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# Proposed Revision to ORPS Criteria for Hazardous Electrical Energy

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# Purpose of this Presentation

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- To review problems with current ORPS categorization for electrical incidents
- To propose a new approach to categorizing electrical incidents in ORPS and to bring reporting into alignment with the Electrical Severity Measurement Tool currently in use.

# Background - Reporting on Electrical Incidents

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- When using the ORPS process for the investigation and reporting of electrical incidents and accidents, a number of confusing issues arise, including:
  - What is hazardous electrical energy?
  - What is “unexpected discovery”?
  - What is a “near miss”?

# Electrical Incident/Accident Critiques and Reports

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- What is “hazardous” electrical energy?
  - some is harmless
  - some hurts
  - some cripples
  - some can kill
- Describing electrical energy is critical, including
  - voltage, current, power, energy, waveform
- Sources of electrical energy in an R&D lab include
  - power, equipment, dc, capacitors, batteries, rf
- What is “unexpected discovery”?
  - I never expected to find it?
  - I suspected it could be there?
  - I didn’t know for sure where it might be?
  - engineering controls failed?
- How to I take into account that I used methods to protect me, in case I encountered electricity?

# Problems with Reporting

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- Lack of understanding of
  - the level of hazard
  - the potential for injury
  - the standards for protection
- has led to some events being
  - over reported,
  - under reported, or
  - not reported at all
- Previous process for critiques and reports may not lead us to the right lessons learned and corrective actions

# Current Reporting Criteria for Hazardous Energy

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- SC 2 - Failure to follow a prescribed hazardous energy control process (e.g., LOTO) resulting in a person contacting (burn, shock, etc.) hazardous energy, OR
- SC 2 - Disturbance of a previously unknown or miss located hazardous energy source (e.g., live electrical power circuit, steam line, pressurized gas) resulting in a person contacting (burn, shock, etc.) hazardous energy.
- SC 3 - A site condition that results in the unexpected discovery of an uncontrolled hazardous energy source, (e.g., live electrical power circuit, steam line, pressurized gas).

# Current ORPS Process for “Hazardous Energy”

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- All forms of energy are lumped under “hazardous energy”
- Three cases:
  - Violation in work control results in “contact” with hazardous energy
  - Unexpected discovery results in “contact” with hazardous energy
  - Site condition leads to unexpected discovery

# Problems with Using Current Generic Process for Electrical Events

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- Only a black and white approach, event is defined by contact or shock
  - Over rates minor shock event from contact
  - Under rates major exposure with no contact
- National codes clearly define exposure with a graded approach to exposure
- Need to differentiate between exposure to large energy and lesser energy, need a graded approach to energy level
- Does not account for “almost” contacting hazardous energy, e.g., inside the Restricted Approach Boundary

# Example of Incorrect Reporting under Current System

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- A dry hand shock from contact with 120 Vac (never fatal) is reported as more significant than
- Passing bare hands 3 inches from 13,800 V transmission line (violates many codes)

# Results from Incorrect Categorization

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- Prevents focus on proper corrective actions and lessons learned
- Over focus on insignificant events waste resources on trying to correct minor, or regularly recurring minor events.
- Under focus on serious events may allow events to reoccur, possibly leading to a serious injury or fatality.

# Key Issue

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- Existing ORPS criteria are too vague (generalized) to allow accurate and consistent categorization for electrical events.
- Recent progress in implementing national codes and standards in a consistent and accurate graded approach process for scoring electrical incidents needs to be incorporated into process.

# Electrical Events should Stand Alone

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- Breaking out the electrical events allows:
  - Better quantitative analysis, less “interpretation”
  - Consistency and accuracy
- > 85% of LOTO events are electrical
- Electrical hazards in R&D are complex and misunderstood
- Hazardous energy events are dominated by electrical events

# Proposal

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- Current process places all exposure to hazardous energy under Group 2, Subgroup C.
- Propose to break out exposure to electrical energy to Group 2, Subgroup D (new)

# Aligning ORPS Criteria with Electrical Severity Measurement Tool

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- The Tool has been a great asset to more consistent reporting of electrical incidents.
- Need to align current ORPS criteria with new tool.
- Will provide a quantitative process for better accuracy and consistency

# Proposed Reporting Criteria for Hazardous Electrical Energy

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- SC 2 - Exposure to a hazardous electrical energy source with a High Electrical Severity
- SC 3 - Exposure to a hazardous electrical energy source with a Medium Electrical Severity
- Non reportable - Exposure to an electrical energy source, or other interaction with electrical energy with a Low Electrical Severity

