

# NSLS II Town Meeting

August 1, 2018

## SAFs, Electrical Equipment & Users

# Injuries FY 18

## 2018 NSLS II

First Aid    Minor treatment  
Recordable    More than just first aid  
DART    Days Away, Restricted, or Transferred

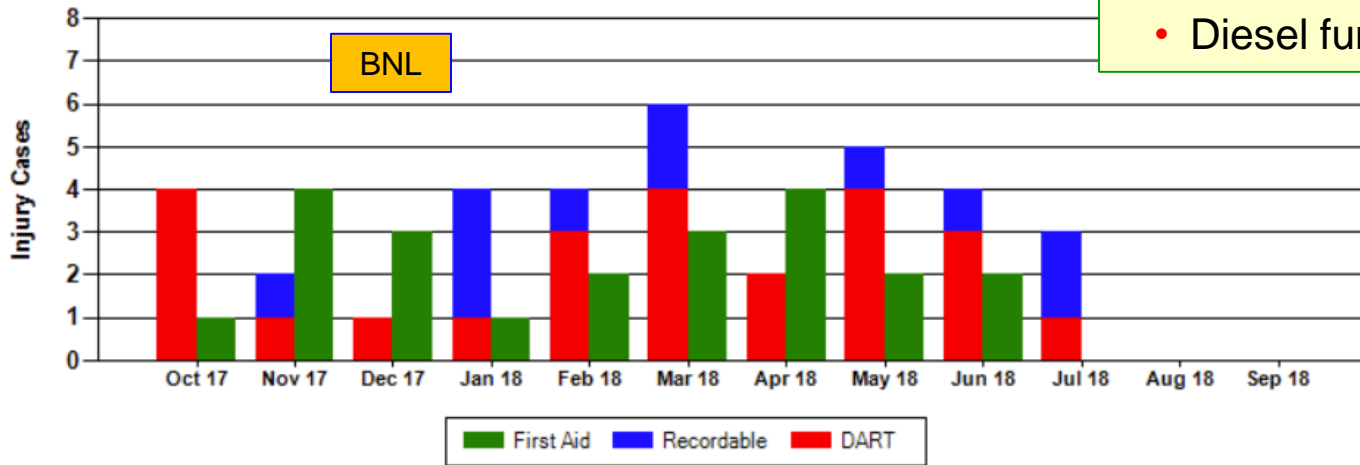
### Recordable

- Shoulder strain (DART)

### First aid

- Heel
- Diesel fume

Fiscal Year 2018 Injury Cases



**FY2017**  
 5 Recordable (2 DART)  
 3 First Aid

**FY2016**  
 1 First Aid

	YTD Cases	Rates
<b><u>DART:</u></b>	24	1.26
<b><u>Recordable:</u></b>	35	1.75
<b><u>First Aid:</u></b>	22	N/A
<b>Total Injuries:</b>	57	
<b>Rates As Of:</b>	June 2018	
<b>Most Recent Injury:</b>	07/25/2018	

### BNL DARTs

- Strains:
- Hand
  - Shoulder
  - Knee
  - Back
  - Hip
  - Foot
- Falls

# Events

# NSLS II Events; FY 2018

Title	Date
O2 sensor failure (green light remained)	10/30/2017
Radiation source received in error (visitor)	12/4/2017
<b>Scarifying event</b>	2/15/2018
Acetone release to sink	3/14/2018
Bake out at 8-ID (EEI)	3/30/2018
21-ID slit opening beyond limits	4/6/2018
Water leak; floor	5/9/2018
Suspect Kobe steel/copper	5/11/2018
ODH alarm in RF bldg. (circuit breaker)	5/16/2018

# NSLS II Events; FY 2018

Title	Date
O2 sensor readout drift; pre-alarm	5/25/2018
Handling of radiological samples	5/24/2018
Family on floor w/o TLD	5/28/2018
Test fixture on 6-BM User labyrinth	5/29/2018
Vendors in LOB1 w/o requisite training	6/1/2018
IVU damaged when gear box shaft sheared	7/1/2018
ACMI does not trip linac	7/3/2018
BD-1 power supply failure	7/11/2018
Unapproved experiment run under different SAF	7/25/2018

# **Electrical Equipment Inspections (EEI)**

# Electrical Equipment Inspection

## EEI

- Enhanced program; emphasis and resources assigned
- Nationally Recognized Testing Laboratory

NRTL 

- NRTL – Simple visual inspection
- No NRTL – Need more time
- EEI Guide
  - Non-NRTL (need docs early; before arrive)
    - Commercial Off the Shelf (COTS) – User Manual
    - Built in House (BIH) – schematic, block diagram, wiring, parts list, ...
- 7 inspectors; 1 coordinator
- Managed with the SAFs
- Early coordination is important

### ELECTRICAL EQUIPMENT INSPECTION (EEI) CRITERIA GUIDE

#### SCOPE

To meet the Department of Energy's Electrical safety guidelines, DOE-HDK-1092-2013 (<https://www.standards.doe.gov/standards-documents/1000/1092-BHdbk-2013/@images/file>), it is strongly encouraged that all equipment (chassis, cables, etc.) containing voltages above 50 volts be approved by a Nationally Recognized Testing Lab (NRTL) certified units.

