

# NSLS ESH Program FY09 Management Review

November 19, 2009

A. Ackerman

## Scope of Discussion

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- ESH&Q Management Systems
- ESH Performance Measures
- Goals for FY 10

- Are the programs:
  - Effective in achieving goals?
  - Adequate to recognize, evaluate, and control risks?
- Are the objectives suitable to manage risks and improve the program?

- **NSLS ESH&Q Management Systems**
- ESH Performance Measures
- Goals for FY 10

# ESH&Q Personnel

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## NSLS

### ESH

ESH Coordinator  
Safety Officer  
ESH Engineer  
Safety Engineer

### Quality

QA Coordinator  
QA Administrator

### Training

Training Coordinator

## Matrixed

### RCD

Facility Support Rep  
Radiation Control Tech

### SHSD

IH Representative (0.5 FTE)

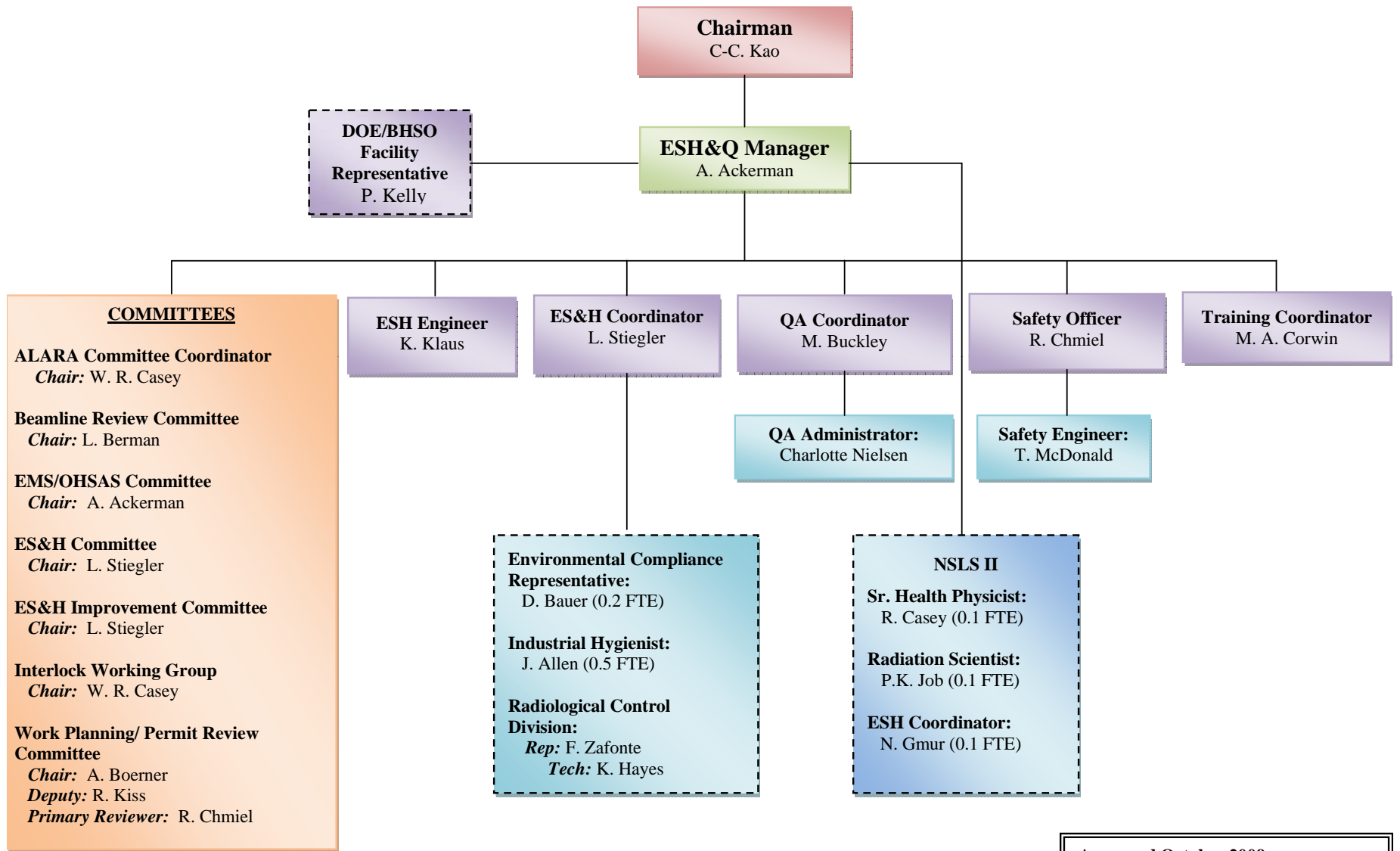
### EWMSD

Env. Compliance Rep (0.2 FTE)

## NSLS II


Sr. Health Physicist (0.1 FTE)  
Radiation Scientist (0.1 FTE)  
ESH Coord. (0.1 FTE)

# NSLS ESH&Q Organization Chart



Matrixed and MOU personnel are represented by dashed boxes

Approved October 2009

  
\_\_\_\_\_  
Andrew Ackerman, ESH&Q

## ESH&Q Program Responsibilities

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- Experiment safety review
- Work planning support
- Emergency planning
- Environmental management
- Hazardous waste management
- Industrial hygiene
- Industrial safety
- Radiation safety
- Safety system configuration control
- Self-assessment
- Risk assessment
- Interlock testing (radiation & laser)
- Tier I inspections
- Compliance audits
- Training
- Quality assurance
- Configuration management

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NSLS  BNL

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## Light Sources Directorate EMS/OHSAS Documents and Links

