DOE *Accident Prevention* and Investigation Program Update

May 2012 - DOE Facility Representative and Fire Safety Workshop – Las Vegas NV.

David K. Pegram

Manager - US DOE Accident Prevention and Investigation Program

Office of Health Safety and Security

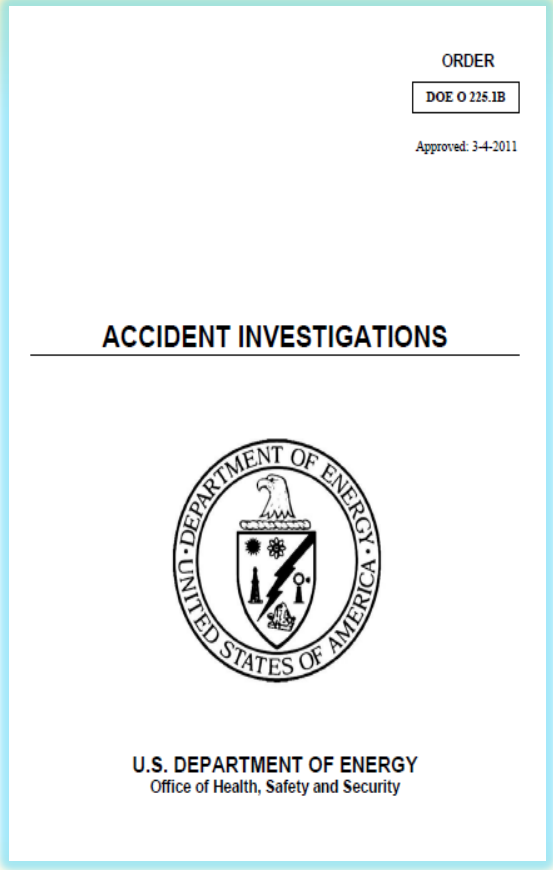
DOE *Accident Prevention and* Investigation Program Update.

A New Order for Accident Investigations

DOE Order 225.1B states the requirements for accident investigation has been approved as revised March 4, 2011.

Appointment of AI Boards now the responsibility of the heads of program elements (NA-1, EM-1, SC-1, etc.)

Only one set of criteria for triggering AI's (Type A and B merged into one – Federally Led Investigation).