(<https://www.osha.gov/dts/otpc/nrtl/nrtllist.html>) However, BNL recognizes that not every experimental installation can use solely NRTL systems in performing an experiment. This condensed guide is intended for the beam line user community on what are the minimum electrical safety concerns when low voltage (less than 50 V) designs are impossible and a "one off" custom design must be fabricated and brought to the NSLS-II for an experiment to be performed.

Documentation is required for devices not NRTL certified. This documentation is required to ensure a proper safety review and a correct implementation of the device. For Commercial Off The Shelf (COTS) devices not NRTL certified the manufacturer's user manual can suffice as this documentation. For Built In House (BIH) custom devices the schematic, block diagram, wiring, parts list and any other documentation used to build the custom device should be made available to an inspector well in advance of planned use to avoid any delays. Any custom cabling (except mains power connection) containing over 50V outside of the chassis must be identified.

Preventing personnel from a shock and preventing a fire due to overcurrent conditions are the two primary safety concerns to any electrical design.

**ALL DEVICES NOT NRTL CERTIFIED WILL REQUIRE MORE INSPECTION TIME THAN NRTL DEVICES. BIH DEVICES WILL REQUIRE MORE INSPECTION TIME THAN COTS DEVICES. DOCUMENTATION SUBMISSION WELL IN ADVANCE OF SCHEDULED OPERATION CAN EXPEDITE THE INSPECTION TIME.**

#### PERSONNEL ISOLATION FROM SHOCKS

People are not permitted to touch an exposed conductor energized above 50 V RMS from ground potential, even accidentally. Naturally every chassis must be undamaged and not provide access to any energized conductor without the use of a tool. There are two approved methods in the electrical industry to assure personnel isolation; grounded/bonded and double insulated chassis designs.

#### GROUNDING/BONDED CHASSIS

This is the preferred technique for any ground referenced voltages above 50 V RMS (e.g. mains supply) in a chassis. The outer conductive chassis acts as a safety barrier between personnel and dangerous voltages by itself being bonded to ground. All mains power provides a ground connection that must be connected directly to the chassis. Painted surfaces at the point of contact must be scraped clean to provide a solid connection to ground. When the contained voltages exceed 600 V an additional external bonding point should be added to the chassis for a secondary bond path.

#### DOUBLE INSULATED CHASSIS

# Electrical Equipment Inspection

## The program

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- One coordinator; 7 inspectors
- >600 units inspected since 10/01/17 new system implementation
- ~300 from Users
- ~ 75% pass with no change needed
- ~ 20% need some correction with ~5% rejected
- Common issues:
  - Improper grounding
  - No over current protection
  - Inappropriate cabling
  - Inadequate documentation

- Early contact is essential
- Most inspections require completed equipment installation
- Some engineering support: account number
- We inspect during the business day



# Electrical Equipment Inspection

## SAF Input; Equipment

Add Equipment









Name/Type of Device:

Acquisition Method:

Properties: (check all that apply)

- High Temperature
- High Pressure
- Laser
- All Electrical Equipment
- Stray Magnetic Fields
- Ionizing Radiation Generator
- Non-ionizing Radiation Generator
- Other

Property Details:

**B** *I* U abc        

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# Electrical Equipment Inspection


## SAF Review; Consultant Request

Request Safety Consult for SAF ID: 302840

Consultant

- Benjamin Ockro
- Jerome Malley Jr**
- Robert Lee
- Andi Barbour
- Syed Khalid

Comments

 \* required

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# Electrical Equipment Inspection

## The experiment review process

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- User identifies electrical equipment on the SAF.
- Experiment Review Coordinator (ERC) sends consultant request
- ERC approves SAF; controls pasted
- EEI coordinator contacts User. (sends guidance doc; requests info; noted on SAF)
- Authorized Beamline Staff (ABS) review & authorize SAF (CSM too if lab chosen)
- User arrives – Work begins; ABS posts SAF; reviews controls -- EEI
- User contacts EEI coordinator (noted on SAF; pre-arranged)
- Work may begin; electrical equipment use awaits EEI.
- EEI completed; units barcoded; EEI coordinator files report, updates SAF.
- **Electrical equipment work begins**

Equipment returns for another experiment?  
Must be checked for change; same process

# Electrical Equipment Inspection

## Personnel Responsibilities

- **User**

- Identify electrical equipment on SAF
- Pursue EEI inspection; supply documentation
- Operate only inspected, acceptable equipment

- Experiment Review Coordinator

- Complete ESH review
- Initiate EEI inspection
- Coordinate resources

- EEI Coordinator

- Initiate inspection with User
- Coordinate resources
- Document inspections

- EEI Inspector

- Complete inspections; report results

- **Authorized Beamline Staff**

- Review SAFs: authorize location specific
- Coordinate with User
- Operations oversight

### **SAFs**

- Planning tool
- Collect information
- Basis for approve
- Multiple participants
- Two weeks advance
- **Help the ERCs!!**

**END**