The Light Sources Directorate follows the BNL requirements in the SBMS Program and Subject Areas for [EMS](#) and [OHSAS](#). The links below contain information that is specific to the Directorate in these areas.

The Light Sources Directorate follows the [BNL Environmental, Safety, Security and Health \(ESSH\) Policy](#).

### Planning

- [NSLS Significant Environmental Aspects Matrix](#)
- [NSLS-II Significant Environmental Aspects Matrix](#)
- [NSLS QA Manual](#)
- [NSLS-II QA Manual](#)
- [Policies and Requirements Manual](#)
- [EMS, FUA and SAD/ASE Checklist for Directorate Reviews](#)
- [Job Risk Assessments](#)
- [Facility Risk Assessments](#)
- [ESH Improvement Plans](#)

### Implementation and Operation

Each employee has an associated Roles, Responsibilities, Accountability and Authority (R2A2) listing for their position. Control of Documents is governed by the NSLS QA manual listed above.

- [NSLS Process Assessments](#)
- [Worker Qualification Matrix](#)
- [NSLS Training Requirements](#)
- [NSI S-II Training Requirements](#)
- [NSLS Job Specific Environmental Training](#)
- [Outline of Light Sources Directorate EMS/OHSAS Communication](#)
- [Key Contacts List](#)
- [EMS/OHSAS Committee](#)
- [EMS FAQs](#)
- [OHSAS FAQs](#)
- [Work Planning and Control](#)
- [Local Emergency Plans](#)

### Checking and Corrective Action

- [NSLS QA Manual](#)
- [NSLS-II QA Manual](#)
- [Assessment Tracking System](#)
- [PRM 1.2.0 Environmental, Safety, and Health Inspections](#)
- [PRM 1.1.1 Injury and Incident/Accident Investigations, Critiques and Occurrence Reports](#)

### Management Review

- Management Review [presentations](#) and [minutes](#)

### FY09 Activity

- 6 JRA's reviewed / revised (NSLS II included)
- NSLS Process Assessments: 4 of 6 reviewed / revised
- NSLS II Process Assessments: 2 completed
- Internal audit
- NSF Audit

