilities where confinement of hazardous materials is required. The seismic design and construction standards and practices, required by current DOE Orders, provide a level of safety judged by the ICSSC/NEHRP to be substantially equivalent to that required by E.O. 12699 for all DOE site construction. The only impact of E.O. 12699 on the activities at DOE sites may be increased reporting requirements.

There are significant impacts on DOE programs that provide financial assistance for construction activities away from DOE sites for research, fossil, and renewable energy activities. Final rule changes were published in January 1992 to DOE's Financial Assistance Rules (10 CFR 600.12) that extend the seismic requirements of the current Model Building Codes to DOE financially-assisted construction projects. Implementing procedures should be in place by January 1993.


Several initiatives have occurred within DOE during the past 3 years that have enhanced seismic safety within the Department. The number of structural/civil engineers has increased by an order of magnitude. Over 1000 engineers, safety analysts, and program managers have been provided training in seismic safety policy, requirements, standards, and practices. Defense Programs, one of the largest DOE programs, issued a seismic implementation "Safety

Information Letter" to over 20 DOE site offices. Also, my office is providing increased support to, and involvement of professional staff in, the activities of the ICSSC/NEHRP for development of standards for new and existing lifelines and for evaluation and retrofit of existing buildings.

As requested, we have given special attention and priority to assure that the detailed information on DOE's implementation progress is provided as requested by Mr. Gary D. Johnson, Assistant Associate Director of the Federal Emergency Management Agency's (FEMA) Office of Earthquakes and Natural Hazards, in his June 10, 1992, letter to James R. Hill, DOE Seismic Safety Coordinator. As agreed upon between Mr. Hill and Mr. Arthur Zeizel, FEMA, we will provide the detailed report by July 31, 1992.

We appreciate the continuing cooperation and support for this program that has developed between our agencies.

Sincerely,



Paul L. Ziemer, Ph.D.  
Assistant Secretary  
Environment, Safety and Health

cc:  
AD-1  
CE-1  
DP-1  
EM-1  
FE-1  
NE-1



**Department of Energy**  
Washington, DC 20585

July 27, 1992  
Mr. Gary D. Johnson  
Assistant Associate Director  
Office of Earthquakes and Natural Hazards  
Federal Emergency Management Agency  
Washington, D.C. 20472

Dear Mr. Johnson:

Enclosed is a report on the Department of Energy's (DOE) implementation of Executive Order (EO) 12699, as requested in your letter to me dated June 10, 1992. The report contains detailed information on the progress of the Department's seismic safety programs toward the actions required by EO 12699 since its issuance on January 5, 1990, to the end of Fiscal Year 1992.

I am pleased to note that the Department has required, since the early 1950's, the use of the seismic requirements of the Uniform Building Code of the International Congress of Building Officials. In addition, increased seismic loads and construction quality are placed on facilities where confinement of hazardous materials is required. This information was reported earlier to the Interagency Committee on Seismic Safety in Construction (ICSSC) of the National Earthquake Hazards Reduction Program (NEHRP). The seismic design and construction standards and practices, required by current DOE Orders and Rules, provide a level of safety judged by the ICSSC/NEHRP to be substantially equivalent to that required by EO 12699. Thus, DOE is considered to be essentially in compliance with the EO.

However, additional efforts will be needed to assure that DOE programs that provide financial assistance include seismic standards in their construction projects, as required by 10 CFR 600.12, published January 2, 1992.

We appreciate the continuing cooperation and support for this program that has developed between our agencies. Please call me if there are questions on (301-903-4508).

Sincerely,

A handwritten signature in cursive script that reads "James Hill".

James R. Hill  
Seismic Safety Coordinator for DOE  
Risk Analysis and Technology Division  
Office of Risk Analysis and Technology

Enclosure

Report on Implementation of Executive Order 12699  
1990 - 1992  
Department of Energy

## SUMMARY

The Department of Energy (DOE) is responsible for the safety of personnel and activities at all DOE sites. This includes protection from the effects of seismic hazards in the planning, design, construction, operation, and decommissioning of DOE facilities. These responsibilities are reflected in DOE policy, rules, orders, requirements, criteria, standards, guidance, and practices.