ORDER

DOE O 225.1B

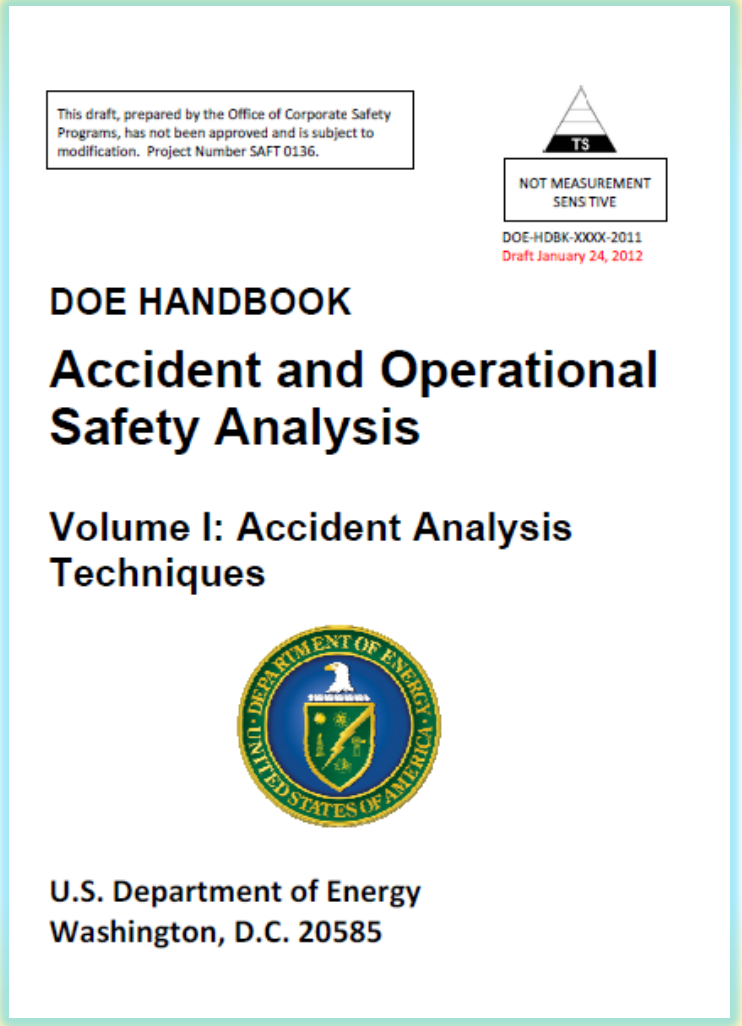
Approved: 3-4-2011

ACCIDENT INVESTIGATIONS

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

DOE *Accident Prevention and* Investigation Program Update.

New Handbook approach incorporates HPI/ISM into the Accident Investigation and Operational Safety Analysis methods.


This draft, prepared by the Office of Corporate Safety Programs, has not been approved and is subject to modification. Project Number SAFT 0136.

TS

NOT MEASUREMENT SENSITIVE

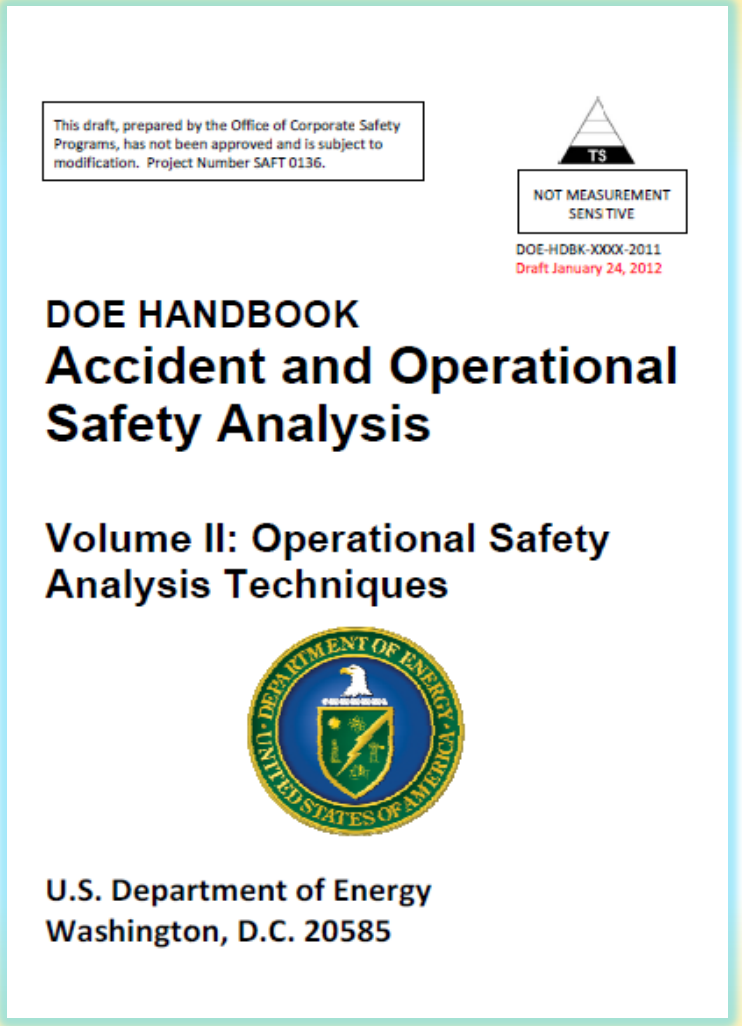
DOE-HDBK-XXXX-2011
Draft January 24, 2012

DOE HANDBOOK

Accident and Operational Safety Analysis

Volume I: Accident Analysis Techniques

U.S. Department of Energy
Washington, D.C. 20585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DOE HANDBOOK