# ISM / Work Planning / Experiment Review Overview

- **Work Planning** (30 Enhanced Work Plans; FY09)
  - Manager – Boerner (Operations)
  - 25 Work Control Coordinators (WCC's) (100's screened)
  - Primary Reviewer – Chmiel (ESH&Q)
- **Experiment Review** (~ 1200 SAF's; FY09)
  - Experiment Review Coordinators (ESH&Q)
    - Stiegler
    - Klaus
  - Control Room staff (Operations)
    - Field verification / authorization to start
  - Extended Reviews
    - More discussion; written plans
    - Ad Hoc Committee
    - FY09
      - 'Energetic' materials

ALL Work  
Is  
Planned



- NSLS ESH Management System
- **ESH Performance Measures**
- Goals for FY 10

# ESH Performance Measures

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- Progress on FY09 ESH Targets
- Assessments and audits
- Tier I
- Traffic violations
- Injuries
- Events
- STOP Observations
- Radiation exposure
- Hazardous waste generation

# ESH Performance Measures

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# ESH&Q Improvement Plan

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- Goals
  - PEMP
  - Institutional OHSAS / EMS
  - Audits
  - Other department specific issues
- Annual Plan
  - Tracked in Family ATS
  - Targets for each goal
  - Assigned (personnel performance appraisal; Due date)
- FY09
  - 14 goals
  - 32 targets

