

# Personnel Safety Systems Integrity Management

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<http://www.jlab.org/accel/ssg/>

# Safety Systems Group

- Personnel Safety Systems
  - Access Controls
  - Radiation Interlocks
  - Audible/Visual Warning Devices
  - RF Interlocks
  - Accelerator Magnet Interlocks
  - Public Address Systems
  - Oxygen Deficiency Monitoring
- Machine Protection Systems
  - Fast Shutdown Systems
  - Beam Loss Monitoring
  - Ionization Chamber Monitors
- Beam Envelope Monitoring Systems



# Recent Unauthorized Work Affecting PSS



# Personnel Safety Systems

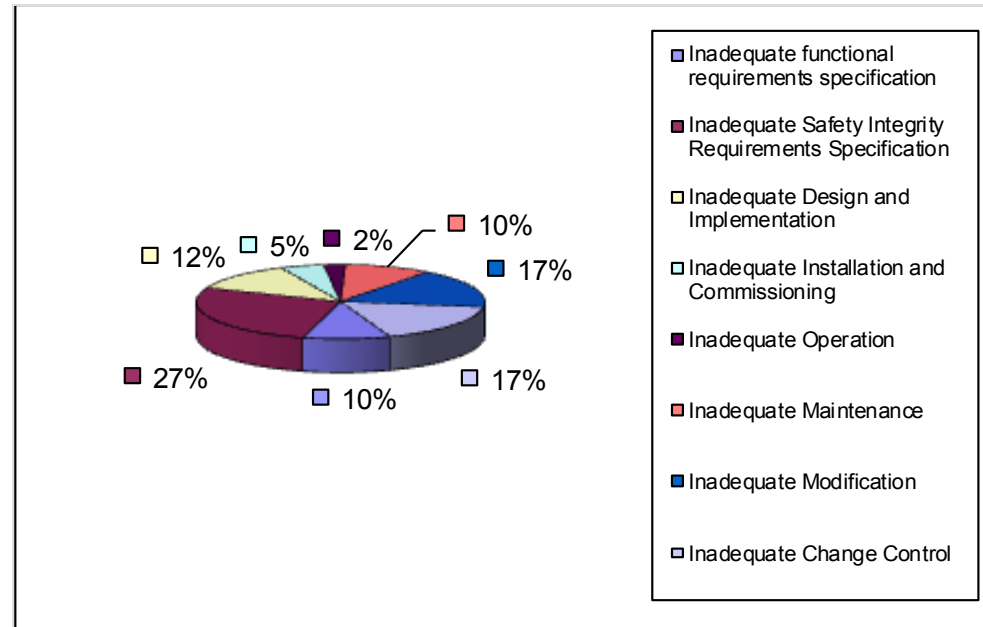
- Required Risk Reduction is combination of engineered controls, administrative controls, and personnel training.
- Safety Reliability of engineering controls is based on a sufficiently low probability of an unsafe/undetected failure between checks.
  - System Redundancy
  - Diversity of Critical Components
  - Independent/Isolated From Other Systems
  - Competency of Personnel Managing, Designing, Implementing, Maintaining, Operating System
  - Configuration Management



# UK Study of Major Industrial Accidents

- In order of decreasing frequency, the underlying causes were found to be:

- Maintenance management
- Design
- Procedure
- Training
- Hardware
- Communication
- Organisation



- Accidents due to poor permit-to-work systems or failures to follow the systems have been discussed, as they are by far the most common causes of accidents involving maintenance.

<http://www.hse.gov.uk/research/otopdf/2001/oto01007.pdf>

# Availability

## Production Availability

## Safety Availability

### Machine Availability

### Experiment Availability

Hard Down

Degraded Performance

Hard Down

Degraded performance

Hard Down

Degraded Performance

Safe Failures

Unsafe Failures

Fail-safe

Detected  
Unsafe  
Failures

Undetected  
Unsafe  
Failures

# Physics PSS Infrastructure

## Hall D and Tagger - Beam Enclosure Level

- Hall and Tagger Enclosures
  - Throughout Hall and Tagger Vault
  - Beam Transport Tunnel
  - Truck Ramps
  - Entry Labyrinths
  - Crane Access Door
  - Oxygen Deficiency Monitoring



# Physics PSS Infrastructure

## Hal D Counting House (Ground Floor)

- Counting Room
  - Control Console
  - Under Floor
  - Overhead Cableways
- Telecom Room
  - PSS Racks
    - PSS Electronics
    - Public Address
    - Oxygen Deficiency Electronics
- Stairway
  - Throughout