# Comparison

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## Current for all Energy

- SC 2 - Failure to follow a prescribed hazardous energy control process (e.g., LOTO) resulting in a person contacting (burn, shock, etc.) hazardous energy, OR
- SC 2 - Disturbance of a previously unknown or miss located hazardous energy source (e.g., live electrical power circuit, steam line, pressurized gas) resulting in a person contacting (burn, shock, etc.) hazardous energy.
- SC 3 - A site condition that results in the unexpected discovery of an uncontrolled hazardous energy source, (e.g., live electrical power circuit, steam line, pressurized gas).

## Proposed for Electrical

- SC 1 - Exposure to a hazardous electrical energy source with an Extreme Electrical Severity
- SC 2 - Exposure to a hazardous electrical energy source with a High Electrical Severity
- SC 3 - Exposure to a hazardous electrical energy source with a Medium Electrical Severity
- Non reportable - Exposure to an electrical energy source, or other interaction with electrical energy with a Low Electrical Severity

# Purpose of the Electrical Severity Measurement Tool

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- to better assess and report electrical accidents and incidents
- to provide a consistent process for evaluating electrical incidents across the DOE complex
- to help gather the relevant electrical information during a critique
- provides a quantitative severity ranking based on codes
- accounts for some protective measures
- provides a method of trending based on site size

# Electrical Severity Score Significance

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- The Electrical Severity Measurement Tool generates scores from 0 to 310,000. This range provides an exponentially rising severity that, when based on a logarithmic scale, breaks down into 3 categories of significance.

Significance	Electrical Severity	ORPS Group 2D Category
Extreme	$\geq 16000$	1
High	$\geq 1750 - < 16000$	2
Medium	$> 30 - < 1750$	3
Low	$\leq 30$	* Non Reportable

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\* Requires evaluation under ORPS Group 10 criteria.

# Comments on Severity Score

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- Extreme score events include a damp 120Vac shock fatality (16000)
- Low score events (0 - 30) are those items that truly did not pose a risk to the worker, such as non hazardous electricity, incidents that did not expose the worker to hazardous energy, or incidents in which the workers was appropriately prepared by anticipation of possible exposure.
- Low score events are low enough in severity that they should be addressed on site by the contractor and may not add any overall value when reported through ORPS.

# Color Key to Table

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- Green - Previously under reported, new process increased the significance category 3/101
- Blue - Previously over reported, new process decreased the significance category 38/101
- Yellow - LOTO incidents, 27/101. All scored less than 30 and are procedural noncompliances

# Occurrences p. 1/5

Date	Report Number	ES Score	Current G2 SC	Proposed G2 SC
March 09	NA--LASO-LANL-HEMACHPRES-2009-0005	2750	2	2
March 09	SC--BSO-LBL-OPERATIONS-2009-0003	1750	3	2
Jul 09	EM-ID--CWI-LANL-ORD-2009-0004	1650	2	3
Jun 09	MA-HQÑ GOHQ-DOEHQ-2009-0003	1650	3	3
March 09	EM-ORON BJC-K25GEN LAN-2009-0001	1400	1	3
Dec 08	NA--LSO-LLNL-LLNL-2008-0061	1400	3	3
April 09	NA--LSO-LLNL-LLNL-2009-0019	700	3	3
Jun 09	SC--BHSO-BNL-BNL-2009-0014	630	3	3
Nov 08	NA--LASO-LANL-PHYS TECH-2008-0017	630	2	3
Jan 09	EM-RL--WCH-DND-2009-0001	600	4	3
Nov 08	EM-SRÑ SRNS-SIPS-2008-0004	600	3	3
April 09	SC--SSO-SU-SLAC-2009-0010	500	3	3
Aug 09	EM-ID--CWIICPWM-2009-0003	330	2	3
Aug 09	EM--RP- WRPS-TANKFARM-2009-0009	330	2	3
Jun 09	SC--SSO-SU-SLAC-2009-0014	330	3	3
May 09	EM-RP--BNRPRPPWPTP-2009-0013	330	4	3
May 09	NA-PS-BWP-PANTEX-2009-0031	330	2	3
Jan 09	NA--SS-SNL-NMFAC-2009-0001	330	3	3
Dec 08	SC--PNSO-PNNL-PNNLBOPER-2008-0025	330	3	3
Oct 08	NA--LASO-LANL-BOP-2008-0014	330	2	3

