MidAmerican Energy Company
Energy Isolation Program
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Tom Daft (tadaft@midamerican.com)
Manager, Wind Development and Administration

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Overview

Energy Isolation Programs need to:

- Be compliant
- Be usable
- Above all, KEEP PEOPLE SAFE!

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Compliance

OSHA Perception of a Successful Program

- Detailed Energy Control Procedures
- Extensive Employee Training Programs
- Periodic Reinforcement of Training
- Sufficient Discipline Regarding Implementation

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MidAmerican Approach

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– Wind has a separate program from other generation facilities

– Program development was led by an experienced wind supervisor

– A consultant supported and fine-tuned the program

– Separate and specific procedures each turbine type:

  • GE “S” turbines, GE SLE turbines, Mitsubishi turbines and Siemens turbines.

– Procedures posted on wind-only portal site with printed copies at each reporting center

– Lock out / tag out devices that fit the equipment

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Procedure Requirements:

- Statement of Intended Use
- Steps for Shut-Down and Energy Control
- Steps for LOTO Device Placement, Transfer and Removal
- Determination of Responsibility
- Steps for Testing LOTO

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Typical MidAmerican Procedure

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MACHINE SPECIFIC ENERGY CONTROL PROCEDURE SUPPLEMENT

DEPARTMENT: MidAmerican Energy **DATE: November 23, 2009**
Review Dates: (see index)

EQUIPMENT DESCRIPTION: Pitch Slip Ring
EQUIPMENT NUMBER(S): SR

The following machine specific procedure is intended to cover the equipment listed above. This energy control procedure is to be used as a supplement to MidAmerican Energy Wind Farm Machine & Equipment Lockout Written Program, and the policy on zero mechanical state. This supplement is not intended to be used alone. This procedure directs the user to the specific points of potential and stored energy. The company procedure and supplement was developed in compliance with 29 CFR 1910.147.

1. **Notify all affected employees and if necessary departmental supervisors of your intent to lockout this Wind Tower Generator (WTG)**
2. **Call the Operation Control Center (OCC) requesting clearance number for WTG**
3. **Receive and record Clearance Number From OCC**
4. **Repeat Clearance Number Back to OCC to confirm accuracy**
5. **Insure equipment is in Maintenance or Repair before following the procedures below.**
6. **Following is the essential information necessary for the safe lockout and tagout of this equipment.**

1. Type(s), magnitude(s), locations of energy, hazards, and isolating means:

***Electrical:** (400 Vac / 3 phase, 230 Vac / 1 phase, 120 Vac) Shut off breakers labeled as 1Q1 and 1F7, located in the Top Box and apply lockout/tagout to the door of the Top Box cabinet. Breaker 1Q1 will de-energize the 400 Vac to the Slip Ring. Breaker 1F7 will de-energize the 230 Vac to the Slip Ring. In the Main Cabinet, shut off breaker 4F3 and apply lockout/tagout to cabinet door. Breaker 4F3 will de-energize the 120 Vac to the Slip Ring.
Remove 10K5 Relay. 10K5 Relay will de-energize the 24 Vdc to the Slip Ring. Employee is responsible for the relay until re energization is to occur.
Verify successful de-energization with voltage meter on the load sides of breakers 1Q1, 1F7, and 4F3.

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MidAmerican GE SLE Wind Turbine Procedures

- Main Tower AC Tower Breaker
- 575 VAC to LVMD; Control Voltage
- 50 kVa Transformer
- Converter
- Pitch Slip Ring
- Gearbox Lubrication Pump
- Gear Box Cooler Fan
- Yaw Drive System
- Hydraulic Brake Unit

And 10 other systems…

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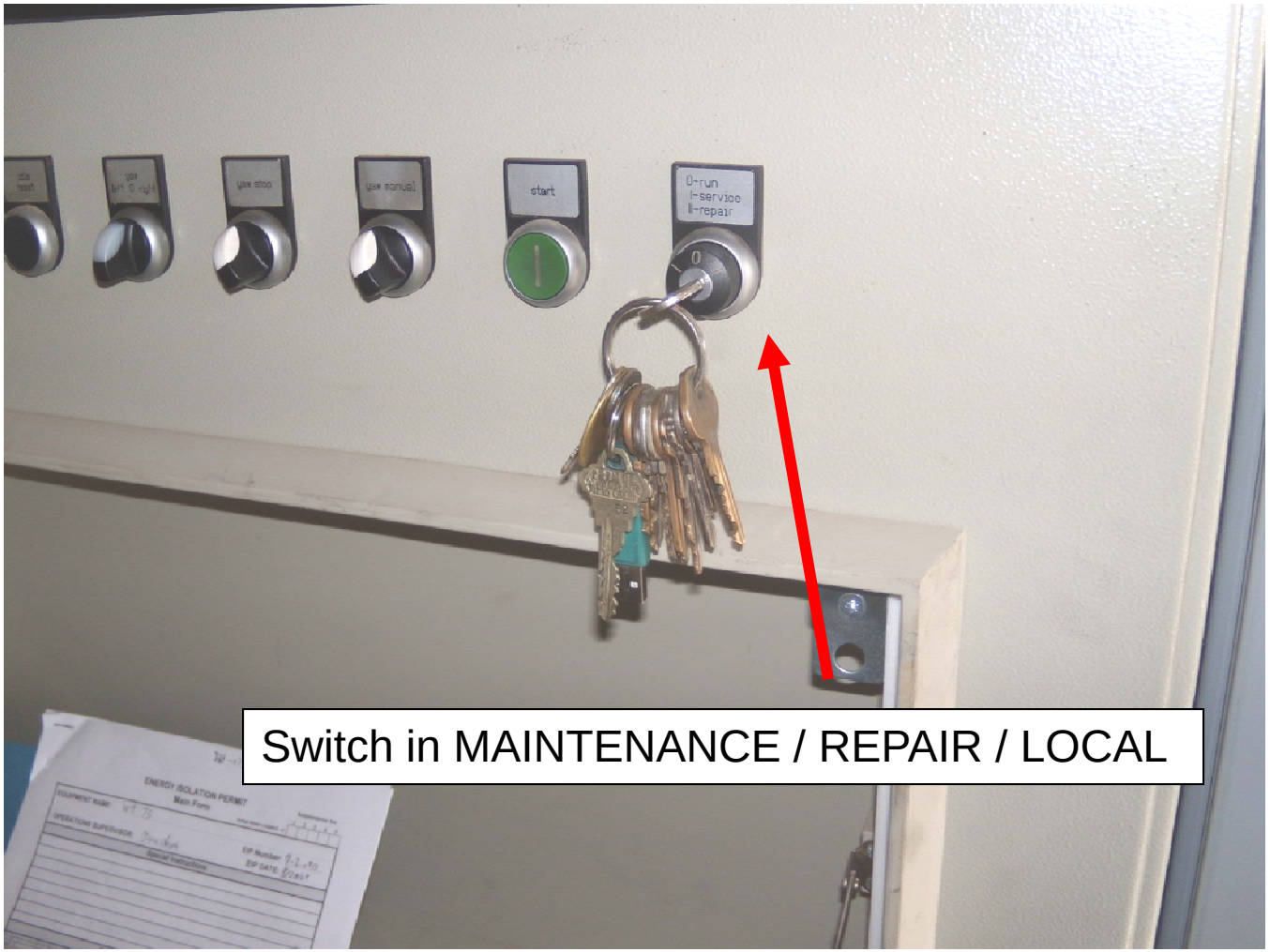
Ensure remote actions are prevented