Accident and Operational Safety Analysis

Volume II: Operational Safety Analysis Techniques

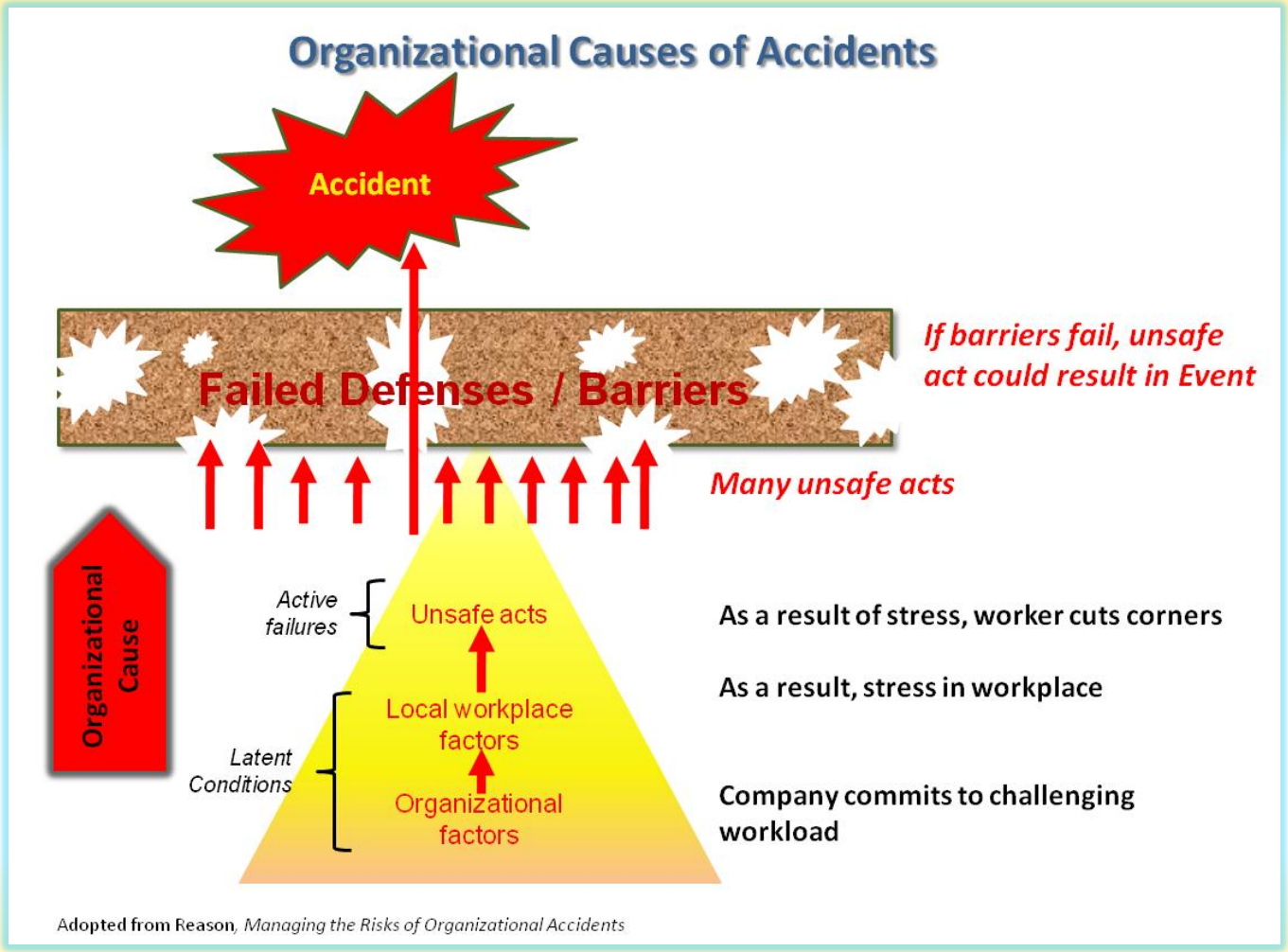
U.S. Department of Energy
Washington, D.C. 20585

DOE *Accident Prevention and* Investigation Program Update.

