

ORDER

DOE O 225.1B

Approved: 3-4-2011

ACCIDENT INVESTIGATIONS



U.S. DEPARTMENT OF ENERGY
Office of Health, Safety and Security

ACCIDENT INVESTIGATIONS

1. PURPOSE.

This Order prescribes organizational responsibilities, authorities, and requirements for conducting investigations of certain accidents occurring at U.S. Department of Energy (DOE) sites, facilities, areas, operations, and activities.

The purpose of the accident investigation is to understand and identify the causes (both individual and organizational) that contributed to the accident so those deficiencies can be addressed and corrected. This, in turn, is intended to prevent recurrence and promote improved environmental protection and safety and health of DOE employees, contractors, and the public.

Moreover, accident investigations are used to promote the values and concepts of a learning organization. The Department's Integrated Safety Management (ISM) Feedback and Improvement function envisions organizations that are continually monitoring performance; identifying deviations or questionable conditions; self-assessing; and using quality analysis to improve. An essential component of organizational learning is learning from accidents and near misses. This requires, through the application of this Order, that we go beyond the surface levels and understand how the underlying sources of operational vulnerability combined to result in failure. The explanation of how the failure was able to emerge in a normally safe and reliable system will lead to an understanding of where the system and processes can be improved and promote accident prevention.

This Order does not supersede the authority of DOE to perform enforcement investigations relating to contractor compliance with Federal regulations enforced by DOE (e.g., Title 10 Code of Federal Regulations (C.F.R.) Parts 824, 830, 835, 850 and 851).

2. CANCELLATION.

DOE O 225.1A, *Accident Investigations*, dated 11-26-97, and DOE Guide 225.1A-1, *Implementation Guide for Use with DOE Order 225.1A, Accident Investigations*, dated 11-26-97. Cancellation of an Order does not, by itself, modify or otherwise affect any contractual obligation to comply with the Order. Cancelled Orders that are incorporated by reference in a contract must remain in effect until the contract is modified to delete the reference to the requirements in the cancelled Orders. 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 is modified to either eliminate requirements that are no longer applicable or substitute a new set of requirements.

3. APPLICABILITY.

- a. Departmental Applicability. Except for the exemptions in Paragraph 3.c, this Order applies to all Departmental Elements, including those created after the Order is issued.

The Administrator of the National Nuclear Security Administration (NNSA) must assure that NNSA employees comply with their respective responsibilities under this Order. Nothing in this Order will be construed to interfere with the NNSA Administrator's authority under Section 3212 (d) of P.L. 106-65 to establish Administration-specific policies, unless disapproved by the Secretary.

The Order applies to all accident investigations conducted by DOE. In some cases other agencies may have the authority to conduct investigations per their C.F.R. These agencies may include: the Federal Aviation Administration; the National Transportation Safety Board; the Nuclear Regulatory Commission; the Occupational Safety and Health Administration; and the Chemical Safety and Hazards Investigations Board. The provisions of this Order are to be used to complement and supplement those regulatory requirements to address the internal objectives of DOE accident investigations.

29 C.F.R. § 1960.29 is applicable to Federal employees and to certain contractor employees where specific jurisdictional agreements have been made with OSHA.

Where a conflict between the C.F.R. and this Order is identified during the accident investigation, the AIB Chairperson is responsible to document the situation and obtain guidance from General Counsel and the Office of Health, Safety and Security (HSS).

- b. DOE Contractors.

- (1) Except for the equivalencies/exemptions in paragraph 3.c. the Contractor Requirements Document (CRD), Attachment 1, sets forth requirements of this Order that will apply to contracts that include the CRD. The CRD must be included in contracts for the operation, management, maintenance, construction, demolition, or remediation of a DOE facility.
- (2) Contractor compliance with the CRD will be required to the extent set forth in the contract, as specified in Paragraph 5.c. of this Order.
- (3) Equivalencies and Exemptions. Equivalencies and exemptions to this Order are processed in accordance with DOE O 251.1C, *Departmental Directives Program*, dated 1-15-09, which requires that HSS, as the Office of Primary Interest (OPI) be consulted on proposed exemptions or equivalencies to this Order.