Under the above directives, DOE is responsible for ensuring that new DOE facilities satisfy the requirements of the Executive Order (EO) on Seismic Safety (EO 12699) issued January 5, 1990. This includes new buildings designed and constructed by DOE and/or its contractors, new buildings leased by DOE and/or its site contractors, and additions to existing DOE or leased buildings. DOE is also responsible for extending seismic requirements to DOE programs that provide financial assistance for design and construction of buildings. DOE appears to have no regulatory authority under EO 12699.

DOE has actively participated in the National Earthquake Hazards Reduction Program (NEHRP), since inception in 1978 and has used the requirements and guidance developed by the Interagency Committee on Seismic Safety in Construction (ICSSC) of the NEHRP. The Federal Energy Regulatory Commission participates as a separate member of the ICSSC/NEHRP and is not involved with DOE operations.

The following progress report provides information in the format requested.

## INTRODUCTION

The Department has required, since the early 1950s, use of the seismic requirements of the most current Uniform Building Code (UBC) of the International Congress of Building Officials (ICBO). This was and today remains applicable to design and construction activities at all DOE sites per Order DOE 6430.1A, DOE General Design Criteria. In addition, this Order and DOE Reactor Development and Technology Standards (including those of the Nuclear Regulatory Commission) place increased seismic loads and construction quality on facilities where confinement of hazardous materials is required. Also, the seismic standards (UBC based) of the DOE power administrations apply to electric power transmission systems both on and off DOE sites.

DOE is also responsible for providing financial assistance in the form of grants, loans, and loan guarantees to organizations at locations other than DOE sites. Although the DOE seismic safety requirements are not applicable in these cases, some DOE field offices require UBC seismic design and construction standards for financially assisted construction.



The Office of Environment, Safety, and Health (EH) has the responsibility within the Department for representing DOE in the ICSSC/NEHRP and for coordinating the involvement of the various DOE Program Offices in the activities of the ICSSC. EH and the Office of Nuclear Safety have responsibilities for providing oversight of the implementation of ICSSC/NEHRP requirements including those of EO 12699, while EH and the Office of Nuclear Energy are responsible for policy and standards.

## STATUS OF DOE PROCEDURES

DOE Orders and Rules have been changed (where required) and administrative actions have been taken to bring the Department into line with the provisions of EO 12699. The Department is considered to be essentially in compliance. Specific actions taken include:

- o Order DOE 6430.1A has required use of the seismic requirements of the most current UBC since the mid 1950s and higher seismic loading and quality of construction for facilities where confinement of hazardous materials is required. DOE 6430.1A also requires use of other codes and national standards.

The current "1B" revision of this order enhances the above by including references to NEHRP/ICSSC Federal guidelines and EO 12699.

- o Final rule changes were published January 1990, to the DOE Financial Assistance Rules (10 CFR 600) that include provisions to comply with EO 12699. Rule 10 CFR 600.12 was added that extends the seismic requirements of the UBC to financially assisted activities where DOE funds are used for design and construction (see Attachment 1).

Rules specific to loan guarantees are being reviewed to determine need for change.

Implementing procedures for the new rules are expected to be in place by January 1993.

Several actions have been taken by DOE in response to the 1991 ICSSC Guidelines and Procedures for Implementation of the Executive Order on Seismic Safety:

- o Copies of EO 12699 and the "Guidelines" were sent to all Headquarters Program Seismic Safety Contacts. Based upon the response and other information, assessments of further implementation needs were made.
- o Development of new DOE Orders is underway to formalize the Seismic Safety Programs of the Department.
- o Seismic walkdowns and evaluation programs were developed and field tested at several sites.

- o The Office of Defense Programs (DP), one of the largest programs in DOE, issued a seismic "Safety Information Letter" September 1991 (Attachment 2), to over 20 DOE sites offices on implementation of EO 12699. A DP program office seismic safety coordinator and alternate were appointed and linkages between DOE Orders and the EO were explained.
- o The Secretary of Energy appointed James R. Hill, Office of Environment, Safety and Health, as the DOE Seismic Safety Coordinator.

DOE policy, orders, requirements, standards, and guidance are documented and distributed to program and site offices and are available from central distribution centers. DOE site organizations maintain drawings and information on facilities design and construction. The DOE Orders on Major System Acquisition and Major Projects controls development of line item construction. These include milestones for accepting environmental impact statements, design reviews, start of construction actions, safety analysis, and start of operations actions.

