

Directive Number and Title:

DOE O 420.1, Facility Safety

Originating Office:

Office of Environment, Safety and Health

Review Team Members:

Richard Stark, EH
Anne Troy, GC
John Evans, S-3.1
Dan Kelley, SPR
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Background:

Why, when, and how was the order and its contractor requirements document established? The 420.1 order was approved October 13, 1995, replacing orders 5480.7A, 5480.24, 5480.28, and 6430.1A. The combining of these four prescriptive orders brought into a single performance directive requirements affecting facility safety: nuclear criticality safety, fire protection, defense against hazards of natural phenomena, chemical explosives safety, and directions for dealing with diverse building codes. This was accomplished under the National Performance Review.

What major modification and recent updates have been made? Change 1, November 16, 1996, simply deleted the expiration date, since the Directives Management Board had decided that safety-related orders would not expire. Change 2, October 24, 1996, incorporated comments made by the DNFSB. Change 3, November 22, 2000, responded to DNFSB recommendation 97-2, Criticality Safety. Change 3, issued for comment on May 11, 2001, is intended to respond to DNFSB recommendation 2000-2.

Overview of Requirements:

What is the order's purpose and how is it accomplished? The objective of the order is to establish safety performance requirements for nuclear safety design, criticality safety, fire protection, and natural phenomena hazards mitigation, and to define facility hazard categories. It serves to adopt industry consensus standards, and is the mechanism for implementing Executive Orders concerning natural phenomena which apply to all buildings owned and operated by the federal government.

What is the CRD's purpose and how is it accomplished? The CRD contains the requirements to be met by the facilities themselves and their operation, and defines the process to be followed by the contractor in assuring that the many National Fire Protection Association codes and standards are efficiently accommodated.

Analysis:

Do we still need to apply the Order to contractors? Yes. The requirements are upon the facility itself and its operation, such that the contractor is the agent needed to achieve facility safety.

If so, are there less bureaucratic approaches? To assure integrated facility safety, an order is necessary to identify the applicable national and state building codes, ANSI standards, and NFPA requirements to be used by the contractor, to implement those Executive Orders which specify capabilities that all federally owned or leased buildings must have, and to address the adequate nuclear safety design issues raised by the DNFSB. To achieve these goals by means other than by referencing a single order in the contract would involve far more bureaucracy.

Are there any other useful changes to the contractor requirements document? As indicated in the "background," above, changes to improvements and external authorities have been made periodically, and are expected to continue. Comments from the field suggested further improvements that could be made to both the order and its guidance documents. In particular, section 4.4.5, which is a single sentence requiring instrumentation to monitor possible earthquake damage, may be deleted or expanded for clarity. Section 4.4.6, which deals with reentry after building evacuations following natural phenomena, may be revised to link facility evacuations with the requirements for restart of shutdown facilities, as in DOE O 425.1B, STARTUP AND RESTART OF NUCLEAR FACILITIES. In addition, a comment suggested that greater authority be given to contractors with respect to fire protection exemptions and equivalencies.

Summary Recommendations of the Review Team:

Retain this order, revising as needed, to maintain all facility safety requirements in a single document. Conduct follow-up meetings with subject matter experts to resolve the minor issues raised by the suggestions for improvements received in the comments.

Minority View by Anne Troy, GC and EH's Response

Ms. Troy's View is stated below and the EH Response is in italicized print.

Minority View Summary. This Order contains inconsistencies as to scope and coverage. It contains overly prescriptive, how-to requirements and fails to provide the contractor any meaningful way to tailor the requirements to the work and associated hazards. This Order is badly in need of an overhaul and there are serious implementation issues. Consideration of limitations in scope and deletion/modifications to overly prescriptive requirements, should be made. DOE contractors should be permitted to use the Necessary and Sufficient Closure Process to tailor the requirements to the work. My objections to this Order illustrate the problems inherent in the orders system. Particularly in the area of the environment, safety and health orders, the orders were written to protect against hazards found at the highest hazard level facilities. Some effort was made to make the orders more performance-based, however, this was done by insertion of a definition for grading. This resolved nothing leaving DOE and contractors

with a plethora of how-to requirements, frustration and immense costs.