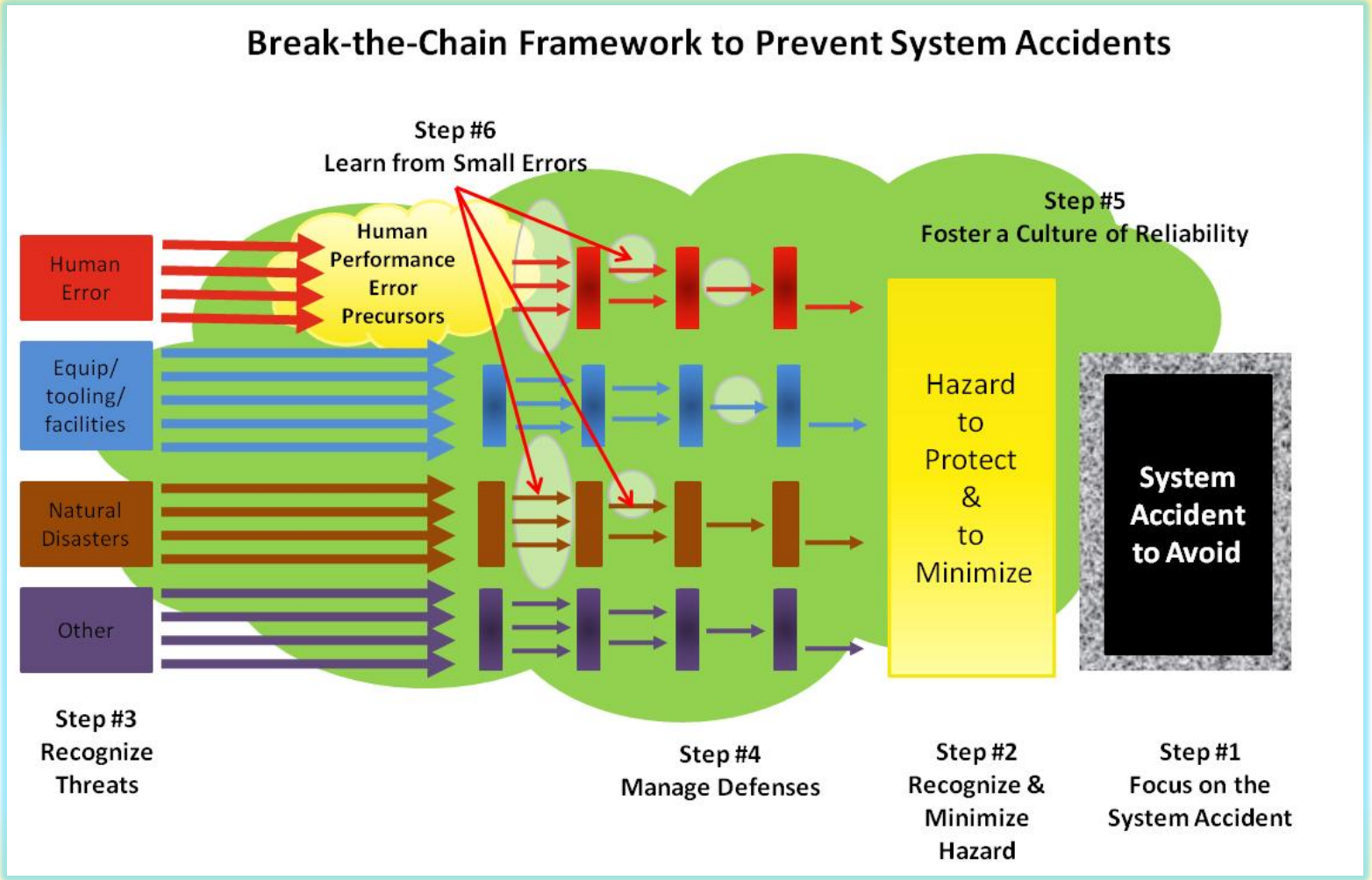
Volume I: (Federal Led) Accident Investigations

Volume I, discusses fundamental concepts of accident dynamics, accident prevention, and accident analysis. The focus is on improvement not placing blame. An understanding of the theoretical bases of safety management and accident analysis, and the practical application of the DOE Integrated Safety Management (ISM) framework, is presented.