- (4) Equivalency. In accordance with the responsibilities and authorities assigned by Executive Order 12344, codified at 50 U.S.C. Sections 2406 and 2511, and to ensure consistency throughout the joint Naval/DOE Naval Nuclear Propulsion Program, the Deputy Administrator for Naval Reactors (Director) will implement and oversee requirements and practices pertaining to this Order for activities under the Director's authority, as deemed appropriate.
- (5) Exemption. In accordance with Section 302 of the Department of Energy Organization Act (P.L. 95-91), the Secretary operates and maintains the Power Marketing Administration (PMA) electric power transmission systems by and through the PMA Administrators (PMAAs). The PMAAs have in place operations management programs which are geared to the special needs of utility operations, are responsive to coordinate multi-utility system requirements and are in conformance with prudent utility practice. In view of the unique nature of the PMAAs' obligations to meet their statutory and public utility responsibilities for the safety, security, and reliability of electric power transmission and of their legal and contractual obligations, the PMAAs must determine the appropriate operations management program for their facilities, which will include consideration of appropriate parts of the criteria set forth by this Order.

4. REQUIREMENTS.

- a. Determination. The Heads of Headquarters Elements must consider the criteria identified in Appendix A, the value of the knowledge to be gained by conducting the investigation, and other relevant factors, to determine whether an Accident Investigation Board (AIB) must be appointed. This determination must be made expeditiously, taking into account that timeliness is crucial to conducting an accurate investigation, preserving the accident scene and evidence, and identifying causal factors (see Appendix B, Definitions). The Head of Headquarters Elements must document the determination and immediately notify HSS of the determination whether to appoint or not appoint an AIB. If the Chief Health, Safety and Security Officer does not concur with rationale for not appointing an AIB, the Chief may elevate the matter for resolution by the Deputy Secretary. After resolution, the Head of Headquarters Elements must document the final determination of a decision not to conduct an investigation with a copy provided to HSS.
- b. Notification of Other Agencies. Public laws or regulations assign other agencies responsibility for investigating certain types of accidents that could occur at DOE facilities or as a result of DOE activities. In some cases, DOE may have a memorandum of understanding with another Federal or state agency to this effect. The Appointing Official must determine whether applicable memoranda of understanding have been executed, ascertain investigative jurisdiction prior to the

appointment of an AIB, and, as appropriate, ensure that notifications are made in accordance with these agreements (or other requirements).

- c. Conducting the Investigation. Upon determination that an accident investigation will be conducted, the Head of the Headquarters Element must appoint an AIB. Alternatively, if the Head of the Headquarters Element and HSS agree that it is in the best interest of DOE, HSS will serve as the Appointing Official. Federal accident investigations must be conducted as follows:

(1) Appoint the Accident Investigation Board.

- (a) Within three calendar days of the accident occurrence, the Appointing Official must formally appoint DOE Federal employees to an AIB. (see Paragraph 5, Responsibilities) If the appointment of an AIB is delayed beyond three calendar days, the rationale for the delay must be explained and documented in the accident investigation report.

1 The AIB must consist of a Chairperson and three to six members, at least one of whom must be a DOE Accident Investigator (see Appendix B, Definitions). All AIB members must be DOE Federal employees with subject matter expertise in areas related to the accident, including knowledge of the Department's ISM directives.

- (b) Both the Chairperson and the DOE Accident Investigator must be selected from a different duty station than the accident location.
- (c) The AIB must be appointed in writing. The appointment letter/memorandum must specify the scope of the investigation, the individuals being appointed, special provisions of the investigation, and a specified completion date for the final report. The appointment letter must release all members of the AIB from their normal responsibilities/duties for the period of time the Board is convened. The scope of the investigation must include gathering facts, analyzing causes, developing conclusions, and developing Judgments of Need (see Appendix B, Definitions) pertaining to DOE and contractor organizations and management systems that could have or should have prevented the accident.
- (d) The Appointing Official or his/her representative must brief the AIB members on their roles and responsibilities and other pertinent information within three calendar days of their appointment.

