

Best Practice #120

Best Practice Title: Definitions/Guidance for DOE O 232.2 Occurrence Reporting and Processing of Operations Information, Occurrence Reporting Criteria, Group 2, Subgroup E, Hazardous Electrical Energy Control

Facility: DOE Complex

Point of Contact: Michael D Hicks, 208-526-3724, hicksmd@id.doe.gov

Todd Kujawa, 757-269-7006, kujawa@jlab.org

Dennis Booth, dennis.booth@srs.gov

Greg Christensen, 208-526-3724, gregory.christensen.inl.gov

Bobby Gray, Bobby.Gray@ettp.doe.gov

Richard Denning, 208 533-4279, denningrw@id.doe.gov

Mark Mcnellis, 505-845-4895, msmcnel@sandia.gov

Brief Description of Best Practice: Provides definitions and guidance for the following subjective terms in the hazardous electrical energy control occurrence reporting criteria for DOE O 232.2.

Why the best practice was used: Subjective occurrence reporting criteria can lead to inconsistent reporting of occurrences across the complex making trending and analysis difficult.

What are the benefits of the best practice: Provides consistency of occurrence reporting across the DOE complex and improved trending and analysis.

What problems/issues were associated with the best practice: Inconsistent categorization to subjectivity of reporting criterion.

How the success of the Best Practice was measured: Hazardous electrical energy control occurrences for the DOE complex are trended and analyzed monthly by HSS. This includes occurrences not specifically categorized as a Group 2, Subgroup E, but identified for analysis using key words associated with hazardous electrical energy control. Success will be measured by the number of non-Group 2, Subgroup E occurrences identified using the key word search criteria.

Description of process experience using the Best Practice: Will be evaluated after implementation.

Subgroup E Hazardous Electrical Energy Control

#	SC	Criterion
(1)	2	Any <u>unexpected or unintended personal contact</u> (burn, injury, etc.) with an <u>electrical hazardous energy source</u> (e.g., live electrical power circuit, etc.).
(2)	3	Any <u>unexpected discovery</u> of an <u>uncontrolled</u> electrical hazardous energy source (e.g., live electrical power circuit, etc.). This criterion does not include discoveries made by <u>zero-energy checks</u> and other precautionary investigations made before work is authorized to begin.
(3)	4	Any failure to follow a <u>prescribed hazardous energy control process</u> (e.g., lockout/tagout, hazardous energy control program).

Best Practice #120

Definitions/Guidance

1. **personal contact** – any intrusion into the prohibited approach boundary (a distance from an exposed energized electrical conductor or circuit part within which work is considered the same as making contact) or the arc flash boundary that results in a shock, burn, or other injury. This includes intrusions with tools or equipment that present a conductive (suitable for carrying electric current) path back to the person, e.g. uninsulated hand tools and back hoes.
2. **unexpected or unintended personal contact** – any personal contact without PPE prescribed by a shock or arc flash hazard analysis.
3. **electrical hazardous energy source** – a source that exceeds the thresholds for a shock (Table 1), arc flash (Table 4), or thermal hazard (Table 5) established in the EFCOG/DOE Electrical Severity Measurement Tool, Rev 2 dated October 20, 2010.

Table 1 - Thresholds for defining shock hazards.

Source	Includes	Thresholds
ac	60 Hz	> 50 V and > 5 mA
dc	all	> 100 V and > 40 mA
Capacitors	all	> 100 V and > 1 J, or > 400 V and > 0.25 J
Batteries	all	> 100 V
Subrf	1 Hz to 3 kHz	> 50 V and > 5 mA
rf	3 kHz to 100 MHz	A function of frequency

Table 4 – Thresholds for arc flash hazards.

Source	Includes	Thresholds
ac	50 and 60 Hz	< 240 V and the transformer supplying the circuit is rated \geq 125 kVA, or < 240 V and the circuit is supplied by more than one transformer, or > 240 V
dc	all	> 100 V and > 500 A
Capacitors	all	> 100 V and > 10 kJ
Batteries	all	> 100 V and > 500 A
sub rf	1 – 3 kHz	> 250 V and > 500 A
rf	NA	Not Applicable (NA)

Table 5 – Thresholds for thermal burn hazards.

Source	Includes	Thresholds
dc	all	< 100 V and > 1000 W
Capacitors	all	< 100 V and > 100 J
Batteries	all	< 100 V and > 1000 W
subrf	1 – 3 kHz	< 50 V and > 1000 W
rf	NA	NA

4. **unexpected discovery** – unforeseen (not planned) discovery of an unsuitably guarded, insulated, or isolated electrical hazardous energy source. Does not include exposures from damage due to external natural phenomena (acts of God).
5. **uncontrolled** – not suitably guarded, insulated, or isolated (locked, tagged, and absence of voltage verified).
6. **zero-energy check** – verification of conductor/circuit part de-energization using an adequately rated voltage detector.
7. **prescribed hazardous energy control process** – a 10CFR851 source requirement identified in the local approved worker safety and health plan (WSHP), e.g. NFPA 70E and OSHA). It does not include local implementing procedural requirements not tied to a source requirement.