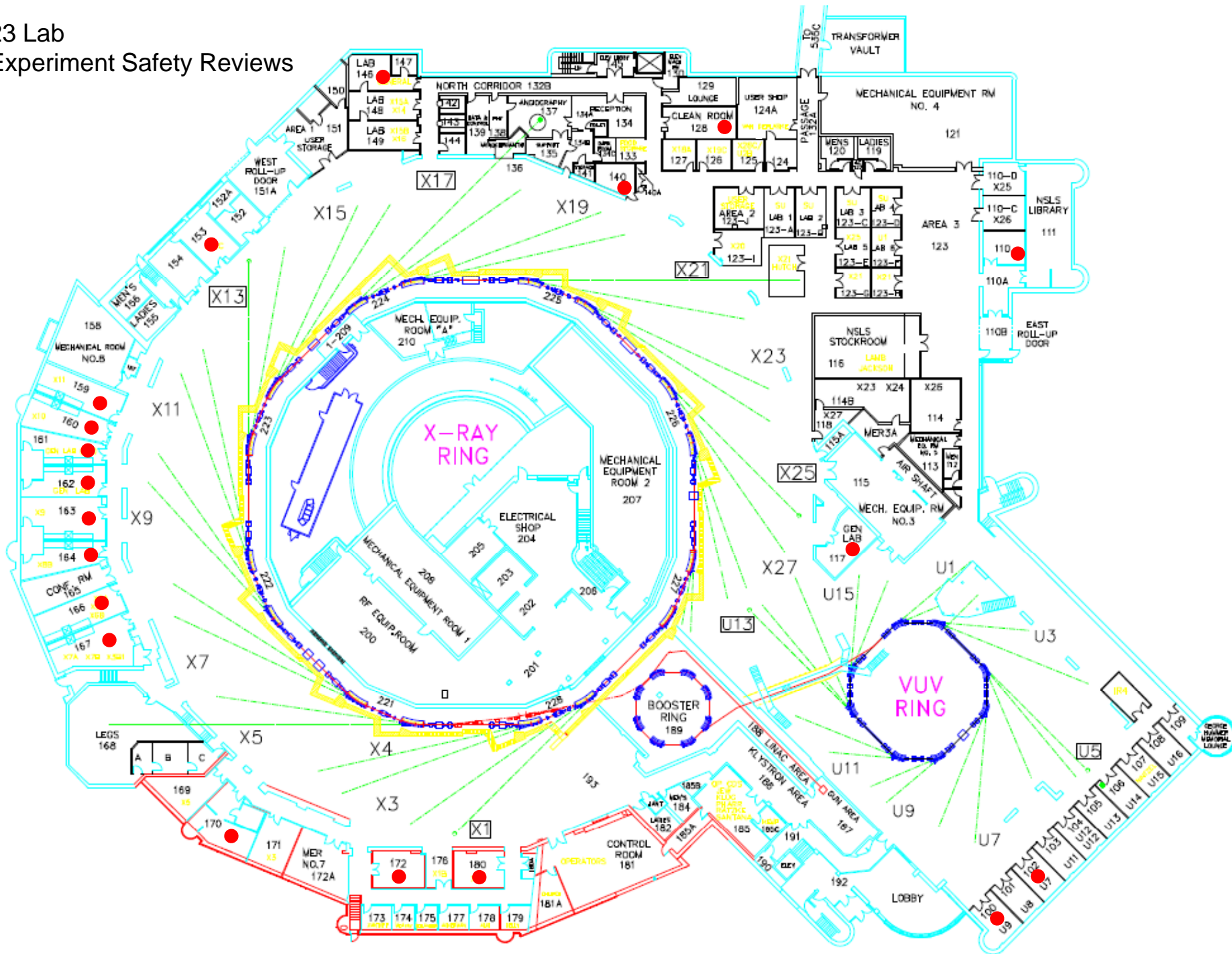
# ESH&Q Improvement Plan

## FY09; 14 Goals

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- **Improve management of the NSLS wet chemistry laboratories.** (Complete)
- **Incorporate Human Performance principles into beam line operations.** (Complete)
- **Increase awareness to accidents and injuries and traffic violations.** (Continuing)
- Define NSLS PPE requirements. (Complete)
- Continue development of web-based JTA questionnaire. (Complete)
- Establish one meaningful and cost-effective P2 proposal. (Complete)
- Assure compliance with BNL emergency management drill requirements. (Complete)
- Improve management involvement in workplace safety. (Complete)
- Improve chemical management. (Complete)
- Assure implementation of new ESH program elements. (Complete)
- Improve energy conservation at the NSLS. (Continuing)
- Coordinate ESH&Q internal and external audits. (Continuing)
- Evaluate new BNL ESH program requirements. (Continuing)
- Continue Human Performance implementation (training and procedures). (Continuing)

# 23 Lab Experiment Safety Reviews



# Wet Chemistry Lab Improvements

- Spaces defined:  
Laboratory or Tech Area
- Spaces cleared of clutter
- Lab Stewards / Deputy Stewards assigned
  - R2A2's developed / accepted
- Experiment Safety Reviews (ESR's) for each lab = envelope
- Lab use proposals – Safety Approval Forms (form modified)
- Guidance web page developed
  - Links to ESR's and Stewards

## LABORATORY STEWARD ENVIRONMENT SAFETY AND HEALTH (ESH) ROLES, RESPONSIBILITIES, ACCOUNTABILITY, AND AUTHORITY (R2A2)

Revision 01; 07/2008; prepared by Andrew Ackerman

### Role

- Manage and oversee use of the set up laboratory space assigned.
- Designate and define use of laboratory work areas
- Act as contact person for facility regarding activities and access of the lab

### Responsibility

- Identify NSLS safety and training requirements for intended lab activities
- Define the work and chemical and equipment storage ESH envelope for the set up laboratory through completion of a BNL Experiment Safety Review (ESR) form.
- Assist NSLS ESH&Q staff in review of the ESR including risk analysis and determination of control requirements.
- Ensure annual review and approval of set up laboratory ESR and inclusion within the NSLS document control program.
- Provide oversight of activities within the set up laboratory to determine if they remain within the scope of the defined ESH envelope, and act to correct discrepancies.
- Instruct users to maintain an inventory of the chemicals stored in the set up laboratory through use of the BNL Chemical Management System.
- Develop and implement adequate written procedures for compliance with ESH control requirements.
- Conduct routine inspections to identify any improper storage or container labeling of chemicals (solids, liquids, and gases) and contact user or deputy steward for correction.
- Maintain an inventory of equipment resident in the laboratory and comply with BNL requirements and inspections.
- Assist experimenters with the proper disposal of wastes. Maintain needed Hazardous Waste Satellite Accumulation areas to meet BNL requirements for use, storage, labeling, and posting.
- Ensure good housekeeping practices, adequate space for experimental work, and no excess or legacy equipment or chemical storage.