- (e) The DOE AIB Chairperson must:
 - 1 Be a DOE manager with demonstrated managerial competence, preferably a member of the Senior Executive Service, or at a senior general service grade level determined to be appropriate by the Appointing Official; and
 - 2 Be knowledgeable of DOE accident investigation techniques and experienced in conducting accident investigations through participation in at least one Federal accident investigation, or have equivalent accident investigation experience, as determined to be appropriate and documented by the Appointing Official.
- (f) An AIB must have either a Chairperson and a DOE Accident Investigator whom meets the full experience and training requirements to serve in those AIB positions. Other AIB and staff personnel need not meet these requirements.
- (g) The AIB may be supported by appropriate advisors and consultants who may be Federal, contractor, and/or consultant personnel as determined by the AIB Chairperson. Investigative and technical expertise may be requested from other Heads of the Headquarters Elements and/or HSS.
- (h) The AIB Chairperson and members must:
 - 1 Report only to the Appointing Official or his/her representative, as identified in the letter/memorandum of appointment, during the investigation.
 - 2 Be independent of the direct line management chain responsible for day-to-day operation or oversight of the facility, area, or activity involved in the accident.
 - 3 Not include both a supervisor and his/her direct-report subordinate.

(2) Investigate the Accident.

- (a) The AIB must conduct a thorough investigation of individuals, organizations, management systems, and facilities having an interest in or potential impact on the accident, as well as the operation or oversight of the facility, area, or activity involved in the accident.

- (b) The AIB must determine the facts of the accident by examining the accident scene, examining DOE and contractor documentation, interviewing witnesses and other personnel directly associated with the accident, and performing engineering tests and analyses as appropriate. Information provided to the AIB (e.g., witness statements, interview notes) must be protected to the full extent provided by law (e.g., Whistleblower Protection Act of 1989 and/or the Privacy Act of 1974). The AIB must also examine policies, standards, and requirements that apply to the accident being investigated, as well as DOE and contractor management systems that could have contributed to or prevented the accident.
- (c) The AIB must analyze the facts and derive causal factors (direct, root, and contributing causes) associated with human performance and safety management systems. Each identified root and contributing causal factor must support a corresponding Judgment of Need.
- (d) The AIB must evaluate the effectiveness of safety management systems (as defined by the Department's ISM directives), the adequacy of policy implementation, and the effectiveness of line management oversight as they relate to the accident.
- (e) Prior to completion of the investigation, the AIB must conduct an internal review of the investigation process to ensure that:
 - 1 The pertinent facts, standards, and requirements relating to the accident are identified and thoroughly analyzed, and that causal factors are determined by employing the core analytical techniques;
 - 2 Judgments of Need are stated and can be supported by the facts and analysis contained in the report, so that the report can serve as a stand-alone document; and
 - 3 The accident investigation report can be used to promote the values and concepts of a learning organization.

(3) Report Investigation Results.

- (a) The AIB must develop an accident investigation report. The purpose of the report is to tell what happened and why it happened so that we can use this understanding to prevent future accidents. The report must identify the causes (both individual and organizational) that contributed to the accident to help explain how failure succeeded in a normally reliable and safe system. The

report must help identify essential learning organizational opportunities.

The report must demonstrate that the Judgments of Need are based on objective analysis and application of the core analytical techniques using the facts to develop the root and contributing causes. The report must also identify DOE and contractor management systems that, if corrected, could have prevented the accident so those systems can be addressed and corrected to prevent recurrence.

- (b) The AIB must offer the facts underlying the draft investigation report to the affected DOE and contractor management for their review for factual accuracy before the report is completed.
- (c) Before completion of the accident investigation report, the AIB Chairperson must:
 - 1 Conduct a review of the report to ensure its technical accuracy, completeness, and internal consistency;
 - 2 Ensure that the report includes results from an analysis of management control, safety systems, and human performance, that may have contributed to the accident;
 - 3 Ensure that the report is reviewed by qualified and authorized personnel to determine that it does not include classified or unclassified controlled nuclear information, Official Use Only information, or information protected by the Privacy Act of 1974, as amended. Documentation that these reviews have been conducted must be retained as part of the investigation file; and
 - 4 Forward an electronic copy of the draft report to the HSS Office of Corporate Safety Analysis for quality review. The AIB will work with the HSS staff to address relevant comments.
- (d) The AIB Chairperson and AIB members must sign and date the final draft accident investigation report. Should any AIB member wish to offer an opinion different from that of the AIB, the report must include a section for the minority opinion. The AIB Chairperson and the AIB member wishing to provide a minority opinion will coordinate on development of the final report. The minority opinion must identify where facts, analysis, and conclusions, and Judgments of Need differ from the opinions expressed by the Chairperson and other AIB members.