# Occurrences p. 2/5

Date	Report Number	ES Score	Current G2 SC	Proposed G2 SC
Sept 08	NE-ID--BEA-FCF-2008-0003	330	2	3
Sept 08	EM-SRÑ SRNS-SRNL-2008-0001	300	3	3
May 09	NA-NVSO--NSTNTS-2009-0007	240	3	3
Aug 09	EM-ID--CWI-BIC-2009-0004	180	3	3
Feb 09	NA--LSO-LLNL-LLNL-2009-0013	120	3	3
Jun 09	EM-SRÑ SRNS-SRNL-2009-0002	110	3	3
March 09	NA--LASO-LANL-ACCCOMPLEX-2009-0002	110	3	3
Feb 09	NA--LASO-LANL-BOP-2009-0001	110	3	3
Jan 09	NA--PS-BWP-PANTEX-2009-0001	110	3	3
Dec 08	SC--BSO-LBL-OPERATIONS -2008-0017	110	3	3
Aug 09	NA--SS-SNLNMFAC-2009-0007	100	3	3
May 09	SC--ORO-ORNL-X10CHRIDGE-2009-0002	100	3	3
April 09	EM-RL--CPRC-PFP-2009-0005	100	3	3
March 09	NE-ID--BEA-ATR-2009-0006	100	3	3
April 09	SC--BSO-LBL-ALS-2009-0001	30	4	0
Aug 09	NA--SRSO-SRNSTRIT-2009-0005	20	3	3
Aug 09	SC--PNSO-PNNLPNNLNUCL-2009-0003	20	3	0
Jun 09	EM-RLÑ PHMC-FSS-2009-0004	20	3	3
May 09	NA--YSO-BWXT-Y12NU CLEAR-2009-00013	20	3	3
May 09	SC--PNSO-PNNL-PNNLBOPER-2009-0010	20	3	0

# Occurrences p. 3/5

Date	Report Number	ES Score	Current G2 SC	Proposed G2 SC
April 09	SC--PNSO-PNNL-PNNLBOPER-2009-0008	20	3	3
March 09	EM-RL--CPRC-PFP-2009-0001	20	3	3
March 09	EM-RPÑ BNRP-RPPWTP-2009-0005	20	3	3
March 09	NA--LASO-GOLA-BOPLASO-2009-0001	20	3	3
Jan 09	EM--PPPO-UDS-PGDPDUC ON-2009-0001	20	3	0
Jan 09	EM-ID--BBWI-AMWTF-2009-0001	20	2	0
Jan 09	NA--LSO-LLNL-LLNL-2009-0006	20	3	0
Jan 09	SC--PSO-PPPL-PPPL-2009-0001	20	3	0
Dec 08	SC--PNSO-PNNL-PNNLBOPER-2008-0026	20	3	3
Oct 08	EM-RL--CPRC-PFP-2008-0001	20	3	0
Oct 08	EM-RPÑ BNRP-RPPWTP-2008-0018	20	3	0
Sept 08	SC--TJSO-JSA-TJNAF-2008-0004	20	3	0
Jul 09	SC--SSO-SU-SLAC-2009-0015	10	3	0
April 09	NA--LASO-LANL-NUCSAFGRDS-2009-0001	10	3	0
Sept 08	NA--LASO-LANL-HEMACHPRES-2008-0002	10	3	0
Feb 09	EM-ID--CWI-IWTU-2009-0002	1	3	0
Aug 09	EM-RL--MSC-FSS-2009-0001	0	3	3
Aug 09	EM--SR-PSC-SWPF-2009-0008	0	3	0
Aug 09	NA--LASO-LANLADOA DMIN-2009-0002	0	3	0
Aug 09	NA--LASO-LANLADOA DMIN-2009-0003	0	4	3