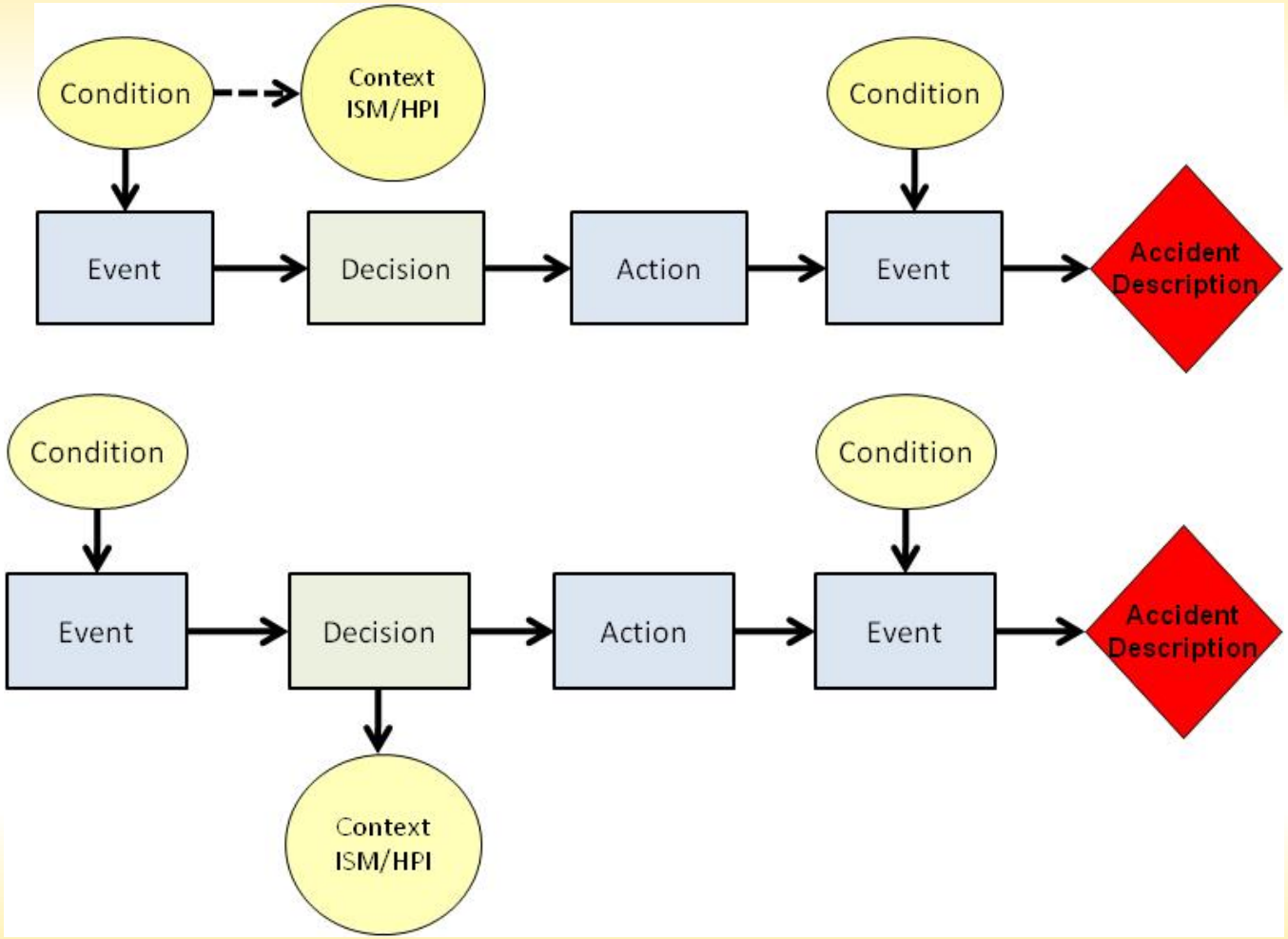
DOE *Accident Prevention and* Investigation Program Update.



Accident Prevention – Concepts



Conditions and Decisions - Context of Human Performance, and Safety Management Systems Flowcharting