- (e) The AIB must submit the final draft report to the Appointing Official for acceptance within the required time frame to assure that the accident investigation has met the scope and any special provisions of the appointing letter/memorandum. Once the final draft accident investigation report is accepted in writing by the Appointing Official, the report is considered final. AIB team members may then be released by the Chairperson as appropriate.
 - (f) A statement signed and dated by the Appointing Official must be included in the final report accepting the investigation report, including the AIB's identified causal factors, conclusions, and Judgments of Need.
 - (g) The Appointing Official must publish and distribute the final report within seven calendar days of report acceptance; provide an electronic version of the final report (.pdf format) to HSS for posting on the DOE Accident Investigation Program web site; and distribute to organizations identified in the Judgments of Need.
 - (h) The Chairperson of an AIB must conduct a formal briefing on the outcome of the investigation. The Appointing Official for the investigation must coordinate and arrange for appropriate representatives to attend this formal briefing at a mutually convenient time and location.
- d. Investigation Closeout. The Appointing Official must close the Federal accident investigations after ensuring the following are completed:
- (1) Lessons Learned: As required by DOE Order 210.2, *DOE Corporate Operating Experience Program*, dated 6-12-06, or Head of Headquarters Element Quality Assurance Program, the lessons learned from the AIB are formally distributed.
 - (2) Corrective Actions: All corrective action plans are approved, completed and implemented to satisfy the Judgments of Need identified in the final AIB report.
 - (3) Records Retention: A memorandum, signed by the Appointing Official is issued stating that since all corrective actions have been instituted and the accident investigation is closed. The unclassified evidence files retained by the Appointing Official for the investigation (correspondence files, work control packages, etc.) are then dispatched as temporary records to the National Archives and Records Administration for disposition in accordance with the records retention schedule for investigative records (75 years). As a result of this time period, records need to be categorized as “permanent” in accordance with 36 C.F.R. § 1225.14 and recommend that access restriction limitation be designated as “Agency Personnel.”

5. RESPONSIBILITIES.

a. Head of Headquarters Element.

- (1) Consider the criteria identified in Appendix A, the value of the knowledge to be gained by conducting the investigation, and any other relevant factors, to determine whether an AIB must be appointed.
- (2) Serve as the Appointing Official for AIBs for programs, offices, and facilities under their authority. Alternatively, if the Head of the Headquarters Element and HSS agree that it is in the best interest of DOE, HSS will serve as the Appointing Official and conduct the accident investigation.
- (3) Maintain a staff of trained and qualified personnel to serve in the capacity of Chairperson and DOE Accident Investigators for AIBs and, upon request, provide them to support other AIBs.
- (4) If requested by the AIB Chairperson, review the draft AIB report for factual accuracy within the time frame allowed so that comments may be considered for incorporation into the final draft report.
- (5) Distribute accident investigation reports to all Heads of Field Elements under their cognizance and direct that extent-of-condition reviews be conducted for issues identified during accident investigations that are applicable to work locations and operations.
- (6) As appropriate, require the submittal of corrective action plans to address the Judgments of Need, approve the implementation of those plans, and track the effective implementation of those plans to closure.

b. Chief Health, Safety and Security Officer.

- (1) Develops and maintains DOE accident investigation policies, procedures, standards, and guidelines, and oversees their implementation.
- (2) Consults with the cognizant Head of Headquarters Element as the OPI on requests for proposed equivalencies and exemptions to this Order that are processed in accordance with DOE O 251.1C, *Departmental Directives Program*, dated 1-15-09.
- (3) Consults with the Deputy Secretary when it does not concur with the Head of the Headquarters Element determination for not appointing an AIB.
- (4) Serves as Appointing Official:
 - (a) When directed by the Secretary or Deputy Secretary; or