Response. *The Necessary and Sufficient Closure Process is designed to identify a minimum set of standards for application to a specific facility or activity. A graded approach is designed to implement requirements to meet their intent in proportion to the activity. Comments from the field did not reveal any frustration or immense costs of compliance.*

Objective Review? With regard to the review done by the team, it should be noted that the Originating Office, a member of the Office of the Departmental Representative to the Defense Nuclear Facilities Safety Board, and myself were the only ones who conducted a review. Other named team members from the field and program offices did not participate. This hindered an objective review of the Order. EH was quick to point out that comments from the field and contractors were neither substantive nor overly critical. While this may be true, my review is not confined to field and contractor comments but is an independent assessment of the Order. See General Comments.

Response *An "objective review" is best performed by people who understand the subject matter, which in this case necessarily involves technical personnel in the field. The comments received were "substantive" and generally found the Order useful and necessary.*

Scope and Coverage Inconsistencies. This Order combined four orders into one order when DOE did the 4-digit to 3-digit review. When reading the plain language of the Order, there is inconsistency in the scope and coverage. For instance, the Originating Office explained that this order was intended to cover only the *design and construction* of new Hazard category 1, 2, and 3 facilities. That appears to be the scope of section 4.1 which deals with nuclear and explosives safety. Yet a reading of the scope for the other sections dealing with fire protection, natural phenomena mitigation and criticality safety cover *far more* than the design and construction of new facilities. They add requirements for providing adequate protection for existing facilities. Moreover, for fire protection and natural phenomena hazards mitigation, the Order applies to all nuclear and non nuclear facilities. Thus, if the intended scope was coverage of only the design and construction of new facilities, then that intent is not manifested by the Order's language. What would be prudent is a review of this Order to discern what scope is intended and to amend the order to reflect that intent. The Order as it now stands is a confusing hodge podge of prescriptive, how-to-language.

Response *It is correct that the combining of four Orders each aiming at different aspects of facility safety introduced an inconsistency in the stated scope of the combined Order. This editorial change will be changed in the next revision. Since there is no confusion created among the people using the Order, it is not necessary to make an immediate change.*

Fire Protection. One particularly troubling section is fire protection. As stated earlier, the scope of this section is broader than the other parts of the order. The Order states,

DOE facilities, sites and activities (including design and construction) shall be characterized by a level of fire protection that is sufficient to fulfil the

requirements of the *best protected* class of industrial risks . . . This includes meeting the applicable building codes and the National Protection Association Codes and Standards or *exceeding them (when necessary to meet safety objectives)*, unless explicit relief has been granted by DOE.

This language authorizes DOE to require that contractors provide the highest level of protection whether or not warranted by the work and level of hazard. This is inconsistent with our statutory mandate that we issue orders and rules providing adequate protection, not gold plated, excellent protection.

Response. *"Best protected" is a term-of-art, well-understood by practitioners in the field. The national consensus standards and NFPA codes were primarily designed for residences and comparatively low-risk commercial application. Since a graded approach is generally used, there is no "gold plated" protection required. Exceeding a code or standard when necessary is not gold plating; rather, it is grading the implementation to ensure adequate protection for the hazards present in DOE facilities beyond those hazards normally present in industrial applications of the code or standard.*

Paternalistic DOE. This conclusion is borne out by the Originating Office's explanation of how the fire protection standards were selected. It was explained to me that 10 -12 years ago, several DOE experts, using their collective judgment, selected those requirements most likely to fit most DOE sites. This was done without consultation with contractors denying contractors any opportunity to provide input. Paternalistically, EH created a set of one-size-fits-all, top-down requirements. By creating a set of generic requirements, the standards provide protection for the highest hazard nuclear facility and may be needlessly expensive in some cases.

Response. *DOE facilities have experienced some of the most expensive fires in industrial history. Fire prevention is, in comparison, cheap. Since a graded approach is generally used, the "one-size-fits-all" description is inaccurate.*

Nuclear Criticality. Another troubling section is the section dealing with nuclear criticality. On the face of it, the order lists a host of ANSI/ANS standards from which a contractor may select a set of requirements best suited to the work. However, the Order states,

Revisions to any of the ANSI/ANS standards listed above will place this section *under immediate review by DOE*. Revised ANSI standards shall not be used unless an exemption is granted or it is incorporated into a DOE order.