### Authority

- Direct any personnel working in the lab to comply with regulations.
- Approve or reject proposals for work within the set up laboratory.
- Stop operations that present unacceptable risk.
- Enforce housekeeping standards.
- Obtain information about user activities from deputy stewards.
- Direct deputy stewards to assist in maintaining the following to support their programs
  - user oversight
  - housekeeping
  - storage
  - equipment inventory

### Accountability

Accountable to the NSLS Chairperson for safe operation of the set up laboratory, for compliance with NSLS requirements, and fulfillment of the roles and responsibilities listed above.

Accountable to deputy stewards to discuss and co-manage the ESR envelope and access to the lab.

# Beam Line Hazard Analyses

## Human Performance

- Identify and characterize ‘routine’ beam line tasks (Not in Experiment Safety Review)
- Identify ‘error likely’ situations
- Meet with ESH at each line (ESH & Training Coordinator)
- Controlled (annual review)
- Implement
  - Reviewed with **BLOSA**

Beamline Equipment:	Electrical Equipment	Other equipment:	
<ul style="list-style-type: none"> <li>● Vacuum chamber                             <ul style="list-style-type: none"> <li>○ Prep chamber</li> <li>○ Growth chamber</li> <li>○ Load lock</li> </ul> </li> <li>● Vacuum pumps</li> <li>● LN2 and LHe dewars</li> <li>● Compressed gas cylinders</li> </ul>	<ul style="list-style-type: none"> <li>● Controllers</li> <li>● Ion gauges</li> <li>● Ion pumps</li> <li>● Ion chambers</li> </ul>	<ul style="list-style-type: none"> <li>● Spot welder</li> <li>● Scaffolding</li> </ul>	
Tasks	Who	Hazards	Controls
Cryogen fill – LHe using transfer line	Beamline and Users	Ergonomic – fill is high, stepladder is needed Burn hazard	<ul style="list-style-type: none"> <li>● Lab/User cryogen training</li> <li>● Training by SME, check list used from PRM. 5.1.0</li> <li>● Cryogen PPE</li> </ul>
Cryogen fill – LN2 – using small container to pour	Beamline and Users	Ergonomic – fill is high, stepladder is needed Burn hazard	<ul style="list-style-type: none"> <li>● Lab/User cryogen training</li> <li>● Cryogen PPE</li> <li>● BLOSA</li> </ul>
Bake-out with heat tape	Beamline and Users	Experimental – tripped breaker  Personnel - burn hazard	<ul style="list-style-type: none"> <li>● BLOSA</li> <li>● Ensure heat tape equipment is distributed into the correct electrical outlets</li> <li>● No breaker reset without proper electrical training</li> <li>● Keep hands and body away from heat tape.</li> </ul>
Using the Baker’s scaffold to remove/replace the cryostat sample chamber out of the holder	Beamline	Ergonomic – heavy equipment up high	<ul style="list-style-type: none"> <li>● Scaffolding constructed and inspected by Competent Person</li> <li>● Used by beamline personnel only</li> <li>● Access by only one person at a time</li> <li>● No extended reaching</li> </ul>
Spot welding	Beamline	Hot surface, sparks	PPE required– safety glasses and insulated gloves
Using flammable gas - hydrogen	Beamline and Users	Fire, explosion, overpressure	<ul style="list-style-type: none"> <li>● Compressed gas/User training</li> <li>● Beamline personnel hook up</li> </ul>

## ESH Communication Increase Awareness

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- Weekly meetings with Chairman and direct reports
- Semi-monthly management meeting
  - Quarterly accident reports
- Weekly User meeting
- Semi-monthly scientific staff meeting
- Tri-annual UEC Town Meetings
- Annual 'All-Staff' meeting
- Monthly E-News
- STOP Observations
- NSLS Highlights
- BNL Lessons Learned



## FY08 ESH&Q Management Review

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Open item from 08 meeting:

Are Human Performance principles accepted at the beam lines? We should ask.