- (b) If the Head of the Headquarters Element and the Chief agree that it is in the best interest of DOE.
- (5) Analyzes accident data to assist in identifying trends and conditions surrounding the initiation or occurrence of accidents. Performs complex-wide analyses of accidents to guide and focus investigative efforts based on analyzed safety impact and DOE-wide significance.
 - (6) Reviews Federal accident investigation reports and determines whether the conditions identified in the report may have DOE-wide implications. As deemed appropriate, recommend to Head of Headquarters Element that they conduct an extent-of-condition review to determine whether similar conditions exist at their sites and, if confirmed, to institute timely compensatory and/or corrective action to prevent recurrence of a similar accident.
 - (7) Develops and disseminates information on DOE accident investigation techniques and ensures that training is available through the HSS National Training Center for personnel who wish to receive training to serve in the capacity of AIB Chairperson or DOE Accident Investigator.
 - (8) Maintains a list of qualified AIB Chairpersons, DOE Accident Investigators, and technical subject matter experts.
 - (9) Provides investigative and technical subject matter expertise to Appointing Officials, AIB Chairpersons, and points of contact, as requested.
 - (10) If requested by the Heads of Headquarters Elements, reviews and provides comments on draft corrective action plans resulting from an AIB.
 - (11) Upon request, provides reasonable support to the Heads of Headquarters Element in implementing the requirements in this Order.
 - (12) Reviews, for quality purposes, all accident investigation reports before submittal to the Appointing Official for acceptance, and provides comments to the AIB Chairperson.

NOTE: This review provides assurance that an objective investigation was conducted, that the AIB employed the core analytical techniques to develop the causal factors, conclusions, and Judgments of Need, and that the required contents of the investigation report are clearly and concisely addressed. A similarly rigorous assurance review will be applied to accident investigation reports published by other government agencies that exercise statutory or regulatory jurisdiction over DOE or DOE contractor activities. If no causal factors are identified in such a report, HSS will consult with the Head of the Headquarters Element on the appropriate

course of action to identify appropriate corrective actions to prevent recurrence.

- (13) In accordance with DOE O 226.1A, *Implementation of Department of Energy Oversight Policy*, dated 7-31-07, which governs line management oversight, supports and participates in the corrective action management review.
- (14) Maintains website library of final accident investigation reports.

c. Heads of Field Elements.

- (1) Identify contracts to which the CRD should apply and notify the cognizant contracting officers.
- (2) After incorporating this Order into contracts, ensure its implementation and identify to the Head of the Headquarters Element and HSS a single point of contact to act as liaison to Headquarters on matters pertaining to the Accident Investigation Program.
- (3) Provide for the necessary on-site support to the AIB, as requested by the Chairperson, to facilitate the timely and effective completion of the accident investigation.
- (4) Review draft accident investigation reports for factual accuracy within the time frame allowed for the investigation.
- (5) As appropriate, develop or provide assistance in developing lessons learned for accident investigations.
- (6) As appropriate, require the submittal of contractor corrective action plans to address the Judgments of Need, approve the implementation of those plans, and track the effective implementation of those plans to closure.
- (7) As directed by the Head of the Headquarters Element, conduct extent-of-condition reviews for specific issues resulting from accident investigations that might be applicable to work locations or activities under the Head of Field Element's authority, and address applicable lessons learned from investigations conducted at other DOE sites.

d. Appointing Officials.

- (1) Review the list of AIB candidates and eliminate those who have a potential conflict of interest. Both the Chairperson and the DOE Accident Investigators are required to be selected from a different duty station than the accident location. Formally appoint DOE employees to AIBs, normally within three calendar days of determining that an AIB is required. The appointment must be in writing.

- (2) Ensure that the AIB's authority is clear about investigating all potential causes of a given accident, including with no restrictions, DOE organizations and management systems up to and beyond the level of the Appointing Official.
- (3) Ensure that the AIB is briefed on its roles and responsibilities stressing the AIB's authority and scope, normally within three calendar days of appointment.
- (4) Accept the investigation report by signing and dating a statement to this effect, which is subsequently incorporated into the final report. Once accepted, the report is considered final and the AIB is released from its responsibilities.
- (5) Publish and distribute the accident investigation report, normally within seven calendar days of report acceptance.

e. AIB Chairpersons.

- (1) Manage the investigation process and represent DOE in all matters regarding the accident investigation.
- (2) Ensure that a thorough and competent investigation is completed.
- (3) Document the situation and obtain guidance from General Counsel and HSS where a conflict between another Government agency's C.F.R. and this Order are identified during the accident investigation.
- (4) Notify the Director, HSS Office of Enforcement, of any potential regulatory noncompliance issues identified during the investigation.
- (5) Submit the draft accident investigation report to the HSS Office of Corporate Safety Analysis for quality review and assurance that the report meets the DOE Accident Investigation Program's objectives and standards.
- (6) Refer allegations and evidence of criminal or suspected unlawful activity that are identified in the course of the accident investigation to the Office of Inspector General in accordance with DOE O 221.1A, *Reporting Fraud, Waste and Abuse to the Office of Inspector General, dated 4-19-08*.
- (7) As the spokesperson for the AIB, coordinate AIB activities and general progress with all relevant and appropriate internal and external stakeholders having an interest in the accident, employing the local Office of External Affairs for interface as appropriate.