The next section states,

All recommendations in the ANSI/ANS listed in paragraph 4.3.3.b *shall be addressed*. When the recommendation is not implemented, justification shall be documented in a manner described in the Implementation Plan. *Two ANSI/ANS recommendations shall be requirements*,

Again, the contractor is left with no choice but to provide protection at the highest level of risk. Indeed, for this section, DOE tells the contractor that it has no choice but to do so and that "recommendations" are not really guidelines but mandatory.

Response. *As with fire protection, the industry standards are designed for nuclear power plants, and not for plutonium processing and weapons manufacturing. Provisions that are considered good practice with low-enrichment reactor fuel should be at least considered for highly enriched materials, and in two specific instances are considered by experts to be absolutely necessary. It is long-standing AEC/ERDA/DOE policy to reference specific revisions to industry standards and not to give blanket approval to unreviewed revisions.*

Grading. EH argues that this Order gives contractors the authority to "grade" the requirements. The truth of the matter is that no one can "grade" an order using the definition given in the Order. A definition does not confer upon the contractor any feasible method to perform grading. This is a recognized truth and is one of reasons DOE moved to standards based management (Blue Criteria Book citation) in 1994. What we discovered is that one can *tailor* an order to the work if a robust, formal, and legally defensible process is used. The only tailoring process endorsed by DOE and the Defense Board is the Necessary and Sufficient Closure Process. EH's failure to promote and permit the use of the Closure Process means that contractors are foreclosed from tailoring the requirements to its work. The inability to tailor connotes that DOE cannot trust its contractor is figure out the best way to do work safely. Attempts to "grade" the requirements to the work are futile causing thousands of "bring me a rock" scenarios. Because grading is not feasible and tailoring using the Necessary and Sufficient Closure Process not permitted, *adequate* protection becomes gold plated, *excellent* protection. Not surprisingly, excellent protection costs DOE a lot more.

Response. *This comment confuses the "tailoring" of Orders or other requirements through an approved process such as Necessary and Sufficient and SRIDs, and the implementation of a selected requirement through "grading" of the requirement to fit the work. All EH Orders, as well as the Nuclear Safety Rules, permit grading. This comment also asserts that inappropriate grading leads to "gold plated, excellent protection" programs that DOE cannot afford. Notwithstanding that this statement is without basis, it also confuses the notions of "adequate protection" and "excellence in operations". DOE can only assure adequate protection, but we can promote excellence in operations - an end state that is desirable and saves DOE money.*

After the completion of the preceding portion of the report, the following supplemental views were received for inclusion in the report. These views have not been reviewed or endorsed by the team.

Views of GC-52

Ben McRae, Assistant General Counsel for Civilian Nuclear Programs, joined by Anne Troy, provided the following additional views regarding an alternative approach to that being

recommended by the Review Team.

The Performance Based Contracts DOE Order Review was established to re-assess the nature and extent of DOE Order requirements on DOE contractors and determine whether there are opportunities to reduce their impact, consistent with performance based contracting concepts. The overall objective of the Review is to eliminate "how to" type requirements as well as requirements which are determined to be unnecessary, non-value added, inappropriate, or duplicative, and to identify changes that would mitigate the impact of overly bureaucratic procedural requirements, or substitute less costly or more effective approaches or standards.

This Order contains many "how to" requirements, especially when the related guides are taken into account. When incorporated into a contract through the DEAR clause on Laws, Regulations and DOE Directives (48 CFR Part 970.5204-2), the result can be the imposition of a system of de facto regulation without any real consideration of whether the myriad of "how to" requirements are appropriate or necessary for a particular facility.

DOE Order 420.1 is not needed to require contractors to develop and implement programs relating to nuclear criticality safety, fire protection, defense against hazards of natural phenomena, chemical explosives safety, and directions for dealing with diverse building codes. 10 CFR Part 830.201 requires contractors to perform work in accordance with hazard controls. 10 CFR Part 830.3 defines hazard controls to include safety management programs and defines safety management programs to include fire protection. In addition, as part of developing the safety basis for a facility, 10 CFR Part 830.204(b)(5) requires a contractor to define the characteristics of its safety management programs. While the definition of safety management programs does not explicitly include natural phenomena and chemical explosives safety, the definitions of hazards and hazard controls are sufficiently broad to encompass these areas and thus the safety basis provisions of 10 CFR Part 830.204(b) would require a contractor to identify and analyze the potential hazards in these areas and develop and implement appropriate controls. 10 CFR Part 830.204(b)(6) explicitly requires a criticality safety program. 10 CFR Part 830.206(b)(1) requires the use of design criteria approved by DOE. While 10 CFR Part 830 applies to contractors directly without the need for any contractual requirement, it is incorporated automatically into contracts through the DEAR clause on Laws, Regulations and DOE Directives.

