# EFCOG Best Practice # 52

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**Title: Implementation of NFPA Arc Flash Requirements in D&D**

**Facility: WVSNCO / West Valley Demonstration Project**

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**Brief Description of Best Practice**

Throughout the DOE Complex, systems and facilities are undergoing safe storage, lay up and dismantlement activities. D&D project activities are often faced with unexpected risks and hazards while dismantlement activities occur. Washington Group International has developed a team approach to prepare the project for the D&D stage by implementing a comprehensive NFPA 70E Arc Flash Site Program that places the entire facility or system in a "safe to work" condition.

This Arc Flash Site Program guides the project team throughout the preparation stages to ensure all electrical sources have been identified, documented, verified and witnessed as correct. It is only through implementing this Arc Flash Site Program that we can safely produce Air Gap boundaries that will eliminate the risk to workers from injury through contact with sources of electrical energy.

This process, which requires a team integration of engineering, operations, safety and qualified electricians, while rigorous and time-consuming, is a proven means of enhancing worker safety and is applicable to D&D work throughout the DOE Complex.

Refer to attached comprehensive description: "Implementation of NFPA Arc Flash Requirements in D&D"

**Why the best practice was used**

This Best Practice was initially developed to assist the engineering department, safety department, maintenance electrician, and instrument tech with identifying and understanding associated risks involved with working on or adjacent to electrically energized components. This topic was quickly integrated into site standards, including revisions to our Personnel Protective Equipment (PPE) program and training programs.

**What are the benefits of the best practice**

Development of this practice provided a greater understanding of the risk involved and provided a knowledge base from which our three (3) part program was designed: appropriate risk sensitive training, proper (PPE) requirements, and Procedure Compliance.

The benefits derived from this practice include improved understanding of existing conditions, increased awareness of proper PPE, and improved site procedures to guide us in our day- to-day efforts.

**What problems/issues were associated with the best practice**

Initial deployment required dissemination of new national standards. With the support of our Electrical Safety Committee, this mountain of information was deciphered and molded into three distinct categories: Procedures, Proper PPE, and Training Program.

The steps taken to roll out this program could not be avoided or modified to be easier. The revisions to existing procedures were performed in accordance with established Document Change Control Policies in terms of timing and selected reviewers. The selection of "upgraded PPE" was based on site requirements and NFPA 70E. Training was designed to be "work task sensitive" on three levels of intensity.
In addition to rolling this effective program out to site employees and after a thorough interview process, we have integrated the same level of training for our subcontractors that fall into this category of exposure and risk.

**How the success of the Best Practice was measured**

This "Best Practice" has evolved into a site-wide safety conscience that is evident in attitude and attention to procedure and details. The Electrical and Instrumentation Tech workers in the field have a new level of comfort, through greater knowledge of the true risks they work with, the supporting procedures, and a thorough understanding of proper PPE required to safely perform their daily activities.

The electrical engineers that author work instructions are fully compliant with this program, and ensure that the hazards have been screened, identified, and inserted mitigating steps to safely perform the work we ask of field personnel.

As a rule, all work is performed in a de-energized state; however, if equipment or systems need to remain energized (i.e.: Critical Ventilation, Critical Safety systems, Critical Testing, or a condition that would upset the safety of people or environment), the safety plan is scrutinized by engineering, subject matter experts, management, and maintenance. An approved Energized Work Permit, extensive Industrial Safety Work Permit, selected PPE, and an Engineering issued work instruction with proper controls in place are all required. A detailed field walk-down by all who have a role in this activity is also required.

**Description of process experience using the Best Practice**

- **Operating Experience**

  Through continuous "on the job" application, the D&D personnel have come to expect a witness point of "Air Gap" condition, complete with case-by-case labeling as part of the turnover phase that authorizes permission to proceed with dismantlement activities associated with a given electrical removal. As such, site personnel also subscribe to the Integrated Safety Management System (ISMS) culture of "Stopping the Job" – or Stand Down - if the worker encounters an unsafe condition and will not proceed with a given work activity until issues are resolved.

- **Evolution of Best Practice Development**

  Initially our program erred on the side of over protection to the point of being cumbersome. Until the actual case-by-case energy calculation was complete (magnitude of arc flash), the program required us to follow the generic tables published by IEEE and OSHA in the body of NFPA 70E, which requires a greater level of PPE.

  The roll-out of training played a large part in kick starting our program and provided for common base line for all site personnel required to perform daily tasks associated with electrical risks. This concurrent state of training provided for a cultural mindset that was easily accepted.

- **End User Experience**

  Our personnel immediately embraced this program and have an excellent attitude toward being safe in our work place.

  While performing an air-gap isolation for D&D safeguard, this best practice quickly became second nature to the qualified electrical or instrument personnel. Whether we work directly on energized components or work adjacent to exposed energized components, the policy requirements are strictly followed. As such, our practice requires us to treat the system and equipment as if energized until proven otherwise. It is common practice to find our personnel donning NFPA 70E PPE in order to open a door to electrical equipment to perform a task as simple as checking for zero volts.

- **Best Practice integrate ISMS Core Functions**
  Our site attitude is to always question and challenge the action until proven successful and acceptable on all levels. This mindset allows us to question ourselves, question each other, and challenge the obvious.

The authors of work instruction packages are qualified within their respective discipline to define required work scope. Authors of electrical work instruction packages are NFPA 70E certified and knowledgeable in the hazards of Arc Flash mitigation. All electrical work instructions undergo a strict level of review and walk down by Peers, Subject Matter Experts, Work Group Supervisors and electricians / instrument techs that will actually perform the task, on behalf of hazard identification and development of necessary controls to eliminate or mitigate the associated risks.

All hazards and risks are documented and recorded in the actual work instruction, on Industrial Work Permits, and on Energized Work Permits as necessary.

Further, a critical part of our practice is feedback. Our program integrates the feedback component of ISMS into all phases of our work. The initiating author develops the work scope due based on knowledge and interview feedback. The drafted work steps undergo critical review and additional feedback before the document can be issued for use.

**Conclusion**

After a full year of development, we've successfully implemented this new Arc Flash program and have been fully compliant for more than a year. As a site, we recognize the level of risk scattered across the facility and embrace the right way to co-exist with said risk.