- Feedback surveys at close of each training completed.
- A separate, additional feedback survey completed.
- Individual discussion.

Results:

- The training is well received; the course is effective and helpful
- People see utility
- Agreement on implementation method imperfect

# ESH Performance Measures

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- Progress on ESH Targets
- **Assessments and audits**
- Tier I
- Traffic violations
- Injuries
- Events
- STOP Observations
- Radiation exposure
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## Audits / Assessments

17 Total

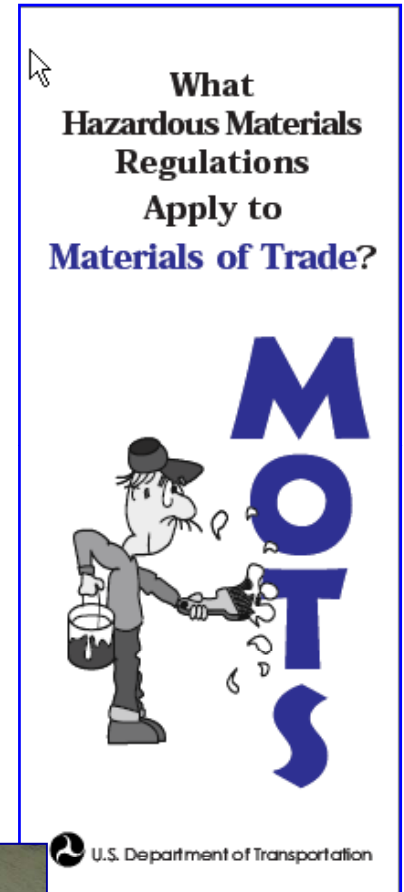
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- 2009 Environmental Multi-topic Assessment
- IH Multi-topic Assessment
- X6A Conduct of Ops
- EMS Internal
- *BHSO Accelerator Safety*
- BHSO Contamination/Activation Controls Program
- Conduct of Ops – Required Reading assessment
- Conduct of Ops – SDL
- Electrical Safety Training
- DOE Accelerator Safety Order Assessment
- S/CI Training Audit; Response to BHSO Audit
- BHSO Document, records, procurement, QA
- NSF EMS/OHSAS Registration Audit
- Nuclear Materials
- **DOT Shipping**
- S&T Business Plan
- Well House 'Extent of Cause'