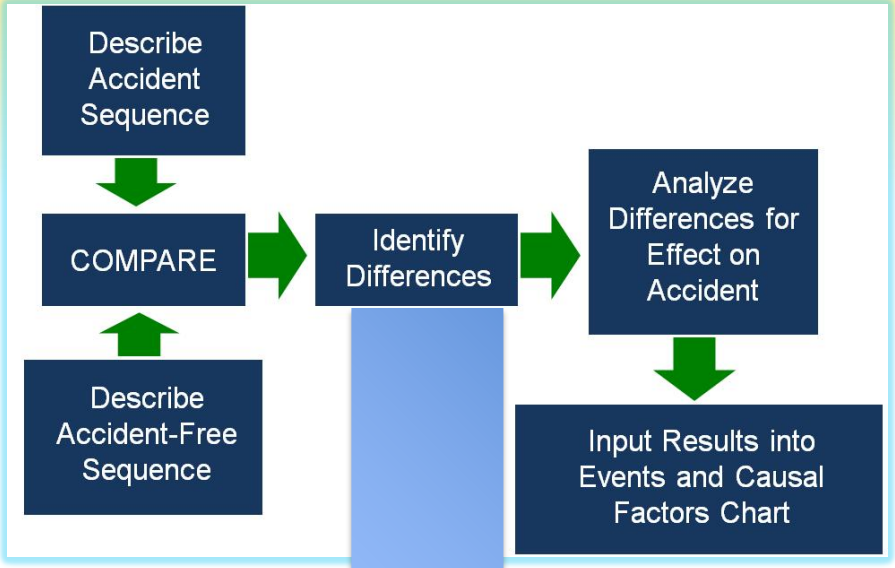


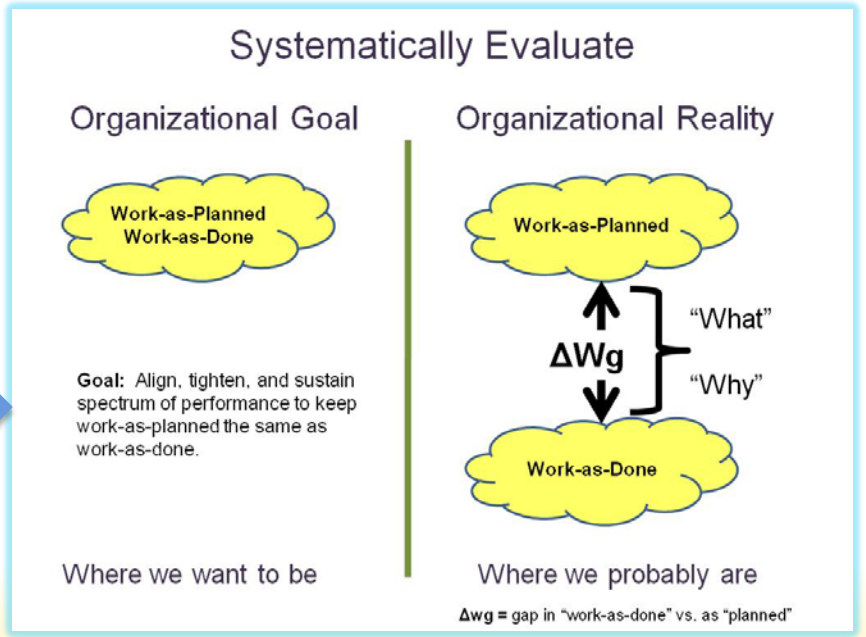
Barrier Analysis

Hazard: 13.2 kV Electrical Cable		Target: Acting Pipefitter		
What were the barriers?	**How did each barrier perform?**	**Why did the barrier fail?**	**How did the barrier affect the accident?**	**Context: HPI/ISM**
Engineering drawings	Drawings were incomplete and did not identify electrical cable at sump location	Engineering drawings and construction specifications were not procured Drawings used were preliminary No as-built drawings were used to identify location of utility lines	Existence of electrical cable unknown	HPI: • **HN #5** – inaccurate mental picture • **HN #6**– inaccurate risk perception • **IC#2** – limited perspective ISM: • **GP #3 & 5** – Hazard identification
Indoor excavation permit	Indoor excavation permit was not obtained	Pipefitters and utility specialist were unaware of indoor excavation permit requirements	Opportunity to identify existence of cable missed	ISM: • CF##1 – Define scope of work • CF#2 – Analyze hazards • CF#3 – Control hazards

HN – Human Nature
IC – Individual Capabilities
GP – Guiding Principles of ISM
CF - Core Functions of ISM

Change Analysis





Volume II: (Contractor Led) Operational Safety Review (OSR)

Volume II of the Accident and Operational Safety Analysis Handbook builds upon the concepts, philosophy, processes, and techniques presented in Volume I.

Volume II is not intended to be a standalone volume, but supplements Volume I, with the key differences in the EXPANED analysis techniques for a Contractor Led - Operational Safety Review (OSR) in order to prevent accidents.

Volume II has been structured using the same logical sequence for organizing a (Contractor) OSR team as for a(DOE) Federal Accident Investigation presented in Volume I.