DOE has established the Natural Phenomena Hazards Information Center at the Lawrence Livermore National Laboratory. This center is intended to be a centralized source of information and reference material on Natural Phenomena for the DOE complex, providing natural phenomena reviews, develop design criteria, evaluate lessons from past earthquakes, provide training and technology transfer, and keep current on the rapidly changing state-of-the-art in earthquake engineering.

A Center for Natural Phenomena Engineering has also been established at Oak Ridge, Tennessee. This center is mainly involved in the testing, evaluation, standards development, and retrofit of existing masonry construction in collaboration with university and other Federal agencies

The DOE has adopted the UBC/ICBO seismic safety "standards." This Model Building Code was found by the ICSSC in its recommendation to FEMA, dated March 4, 1992, to provide a level of seismic safety substantially equivalent to that provided by the NEHRP Provisions and to be appropriate for implementing EO 12699. The DOE "standard" UCRL-15910 provides a graded approach for seismic design and evaluation of DOE facilities such that the various loads and methods bracket the range of construction from UBC levels to those required for nuclear power plants.

Several initiatives are underway within DOE to enhance the current seismic safety policy, rules, orders, criteria, standards, and guidance for new and existing facilities. (A summary of evaluation and upgrading activities is provided in a related DOE 1991-1992 NEHRP Activity Report).

While the Department meets the provisions of EO 12699, DOE Orders and Standards are constantly being updated to achieve improve seismic and other natural phenomena hazard performance. To date, the UBC and other codes and standards (including UCRL-15910) have been implemented in DOE Order 6430.1a. New DOE Orders are being developed to formalize DOE seismic safety programs and responsibilities and to improve technical requirements and standards. A Seismic Safety Order is under development to formalize DOE seismic safety

programs and provide linkage to the program elements in other DOE directives, the NEHRP, and EO 12699. Natural phenomena safety requirements for all DOE facilities are being consolidated in DOE Order 5480.NPH. The purpose of this Order is to establish: (1) requirements for application of the DOE General Design Criteria on seismic and other phenomena at DOE sites; (2) consistent natural phenomena hazards (NPH) requirements for all natural phenomena hazards for all DOE facilities at all DOE sites; (3) NPH requirements appropriate for facility characteristics and objectives within a graded approach that covers the wide variety of facilities found at DOE sites.

The Department is developing a hierarchy of documents that describe seismic safety requirements and their implementing procedure as shown in Figure 1. These requirements are intended to provide protection against natural phenomena hazards for occupant and public health and safety, for the environment, for minimizing interruptions to essential operations, and for reducing property losses. Consistent NPH requirements are established by use of target probabilistic performance goals. Performance goals are achieved by application of loading specification from probabilistic natural phenomena hazard estimates along with deterministic NPH design or evaluation requirements which include intentional and controlled conservatism. Figure 2 shows the relationships between specific DOE directives and Federal requirements related to seismic safety.

Methods to implement this Order are provided in DOE Standards describing: (1) design and evaluation of facilities for NPH effects; (2) prioritizing and screening NPH evaluation and upgrading of existing facilities; and (3) assigning performance goals (by means of performance categories) to individual structures, systems or components which are appropriate for the consequences of their potential damage or failure due to NPH effects. In addition, more detailed methods on specific NPH design and evaluation subjects are provided in DOE guidance documents as well as consensus national standards, model building codes, and industry accepted codes and specifications. Figure 3 shows the existing, draft, and future standards and guidance documents that DOE plans for carrying out its natural phenomena safety programs. A bibliography of guidance and training documents is provided in Attachment 3.

## **IMPLEMENTATION PROGRESS**

The DOE was deemed to meet the requirements of EO 12699 when issued, January 5, 1990, because of our prior adoption of the seismic safety requirements of the UBC/ICBO. The responsibilities for an effective DOE seismic safety program is shared by various DOE Headquarters Offices as follows:

- o Assistant Secretary for Environment, Safety, and Health (EH) has overall responsibility, (in addition to the lead role with the ICSSC/NEHRP), for establishing non-nuclear safety policy and implementing guidance at all facilities. EH develops, promulgates, and maintains materials and provides advice and assistance as requested concerning implementation of non-nuclear safety policy as it relates to natural phenomena hazards at all facilities; and acts as the independent element responsible for non-nuclear and

occupational safety and health oversight of line management for The Department and monitors and audits the implementation of all aspects of the natural phenomena hazards mitigation, at all facilities, related to non-nuclear and occupational safety and health, including field organization and contractor performance.