(8) Ensure that the AIB is supported by appropriate advisors and consultants with specialized expertise as deemed necessary. If additional technical resources (e.g., subject matter experts, team coordinator, and administrative personnel), logistical support, and/or investigative time is needed to produce a high quality investigation and report, notify the Appointing Official and Head of the Field Element when those needs are recognized so that requested support can be acquired early in the investigation.

f. Contracting Officers.

Incorporate the CRD into contracts in a timely fashion upon notification of its applicability.

6. REFERENCES. (Note: DOE Directives are available online at www.directives.doe.gov).

- a. DOE O 151.1C, *Comprehensive Emergency Management System*, dated 11-02-05.
- b. DOE O 210.2, *DOE Corporate Operating Experience Program*, dated 6-12-06.
- c. DOE O 221.1A, *Reporting Fraud, Waste and Abuse to the Office of Inspector General*, dated 4-19-08.
- d. DOE O 226.1A, *Implementation of Department of Energy Oversight Policy*, dated 7-31-07.
- e. DOE O 231.1A Chg 1, *Environment, Safety and Health Reporting*, dated 6-3-01
- f. DOE G 231.1-2, *Occurrence Reporting Causal Analysis Guide*, dated 8-20-03
- g. DOE O 251.1C, *Departmental Directives Program*, dated 1-15-09.
- h. DOE O 414.1C, *Quality Assurance*, dated 6-17-05.
- i. DOE P 450.4, *Safety Management System Policy*, dated 10-15-96.
- j. DOE M 450.4-1, *Integrated Safety Management System Manual*, dated 11-1-06
- k. DOE Technical Standard Human Performance Improvement Handbook, Volume 1: Concepts and Principals, DOE-HDBK-1028-2009
- l. DOE Technical Standard Human Performance Improvement Handbook, Volume 2: Human Performance Tools for Individuals, Work Teams, and Management, DOE-HDBK-1028-2009.
- m. Title 29 C.F.R. §1960.29, *Accident Investigation*.
- n. Title 29 C.F.R. Part 1910, *Occupational Safety and Health Standards*

- o. 10 C.F.R. Part 835, *Occupational Radiation Protection*
 - p. 40 C.F.R. Part 302, *Designation, Reportable Quantities and Notification*
7. DEFINITIONS. See Appendix B.
8. CONTACT. Questions concerning this Order can be directed to the Office of Health, Safety and Security at 301-903-3777.

BY ORDER OF THE SECRETARY OF ENERGY:



DANIEL B. PONEMAN
Deputy Secretary

ACCIDENT INVESTIGATION CRITERIA

1. GENERAL.

The following criteria must be considered to determine whether any accident resulting from DOE, contractor, or subcontractor operations requires the appointment of an AIB. Accidents must be analyzed expeditiously, as indicated in Paragraph 4.a of the Order, to determine whether an AIB must be appointed based on the criteria indicated below, the value of the knowledge to be gained by conducting the investigation, and other relevant factors.

2. DETERMINATION CRITERIA.

a. Human Effects.

- (1) Any injury or chemical or biological exposure that results in, or is likely to result in, the fatality of an employee or member of the public. Fatal injury is defined as any injury that results in death within 30 calendar days of the accident.
- (2) Any single accident that results in the hospitalization for more than five calendar days, commencing within seven calendar days of the accident, of one or more DOE, contractor, or subcontractor employees or members of the public due to a serious personal injury or acute chemical or biological exposure. Serious personal injury means any injury that: (1) results in a fracture of any bone (except simple fracture of fingers, toes, or nose); (2) causes severe hemorrhages or nerve, muscle, or tendon damage; (3) involves any internal organ; or (4) involves second or third degree burns or any burns affecting more than 5 percent of the body surface.
- (3) Any single accident resulting in three or more DOE, contractor, or subcontractor employees having lost-workday cases.
- (4) Accidents involving Federal or contractor employees driving vehicles while on official Government business, on or off Government property, if the consequences result in meeting any of the criteria above.

b. Loss of Control of Radioactive Material

- (1) Any single accident that results in:
 - (a) A general employee exceeding any of the external dose limits in 10 C.F.R. Part 835.202, *Occupational Dose Limits for General Employees*, by a factor of two or more.
 - (b) The embryo/fetus of a declared pregnant worker, a minor, or a member of the public in a controlled area exceeding an external dose of 1 rem effective dose.