Given the requirements in 10 CFR Part 830, at least three sections of DOE Order 420.1 (namely, Fire Protection, Natural Phenomena Mitigation, and Design Criteria) could be eliminated and replaced by a Policy Statement that would describe DOE's overall expectations for contractors implementing fire protection, natural phenomena mitigation and design criteria programs. This policy statement would focus on (1) performance objectives for each program, (2) the need to tailor the programs to reflect the work being performed and the associated hazards, taking into account applicable laws, regulations, and national/international consensus standards, and (3) integration into the contractor's safety management system.

The elimination of these three sections would not prevent the continued or future use of the existing requirements in these sections as the basis for a contractor's fire protection program,

natural phenomena mitigation program or design criteria program. It would, however, lessen the likelihood these requirements would be imposed without a thorough and thoughtful application of the safety basis rule in 10 CFR Part 830 and of integrated safety management (ISM) pursuant to the DEAR clause on Integration of Environment, Safety and Health into Work Planning and Execution (48 CFR Part 970.5223-1).

In addition to the elimination of these three sections of DOE Order 420.1, two working groups, with representatives from EH, GC and other interested entities, should be convened. One group would conduct an objective review of these three sections of the Order to determine if any the requirements should be retained in a guidance document, as well as to review and revise the existing guidance to make it clear and concise and eliminate the potential for de facto regulation.

The second working group would review the section of DOE Order 420.1 on Criticality Safety and determine whether any of the existing criticality requirements could be simplified, clarified or moved to a guidance document and to review and revise the existing guidance to make it clear and concise and eliminate the potential for de facto regulation.

If the Panel for the Performance Based Contracts DOE Order Review (the Panel) accepts this recommendation, it should specify a date (such as 90 days after the acceptance of the recommendation by the Panel) by which the three sections (Fire Protection, Natural Phenomena Mitigation, and Design Criteria) of the Order must be eliminated and a policy statement issued. The Panel's intervention may be necessary to achieve this date. In addition, the Panel may specify dates for the working groups to complete their reviews.

Views of EH-5

The Office of Safety and Health (EH-5) worked with Ben McRae and Anne Troy to create the alternative approach described in the preceding paragraphs. EH-5 believes there is merit in this alternative approach to streamline requirements, consistent with the hazards in the workplace, into an integrated safety management system. EH-5 believes it will be productive to establish a Working Group to pursue this alternative approach using a deliberative and inclusive process that includes the DNFSB.

Views of DOE Departmental Representative to the Defense Nuclear Facilities Safety Board (DOE S-3.1)

The DOE Departmental Representative strongly recommends that the Department consults with the Defense Nuclear Facilities Safety Board (Board) before making any decision to eliminate a "Directive of Interest" to the Board. In recent meetings with Mr. Richard Hopf and Ms. Ellen Livingston, the Board has requested to be notified of any potential decisions to eliminate "Directives of Interest" to the Board. The Board's most recent list of "Directives of Interest," issued on October 16, 2001, includes this directive.

The Board has statutory responsibility to review and evaluate the content of safety-related

standards for defense nuclear facilities [42 USC 2286a]. The Department management has long ago established and institutionalized an agreement with the Board for the Board to review and comment on all safety-related directives and changes prior to issuance. The Department's Order and Manual on Directives (O 251.1 and M 251.1-1A) describe the Department's process to ensure the Board has opportunity to review safety-related directives and changes prior to issuance. A sudden unilateral change in the long-established way the Department does business with the Board on review of safety requirements is likely to cause unnecessary perturbations in the Department's working relationship with the Board.

The Departmental Representative has responsibility to facilitate the Board's review of safety-related directives. If requested, the Departmental Representative will facilitate discussions between applicable Department and Board personnel to discuss potential elimination of this directive. Again, the Departmental Representative strongly recommends that this consultation with the Board needs to occur before a Department decision on elimination is reached.