- o Assistant Secretary for Nuclear Energy (NE) has overall responsibility for establishing nuclear safety policy and implementing guidance at DOE facilities. NE develops, promulgates, and maintains guidance materials and provides advice and assistance as requested concerning implementation of nuclear safety policy as it relates to natural phenomena hazards at nuclear facilities
- o The Director, Office of Nuclear Safety (NS) reports directly to the Secretary and advises the Secretary on whether or not line management is adequately achieving nuclear safety which includes the impact of Natural Phenomena. NS has broad responsibilities to monitor and audit the nuclear safety programs and performance of DOE line and contractor organizations. NS is responsible for identifying to the Secretary special circumstances indicative of deteriorating or poor performance that may warrant further in-depth appraisals to identify and fix fundamental problems. NS reviews and concurs in nuclear reactor and non-reactor nuclear facility safety policies and requests for exemptions thereto. In execution of these broad responsibilities, NS is expected to provide a bridge with DOE operations and commercial nuclear industry practices.
- o The assistant secretaries that manage line program organizations are responsible for the safety of their programs. The line organization includes DOE field and DOE contractor site management. The line is responsible for implementing DOE directives and includes the design and construction of DOE facilities to acceptable seismic standards.

Changes in the Department's administration of its seismic safety programs include providing a full-time Manager for Natural Hazards Safety Programs, appointment of the ICSSC representative to be the DOE Seismic Safety Coordinator, an order of magnitude increase, at all levels, in engineering staff related to seismic safety, establishment of various headquarter and field working groups, continuing the activities of the General Design Criteria Planning Board Working Group on Natural Hazards Design Criteria, and the establishment of internal and external oversight groups whose interest areas include seismic safety. One of the functions the oversight groups is to assure that the seismic safety actions taken are technically sound and consistent with national standards and requirements.

## **IMPACTS ON OPERATIONS**

The EO 12699 had no substantial impact on DOE operations because DOE requirements had already implemented its provisions for new construction. Thus, only minimal administrative changes were needed to existing orders. One impact of EO 12699 on activities at DOE sites may be increased reporting requirements.

However, DOE Programs, where DOE provides financial assistance for construction of buildings will have significant impacts. Most of these projects will now have to be designed and constructed to seismic standards which will add to cost and schedule. Enforcement activities if possible, may be complicated. These impacts are yet to be assessed by the three primary DOE program offices involved with financial assistance programs.

The Department of Energy has had a program in place for many years to minimize the effects of natural phenomena including earthquakes. This program has the following main elements:

- Technical Support
- Research and Development
- Hazard Model Development
- Design and Evaluation Criteria Development
- State of Practice Manual Development
- Implementation Procedure Development
- Technology Transfer
- Oversight

The following provides information on the elements of technical support, technology transfer, and training and the locations of major efforts are summarized in Figure 4.

A key DOE implementing document for design and evaluation of facilities for seismic safety has been the "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," UCRL-15910 dated June 1990. This document was first available in draft form in 1985. It went through detailed review and was issued for trial use. A four day workshop on the philosophy, procedures, and examples has been conducted semi-annually since May 1989. Two days of this workshop are devoted to Seismic Guidelines. To date the workshop has been held seven times with the next one planned for September 1992. By the end of 1992, over 400 DOE and DOE contractor staff and others will have completed the workshop training. This workshop has been videotaped for DOE and contractor site use.

DOE has been conducting a Natural Phenomena Hazards Conferences, since 1980, to bring together engineers, scientists, safety professionals and managers from throughout the DOE complex to share their work. The first conference was held in 1980 and others followed in 1985, 1989, 1991, and the fifth is being planned for 1993. The second conference also offered six 3 hour mini-courses on Natural Phenomena. These courses were videotaped for use throughout DOE and covered Seismic Analysis, Seismic Designs, Emergency Preparedness, Wind/Tornado Overview, Wind/Tornado Design, and Flood Overview. The 1989 and 1991 conferences and other symposiums have included sessions on implementation of EO 12699.

Since 1990, DOE has been preparing and issuing a technical newsletter called Phenomenal News. This provides current natural phenomena information to over 900 DOE and DOE contractor staff, to members of the ICSSC, and to others. Information on Executive Order 12699 and the activities of the ICSSC have appeared in various issues to help keep the community informed (see April 1992, issue, Attachment 4).