- (c) Any confirmed monitoring result (workplace or individual) indicating an intake (via inhalation, ingestion, wound or absorption) of radioactive material by a general employee equivalent to 2 or more times the annual limit on intake (ALI).
- (d) Any confirmed monitoring result (workplace or individual) indicating an intake of radioactive material to a declared pregnant worker; a minor; or a member of the public in a controlled area equivalent to 20% or more of an ALI.

Notes:

- (i) Dose thresholds for the embryo/fetus apply after declaration of pregnancy.
- (ii) Confirmation must be made within 3 working days following identification of monitoring results (workplace or individual monitoring) indicating an exposure exceeding one or more of the criteria in this section.
- (iii) Monitoring results are those obtained prior to medical intervention to reduce or otherwise mitigate dose.
- (iv) ALIs for an inhalation are 10 C.F.R. Part 835 Appendix A values, in uCi/ml, multiplied by 2.4×10^{-9} ; ALIs for ingestion are ingestion dose coefficients from ICRP Publication 68; ALIs for wounds should use dose coefficients published in a consensus or refereed report;
- (v) Planned special exposures (10 C.F.R. Part 835.204) or authorized emergency exposures (10 C.F.R. Part 835.1301) to general employees are excluded.
- (vi) "Confirmed" means a monitoring result confirmed by follow-up radiobioassay, by association with a known incident, or by investigation.

c. Environmental Release of Hazardous Material.

- (1) An accident that resulted in the environmental release of a hazardous material from a DOE facility (on site or off site), in an amount greater than five times the reportable quantities specified in 40 C.F.R. Part 302, *Designation, Reportable Quantities, and Notification*.
- (2) An accident that resulted in the release of a hazardous material from a DOE facility (on site or off site) that meets the criterion for classification as a Site Area or General Emergency in DOE Order 151.1C, *Comprehensive Emergency Management System*, dated 11-02-05.

- (3) Any offsite transportation incident involving hazardous materials that would require immediate notice pursuant to 40 C.F.R. Part 302.
- (4) For facilities in which 29 C.F.R. Part 1910.119, *Process Safety Management of Highly Hazardous Chemical*, is applicable, an incident that resulted in, or could reasonably have resulted in, a catastrophic release of a highly hazardous chemical in the workplace.

d. Property Effects.

- (1) Estimated loss of or damage to DOE property, including aircraft, equal to or greater than \$2.5 million or requiring estimated costs equal to or greater than \$2.5 million for cleaning, decontaminating, renovating, replacing, or rehabilitating property. DOE facility damage is estimated within 72 hours of the accident based on comparison with the facility replacement value in the Facility Information Management System database maintained by the Headquarters Office of Administration, Office of Engineering and Construction Management.
- (2) Any unplanned nuclear criticality.

e. Other Effects.

Any accident or series of accidents for which an AIB is deemed appropriate by the Secretary or Deputy Secretary. In such circumstances, the Secretary or Deputy Secretary may direct the Head of the Headquarters Element or Chief Health, Safety and Security Officer, to conduct an accident investigation.