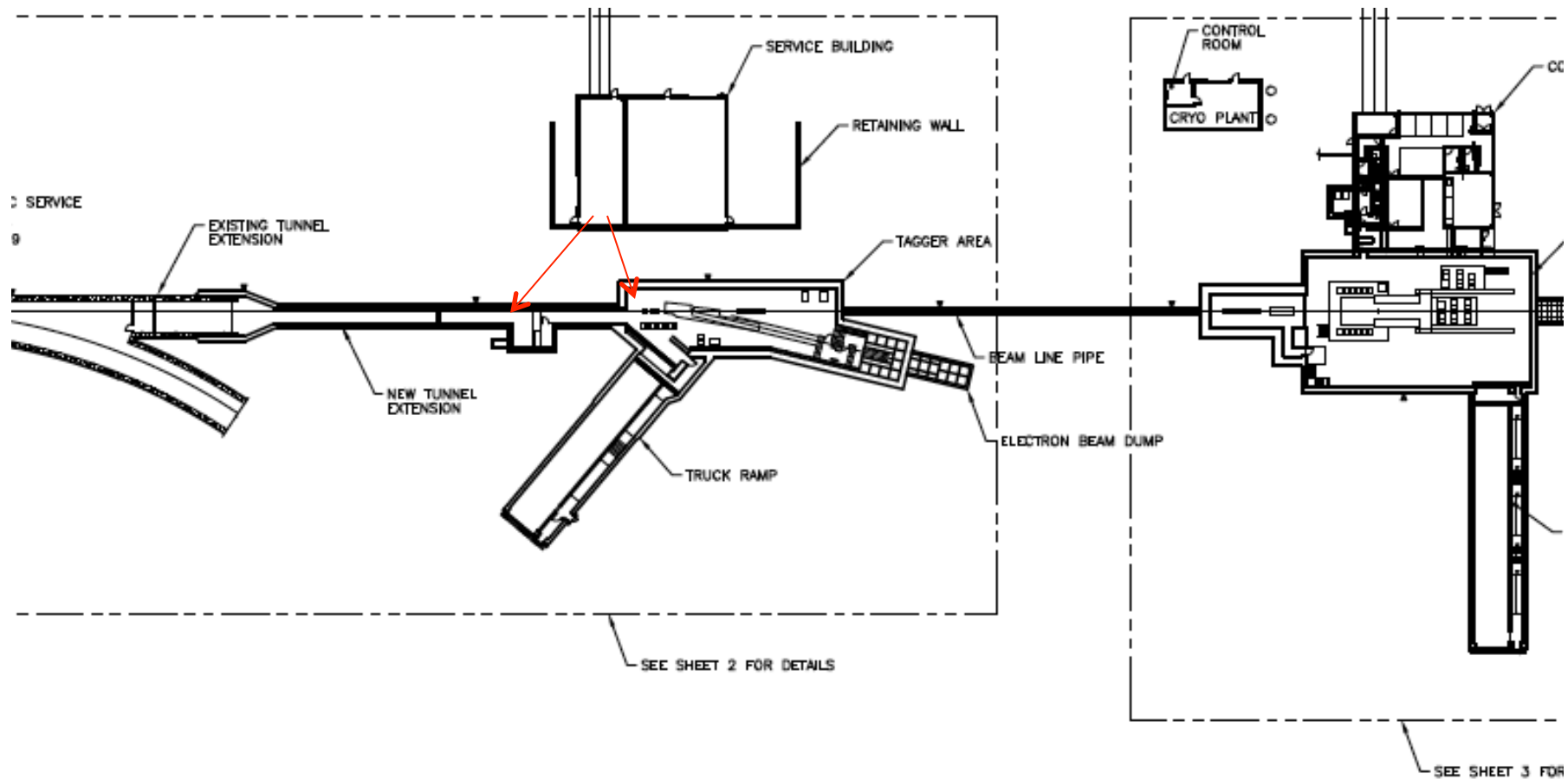


# Physics PSS Infrastructure

## Tagger PSS

- Tagger Equipment Building
  - PSS Racks
    - PSS Electronics
    - Public Address
    - Oxygen Deficiency Electronics

# Hall D/Tagger PSS



# PSS Configuration Control Labels

- **Critical Device**
  - Prevents Beam Transport into and occupied area
- **Safety System Equipment**
  - All Equipment and Infrastructure Owned by the Safety Systems Group
- **PSS Configuration Control**
  - Non-SSG Equipment used to perform Safety Function

**SAFETY SYSTEM  
CRITICAL DEVICE**

DO NOT TAMPER  
CALL SAFETY PERSONNEL

**SAFETY SYSTEM  
EQUIPMENT**

FOR SAFETY PERSONNEL ONLY  
PLEASE DO NOT TAMPER

**Attention:** This component is under PSS configuration control. Contact the safety systems group before removal.

# Identifying PSS Infrastructure and Equipment

- Use Work Planning Tools
  - ATList
  - HAList
  - HBList
  - HCList
  - HDList
- Walk through affected work area
- Follow cables and conduits to check for PSS labels
- Check Electrical Panels for PSS and RadCon Circuit breakers

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