A special initiative during 1992 has been to develop a sequence of information exchange meetings in the area of Seismic Base Isolation. This was coordinated with other Federal Agencies including the National Institute for Science and Technology, the U.S. Navy's Civil Engineering Laboratory and the National Research Council. DOE held a 3 day workshop in May 1992 for 50 participants where the seismic base isolation concepts were discussed, a tour of isolated structures in the Los Angeles area was conducted, and example applications and current research were presented. This was followed by a 5 day short course on seismic base isolation applications with emphasis on design. The short course was videotaped for future use throughout DOE.

DOE has also developed an earthquake alert system to provide early warning to facilities while an earthquake is occurring. This system can provide from 10 to 25 seconds of warning to a site prior to the arrival of damaging ground motion. This is sufficient time to automatically place critical facilities in a safe state, start emergency generators, raise fire house doors, and issue warning to take cover. A demonstration is currently under way at Lawrence Livermore National Laboratory.

DOE has had a team in place for over 10 years that visits areas where earthquakes have occurred and documents lessons learned from these events. This allows continual improvement in design and operation practice for DOE facilities. The team works with other U.S. teams and has participated in the following earthquake investigations:

|      |                                                  |
|------|--------------------------------------------------|
| 1980 | LLNL, Livermore, California                      |
| 1984 | Morgan Hill, California                          |
| 1985 | Mexico City                                      |
| 1987 | New Zealand                                      |
| 1987 | Whittier, California                             |
| 1989 | Loma Prieta/San Francisco area                   |
| 1991 | Costa Rica                                       |
| 1992 | Cape Mendocino Earthquakes/Northern California   |
| 1992 | Landers/Big Bear Earthquakes/Southern California |

The team is also available to assist DOE if an earthquake occurs on or near a DOE site. Team members have been trained on earthquake investigation techniques. DOE is also developing an aftershock warning system which would deploy portable instruments in an area where an earthquake occurred. This would allow monitoring of aftershocks and possibly issuing radio warnings. This system was deployed for initial testing during the June 1992 Landers and Big Bear Lake earthquakes in Southern California.

DOE is also developing requirements for Seismic Instrumentation throughout the complex. This will provide post event data to help interpret facility response.

DOE is revising its Seismic Safety Guide, first issued in 1983, the Guide provides facility managers practical advice on how to establish seismic safety programs at their facilities. A revision of this document is underway and is to be published by September 1993. DOE intends to make this document their contribution to the International Decade for Natural Disaster Reduction.