DEFINITIONS

1. **Accident.** The term "accident" can be defined as an unplanned event that has resulted in or suggests the failure of a DOE safety management system, barriers, or loss of controls that rises to the threshold criteria specified in this Appendix A of this Order.
2. **Accident Investigation Board Chairperson.** The DOE Official designated by the Appointing Official and has been given the authority to: conduct the lead accident investigation; manage the activities of the Board; obtain external or internal DOE Federal and contractor resources required; control the accident scene; collect evidence; analyze evidence; and issue a formal report of the Board's conclusions and Judgments of Needs to the Appointing Official.
3. **Accident Investigation Board Consultant/Advisor.** Are either Federal, or non-Federal employees who possess subject matter expertise in more narrow or specific areas of focus of the Accident Investigation, such as accident analytical techniques, occupational medicine, toxicology, specific engineering, safety, health, environmental technical or regulatory knowledge, required by the AIB Chairperson to conduct the investigation, see Section 4.c.(1).(d).
4. **Accident Investigation Board Members.** Are DOE Federal employees, who possess subject matter expertise in core areas of focus of the Accident Investigation, required by the AIB Chairperson to conduct the accident investigation, see Section 4.c.(1).(d).
5. **Appointing Official.** A Departmental authority responsible for appointing an AIB, with responsibilities as prescribed in Paragraph 5.d. of this Order.
6. **Causal Factor.** An event or condition in the accident sequence necessary and sufficient to produce or contribute to the unwanted result. A causal factor is a collective descriptive term associated with human performance or a safety management system which can be broken down to identify direct, root, and contributing causes.
7. **Confirmed monitoring result.** Either a dosimeter result or an intake, confirmed by follow up radio bioassay, or by association with a known incident, or by investigation.
8. **Core Analytical Techniques.** The techniques are events and causal factors analysis, barrier analysis, and change analysis.
9. **Department of Energy (DOE) Accident Investigator.** A DOE Federal employee who has participated on at least one Accident Investigation Board (AIB) and has successfully completed an Office of Health, Safety and Security (HSS) accident investigation course of instruction. Effective two years from the approval date of this Order, personnel who serve in this position must have attended a HSS National Training Center accident investigation training course within the five years preceding the accident.
10. **Environmental Release.** Environment means (1) the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Fishery Conservation and Management Act of 1976, and (2) any other surface water, ground water, drinking water

supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States;

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant)

11. **Equivalencies.** Alternative approaches to fulfilling the requirements of this Order in cases where the “how” is specified. Acceptable alternative approaches to achieving the goal of this Order are approved by the cognizant Head of the Headquarters Element in consultation with the Office of Primary Interest (the Office of Health, Safety and Security) in accordance with the requirements specified in DOE O 251.1C, *Departmental Directives Program*.
12. **Exemption.** A release from one or more requirements of an Order. Exemptions are processed in the same manner as equivalencies (see above).
13. **Heads of Field Elements.** First-tier field managers of the site and operations offices. Field Elements is a general term for all DOE sites located outside of the Washington, D.C. metropolitan area.
14. **Head of Headquarters Element.** Headquarters first-tier organizations, Secretarial Officers, Administrator for NNSA, and Heads of Staff Offices.'
15. **Judgments of Need.** Managerial controls, safety measures, or human performance improvements necessary to prevent or minimize the probability or severity of a recurrence of an accident.
16. **Learning Organization.** A learning organization is one that values learning and is committed to facilitating continuous performance improvement. It encourages a culture of openness and trust in an environment that rewards efforts to learn from experiences. The organization recognizes Human Performance Improvement concepts and principals in problem analysis, solution planning, and solution implementation. It rewards ongoing efforts to learn from experience, learn from others, and from self-directed studies and aggressively seeks to know what it doesn't know.

Reference: DOE M 450.4-1, *Integrated Safety Management Manual*, dated 11-1-06; DOE -HDBK-1028-2009, *Human Performance Improvement Handbook, Volume 1: Concepts and Principals*, and, DOE -HDBK1028-2009, *Human Performance Improvement Handbook, Volume 2: Human Performance Tools for Individuals, Work Teams, and Management*.
17. **Lesson Learned.** A “good work practice” or innovative approach that is captured and shared to promote its repeated application. A lesson learned may also be an adverse work practice or experience, or human factor that is captured and shared to avoid recurrence.
18. **Root Causes.** The causal factor(s) that, if corrected, would prevent recurrence of the accident.

**CONTRACTOR REQUIREMENTS DOCUMENT
DOE O 225.1B ACCIDENT INVESTIGATIONS**

Regardless of the performer of the work, the contractor is responsible for complying with the requirements of this CRD. The contractor is responsible for flowing down the requirements of this CRD to subcontractors at any tier to the extent necessary to ensure the contractor's compliance with the requirements.

The contractor must support Federal investigations of accidents related to activities under their contract. The contractor must:

1. Establish and maintain a capability to respond to accidents, mitigate accident consequences, assist in collecting and preserving evidence, and assist during the conduct of the investigation. The assistance provided must include preserving and documenting the accident scene to the extent that it is under the control of the contractor.
2. Prepare, implement, and track to completion, approved corrective action plans that are identified for their action by the Accident Investigation Board.