Volume II: Operational Safety Review (OSR)

The Operational Safety Review (OSR) is based on the premise that major accidents or incidents are not caused by individual errors, but are set up by the organizational environment the employee works in.

It is not necessary to wait until a catastrophic accident for Contractors to use the investigation and analysis process defined in this handbook because the underlying organizational issues are at work all the time and can be preemptively identified through review of precursor incidents.

Lesser consequential or information-rich events or negative trend indicators investigated using the OSR process can identify key organizational factors that if not identified and corrected, could lead to a more catastrophic event.

The OSR Differs from the AI in the OSRs Expanded Analysis – Digging Deeper into Organization Weaknesses

	Activity	Basic Events & Causal Factors (ECF) Analysis (AI)	Expanded ECF Analysis(OSR)
Work-As-Planned (WAP)	Collect and Catalog Documentary Evidence	Collect, read and understand applicable federal regulatory requirements Code of Federal Regulations (CFRs), DOE directives, and DOE requirements. Collect, read and understand organizational policies, procedures, hazards analyses, drawings, work instructions, training. Interview management and procedure writers to understand their intent of planned work. Develop work-as-planned process maps (understand planned work sequence) Catalog Preserve Capture evidence and logs in electronic files	Same as AI but add CTL to collect what should have happened (Column #3 CTL) and initial conditions on CFA Chart
	Conduct Barriers Analysis	Barrier analysis matrix to understand barriers-as-planned by management and process designers.	Systematic barrier analysis matrix to understand barriers-as-planned by management and process designers. Collect barriers in CTL (Column #5 CTL)
	Develop a Technical Basis for the Event	Review management and work planning and control systems and line management oversight to determine if adequate to deliver required level of safety. Determine, based on the physics, if procedures would have worked and provided the requisite level of safety if they were executed properly.	Same as AI but add the step to look for ineffective or non-value added process steps and recommend removal (Column #4 CTL)
Compare WAP – WAD to determine gaps (ΔWg)	Systematically Evaluate Difference Between WAD and WAP	Compare work-as-done process to work-as-planned process to determine if procedures ineffective or improperly implemented, Compare barriers-as-done to barriers-as-planned to determine if barriers are missing or flawed because of design or because not implemented and maintained. List gaps (ΔWg) that matter, i.e., that lead to event/accident.	Systematically evaluate changes or differences between WAD and WAP (ΔWg to include process differences and barriers) in CTL(Compare Column #2 with Column #3 and document in Column #4 CTL) Significant (ΔWg), that is those that caused the accident, are placed on the side of CFA Chart.

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- DOE Order 225.1B, *Accident Investigations* NEW!
- DOE Order 225.1B, DOE Accident Investigation Electronic Reference Tool NEW!
  In HTML
- DRAFT Technical Standard: DOE HANDBOOK Accident and Operational Safety Analysis Techniques (Note this draft Technical Standard is being jointly developed by HS-23 and EFCOG for use by the DOE Accident Investigation Community of Interest, please address any comments to: dave.pegram@hq.doe.gov) NEW!
- DOE Workbook, *Conducting Accident Investigations* HTML, PDF
- Accident Investigation Day Planner: *A Guide for Accident Investigation Board Chairpersons*
- Administrative Coordinator and Editor Guide

Accident Investigation Reports

- Federally Led Accident Investigation Reports (Includes Pre March 2011 Type A Reports)
- Type B Accident Investigations
- Limited-Scope Investigations

Accident Investigation Training

- SAF-230 Accident Investigation Courses Information and Schedule
- Accident Investigation and Analysis Training
  - Accident Investigator Course
  - Sample 40 Hour Accident Investigator Course Agenda
  - Operational Safety and Accident Analyst Training Course
  - Operational Safety and Accident Analyst Training Description
  - American Board of Industrial Hygiene (ABIH) Continuing Education Maintenance Points Approval
  - Accident Investigator Course - 2009 American Board of Industrial Hygiene (ABIH) Continuing Education Maintenance Points Approval
  - Accident Analyst Course - 2009 American Board of Industrial Hygiene (ABIH) Continuing Education Maintenance Points Approval
  - Accident Investigator Course - 2010 American Board of Industrial Hygiene (ABIH) Continuing Education Maintenance Points Approval

DOE *Accident Prevention and* Investigation Program Update.