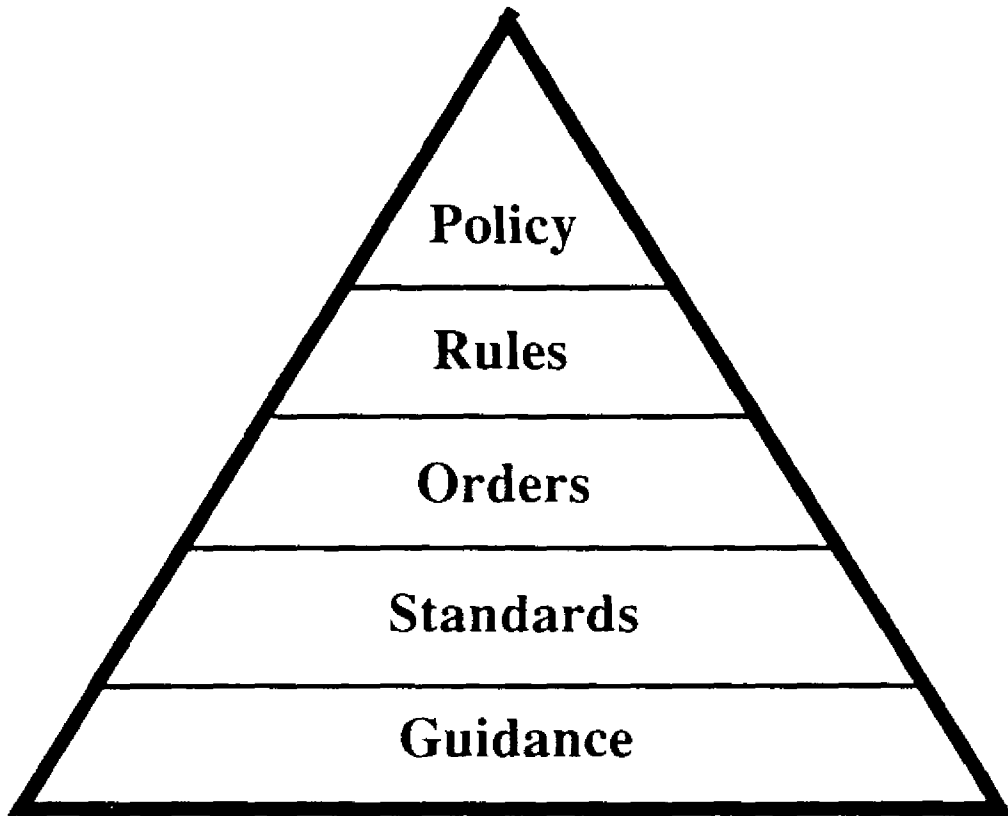


Figure 1: Hierarchy of Department of Energy Documents

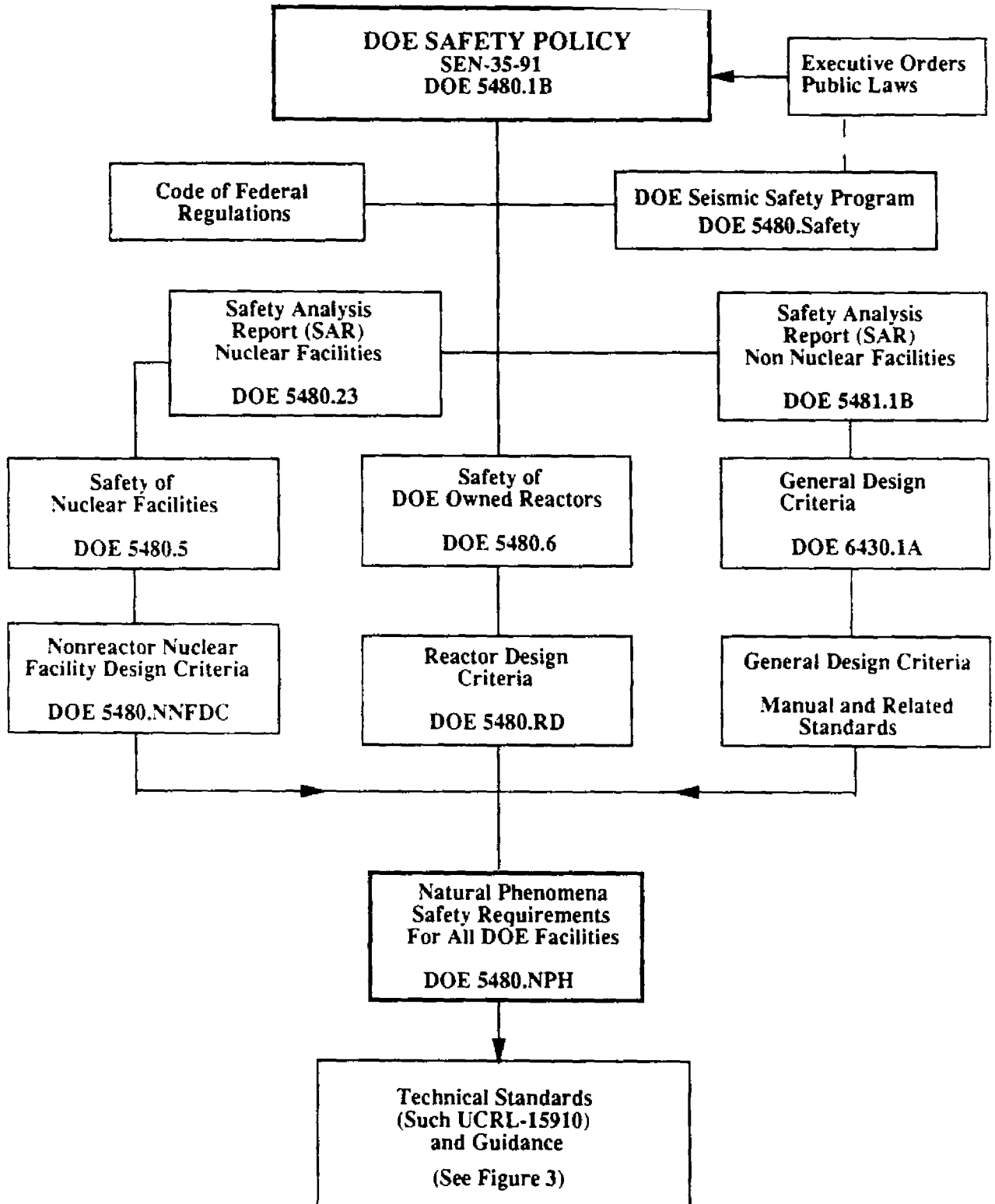


Figure 2: DOE Safety Documents for Natural Phenomena Hazards.