# Occurrences p. 4/5

Date	Report Number	ES Score	Current G2 SC	Proposed G2 SC
Aug 09	NE--ID-BEA-MFC-2009-0002	0	3	3
Aug 09	NE--ID-BEA-SMC-2009-0010	0	3	3
Jul 09	EM-RL--PHMC-FSS-2009-0007	0	3	0
Jul 09	NE-ID--BEA-HFEF-2009-0002	0	3	0
Jul 09	SC--TJSO-JSA-TJNAF-2009-0004	0	4	0
Jun 09	EM-ORO--ISOT-3019A-2009-0002	0	3	3
Jun 09	EM-RL--PHMCFSS-2009-0005	0	3	3
Jun 09	NA--LASO-LANL-PHYSTECH-2009-0003	0	4	0
Jun 09	NA--LSO-LLNL-LLNL-2009-0027	0	3	3
Jun 09	SC--PNSO-PNNL-PNNLBOPER-2009-0013	0	3	3
May 09	EM-SR--SRNS-SIPS-2009-0003	0	3	0
May 09	NA--LASO-LANL-FIRNGHELAB-2009-0008	0	2	0
May 09	SC--ASO-ANLE-ANLEES-2009-0004	0	4	0
May 09	SC--PNSO-PNNL-PNNLBOPER-2009-0009	0	3	0
May 09	SC--ORO-ORNL-X10EAST-2009-0001	0	3	0
April 09	EM-SR--GOSR-GOSR-2009-0001	0	3	0
April 09	NA--LASO-LANL-FIRNGHELAB-2009-0007	0	3	3
April 09	NE-ID--BEA-ATR-2009-0007	0	3	3
April 09	NE-ID--BEA-SMC-2009-0003	0	3	3
April 09	SC--PNSO-PNNL-PNNLBOPER-2009-0007	0	3	3

# Occurrences p. 5/5

Date	Report Number	ES Score	Current G2 SC	Proposed G2 SC
March 09	EM-RL--CPRC-SNF-2009-0002	0	3	3
March 09	NA--LASO-LANL-HEMACHPRES-2009-0006	0	4	0
March 09	NA--LASO-LANL-PHYS TECH-2009-0002	0	4	0
March 09	NA--YSO-BWXT-Y12SITE-2009-0011	0	3	0
March 09	SC--TJSO-JSA-TJNAF-2009-0002	0	3	0
Feb 09	SC--PNSO-PNNL-PNNLBOPER-2009-0003	0	3	3
Jan 09	EM--PPPO-TPMC-POR TENVRES-2009-0001	0	3	3
Jan 09	NA--PS-BWP-PANTEX-2009-0004	0	3	0
Jan 09	SC--BSO-LBL-OPERATIONS-2009-0001	0	3	3
Dec 08	EE-GO--NREL-NREL-2008-0013	0	3	0
Dec 08	EM-IDN CWI-RWMC-2008-0005	0	4	0
Dec 08	NA--PS-BWP-PANTEX-2008-0128	0	3	0
Nov 08	EM-RL--WCH-REMACT-2008-0005	0	3	0
Nov 08	NA--LASO-LANLBOP-2008-0018	0	3	0
Nov 08	SC--SSO-SU-SLAC-2008-0019	0	3	3
Oct 08	EM-ORO--ISOT-3019A-2008-0005	0	3	3
Oct 08	FE--NETL-GOPE-NETLALBANY-2008-0002	0	3	0
Oct 08	SC-ORON ORNL-X10EA ST-2008-0003	0	3	3
Sept 08	EM-RLN PHMC-PFP-2008-0005	0	3	0
Sept 08	SC--PNSO-PNNL-PNNLBOPER-2008-0019	0	3	0
Jan 09	SC--PNSO-PNNL-PNNLNU CL-2009-0001		3	3

# Proposed Subgroup D

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- SC 1 - Exposure to a hazardous electrical energy source with a High Electrical Severity Value ( ES  $\geq$  16000).
- SC 2 - Exposure to a hazardous electrical energy source with a High Electrical Severity Value ( ES  $\geq$  1750 -  $<$ 16000).
- SC 3 - Exposure to a hazardous electrical energy source with a Medium Electrical Severity Value ( ES  $>$ 30 -  $<$  1750)
- SC 3 - Failure of a hazardous electrical energy control process (e.g., lockout/tagout) resulting in the discovery of an incomplete isolation of hazardous electrical energy. This includes discoveries made by zero-energy checks before work is authorized. This does not include administrative errors.

**Exposure** - touched or approached nearer than a safe distance by any part of a worker

**Hazardous Electrical Energy** - defined by electrical hazard classification in the Electrical Severity Measurement Tool.

**ES** - Score generated by the Electrical Severity Measurement Tool.

# Summary

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- Proposed revision to ORPS categorization criteria will allow more consistent, accurate and reproducible categorization of electrical incidents.
- Utilizes recent progress made on a graded ranking process based on national codes and standards.

# If you have Questions

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