DOE ACCIDENT PREVENTION AND INVESTIGATION

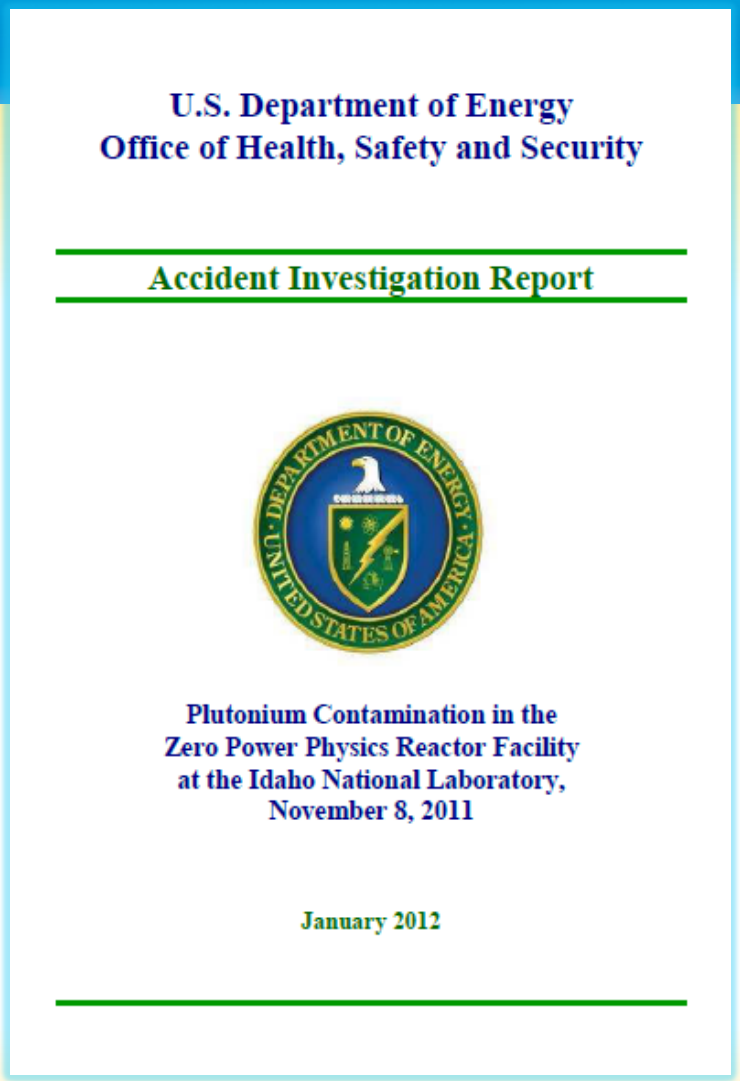
Bi-Annual Summary Report

U.S. Department of Energy • Office of Health, Safety and Security • AI-2012-01 • February 28, 2011

Federally Led Accident Investigation:
Injury from Tele-Tower Fall in KAC PAV,
July 1, 2011

Federally Led Accident Investigation:
Grass Cutting Fatality at SPR Storage Site,
September 13, 2011

Federally Led Accident Investigation:
ZPPR Workroom Pu Contamination Event in MFC-775,
November 8, 2011



U.S. Department of Energy
Office of Health, Safety and Security

Accident Investigation Report

Plutonium Contamination in the Zero Power Physics Reactor Facility at the Idaho National Laboratory, November 8, 2011

January 2012

DOE *Accident Prevention and* Investigation Program Update.

We need more people to volunteer as AI Board Members and Subject Matter Experts!

Please take the time to volunteer as a subject matter expert by filling out a form at this meeting session!

Consider enrolling in an up-coming AI Course thru the NTC.

http://www.hss.doe.gov/sesa/corporatesafety/aip/docs/SAF-230_AI_Courses_Information_and_Schedule.pdf

Links, Websites, Resources

For more information:

- The new DOE Order 225.1B, Accident Investigations, is at https://www.directives.doe.gov/directives/current-directives/225.1-BOrder-b/view

- Accident Prevention and Investigation Program:
  - Reports from 1995 to present are available on the HSS/Corporate Safety Programs Website and E-Reference Tools http://www.hss.doe.gov/CSA/CSP/AIP/index.html

Questions?

Contact:
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301-903-9840