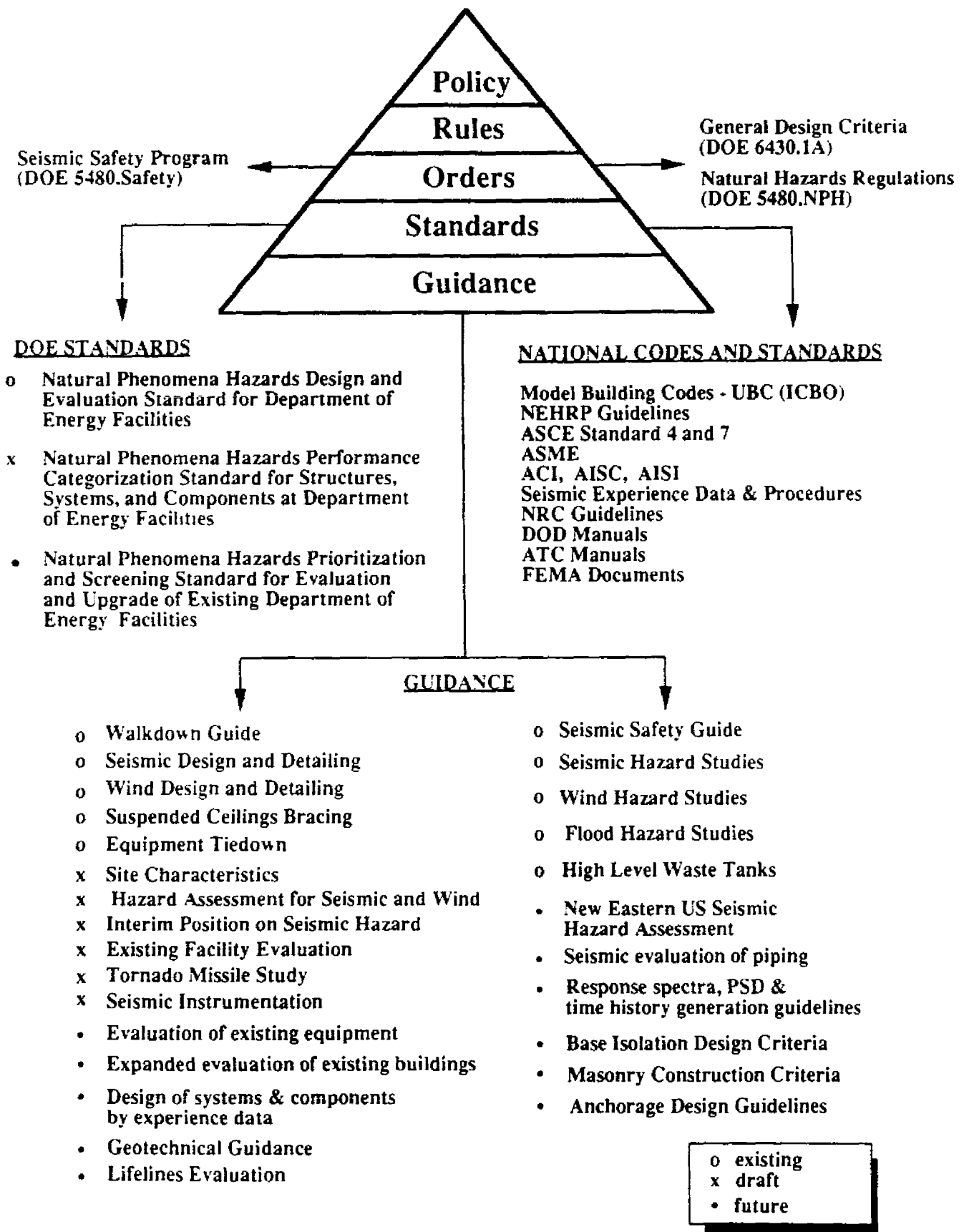


Figure 3: List of Existing, Draft, and Future Standards and Guidance.