- Few findings; Tracked in Family ATS
- Value = self-assessment preparation

# Transport Equipment and Materials

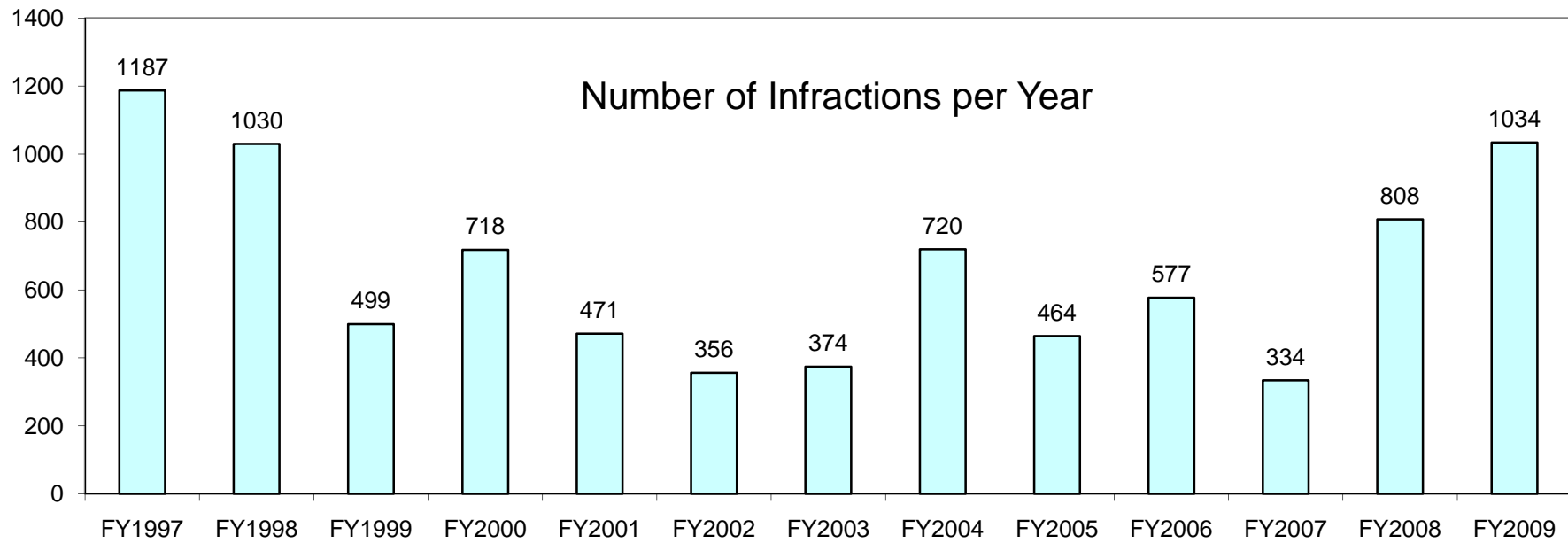
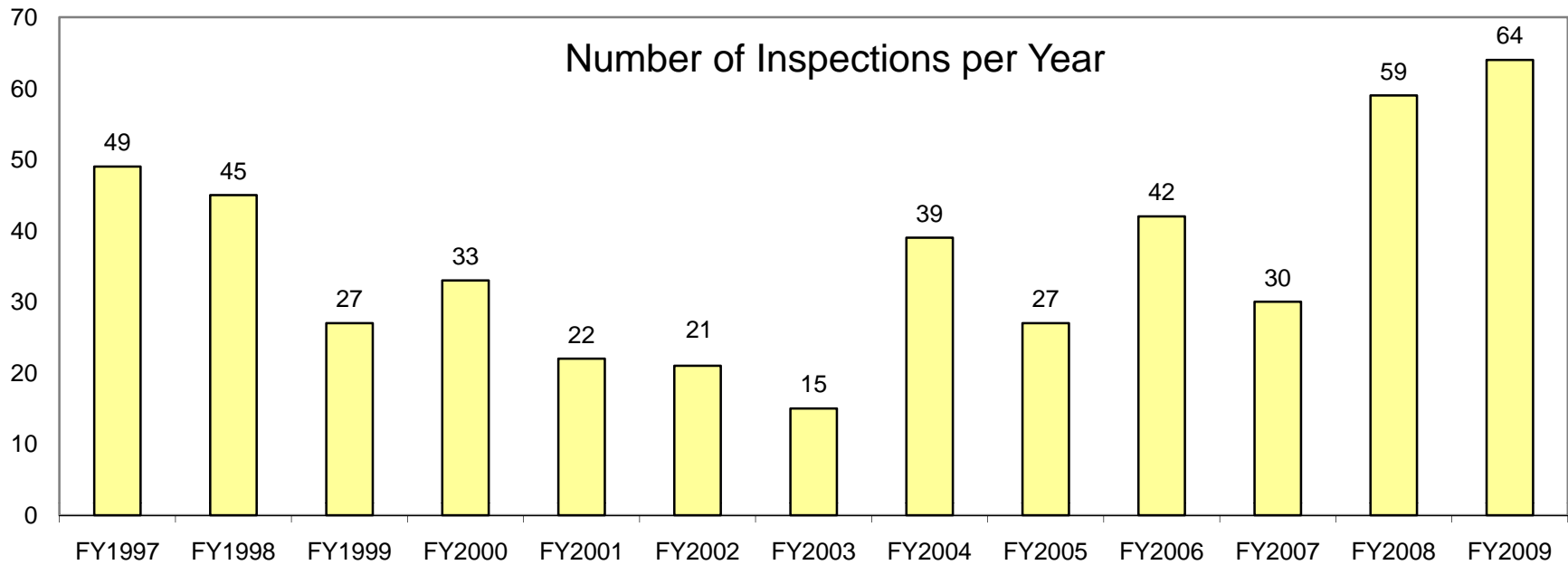
- Everyone brings something
- Shipping is best (time, planning, and money)
- What can I bring in my car? – Materials of Trade (MOT)
- Can I use off-site service
- 2009 TCAP Audit
  - Level I Finding (1): Training for employees involved in the shipping processes of hazardous materials is deficient.
  - Level II Findings: Materials not properly identified for shipping.
  - Inconsistent package preparation
  - Documentation errors
  - No MOT's ??
  - 'Propane popsicle' variance ??

