Hazard Analysis 101
Putting the "A" Back in JHA

Office of Health, Safety and Security
Office of Worker Safety and Health Assistance
DOE Voluntary Protection Program

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DOE P 450.4A

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- **Guiding Principles:**
- **IDENTIFICATION OF SAFETY STANDARDS AND REQUIREMENTS. Before work is performed, the associated hazards are evaluated and an agreed-upon set of safety standards and requirements is established which, if properly implemented, will provide adequate assurance that the workers, the public, and the environment are protected from adverse consequences.**

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- **Core Functions:**
- **The functions are applied as a continuous cycle with the degree of rigor appropriate to address the type of work activity and the hazards involved.**
- **ANALYZE THE HAZARDS. *Hazards associated with the work are identified, analyzed, and categorized.***

DEAR Clause 970.5223-1

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Integration of environment, safety, and health into work planning and execution.

- **(5) Before work is performed, the associated hazards are evaluated and an agreed upon set of ES&H standards and requirements are established which, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences.**
- **(2) Identify and analyze hazards associated with the work;**

DOE G 450.4-1C, 9-29-2011 INTEGRATED SAFETY MANAGEMENT SYSTEM GUIDE

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ENHANCED WORK PLANNING. A process that evaluates and improves the program by which work is identified, planned, approved, controlled, and executed. The key elements of enhanced work planning are line management ownership; a graded approach to work management based on risk and complexity; worker involvement beginning at the earliest phases of work management; organizationally diverse teams; and organized, institutionalized communication.

Core Function 2, Analyze the Hazards

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Hazards associated with the work are identified, analyzed, and categorized.

- **Sites identify and categorize the hazards, then develop an understanding of the potential for each hazard to affect the health and safety of workers, the public, and the environment. The level of line management involvement in reviewing and approving hazard analyses should be commensurate with the complexity of the work and the hazards involved. Regulatory and contractual requirements applicable to the work and the complexity and hazards of the work dictate the methods used to identify and analyze hazards. These standards also establish the expectations for the contractor's conduct of hazard analyses, how hazard analysis is to be integrated into work processes, and how activity-specific hazard analyses are to be integrated with sitewide and facility hazard analyses.**

What is Analysis?

- **Analytical Questions – Quantitative or Qualitative answers**

- **WHO :**
  - **Is at risk?**
  - **Is performing the task?**
  - **Else might be in the vicinity?**
- **WHAT :**
  - **Is being done?**
  - **Specific chemicals, tools, or processes are being used?**
  - **Regulations apply to the task?**
  - **Company policies or procedures apply?**
- **WHEN :**
  - **Will the work start?**
  - **Will the workers be exposed to the hazard?**

What is Analysis?

- **Analytical Questions - Continued**
- **WHERE :**
  - **Is the work being done?**
  - **Where is the hazard located?**
  - **Where will the worker be in relation to the hazard?**
- **HOW :**
  - **Can the worker be exposed to the hazard (exposure pathway)?**
  - **Can the worker recognize the hazard?**
- **WHY:**
  - **Is the hazard a concern?**
  - **Are we doing the work?**

Example

- **Removal of residual acid from elevated piping using a hot tap ,tygon tubing ,and collection drum. AHA performed, PPE used to protect workers from acid, workers briefed, however job took longer than previously expected. Hot tap bumped, workers exposed to acid fumes, and one worker received acid burn to wrist.**
- **Investigation cited inadequate Hazard Analysis –**
  - **Engineers not included in the AHA process**
  - **Compatibility of acid with collection system**
  - **Acid concentration not confirmed (lower acid concentration increased deterioration of some materials)**
  - **Maximum volume of liquid incorrectly determined based on system configuration**
  - **Expected drain times not evaluated, exposure time of materials**
  - **Use of the equipment not IAW vendor expectations (compression of stop ring when assembly was torqued)**

Example

- **Worker was performing waste remediation activities in a remediation enclosure . TRU waste containing PU-238 was the primary radiological hazard. Worker was using survey flags to identify holes in inner cans of 55 gallon drums. A puncture wound occurred resulting in a dose to the worker exceeding DOE exposure limits.**
- **Report cited Inadequate Hazard Analysis**
  - **Techniques used for insertion of the wired flags were not evaluated, although multiple techniques were identified during the investigation**
  - **Flags were cut, hazard of bevel end was not identified and analyzed. Uncut flags would not have punctured PPE.**
  - **Other techniques for handling waste were not analyzed. (We've always done it that way).**

Conclusions

- **Analysis is a key element of ensuring the proper controls are selected and used.**
- **Doing it right once, and keeping it adds value to the work process.**