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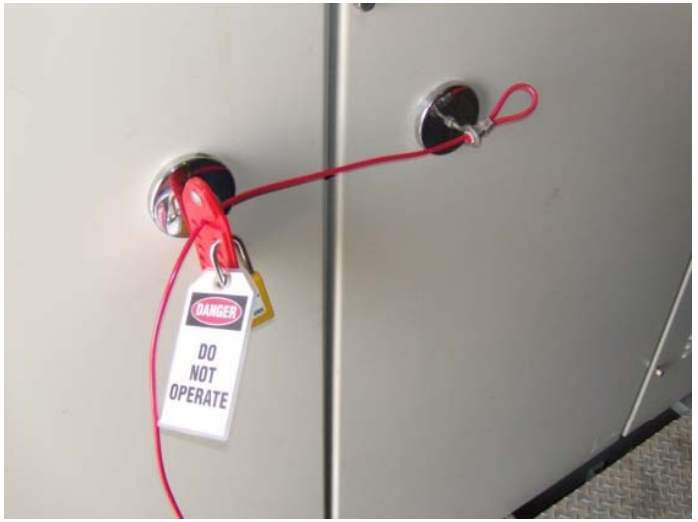
LOTO Devices



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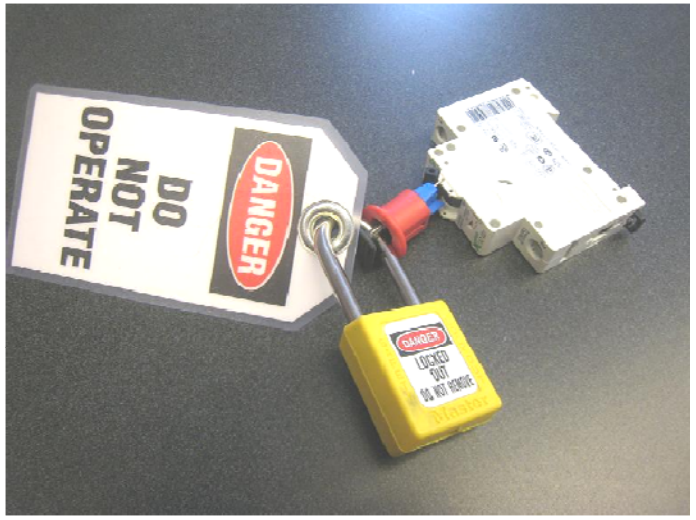

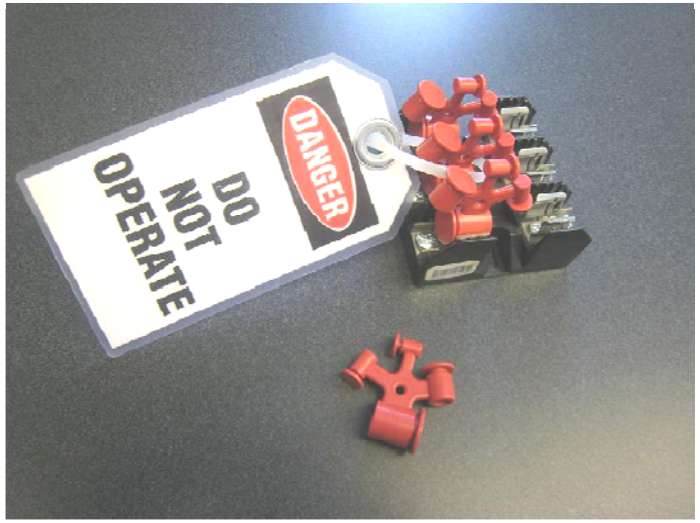

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Questions?