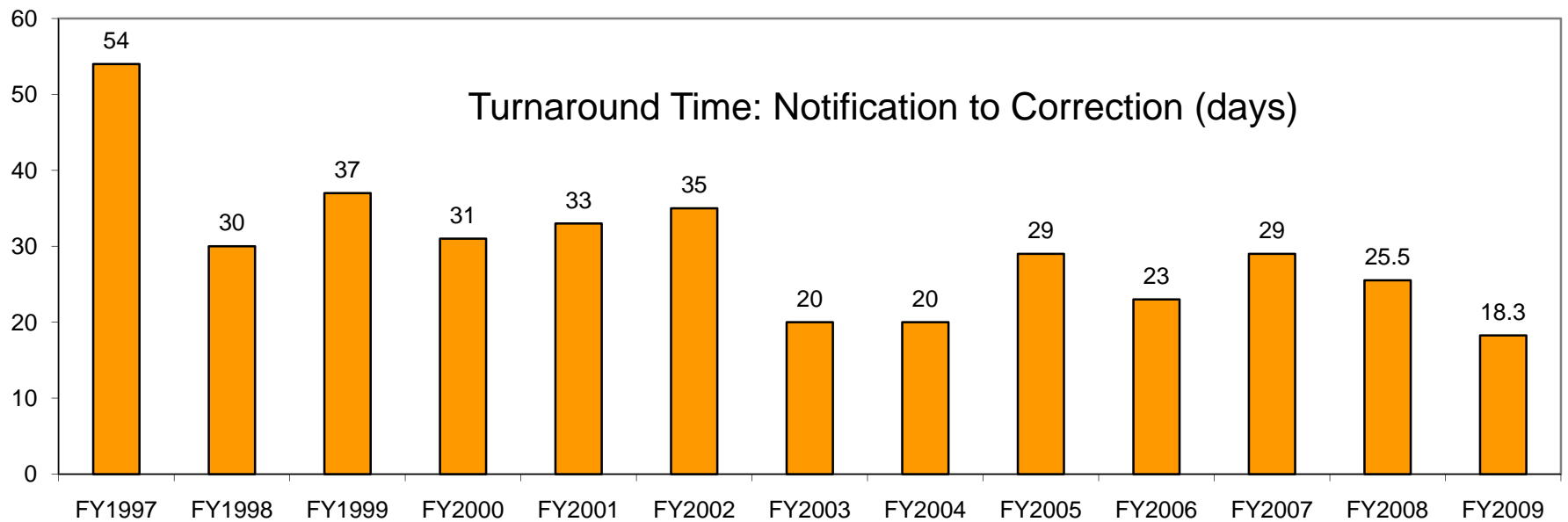
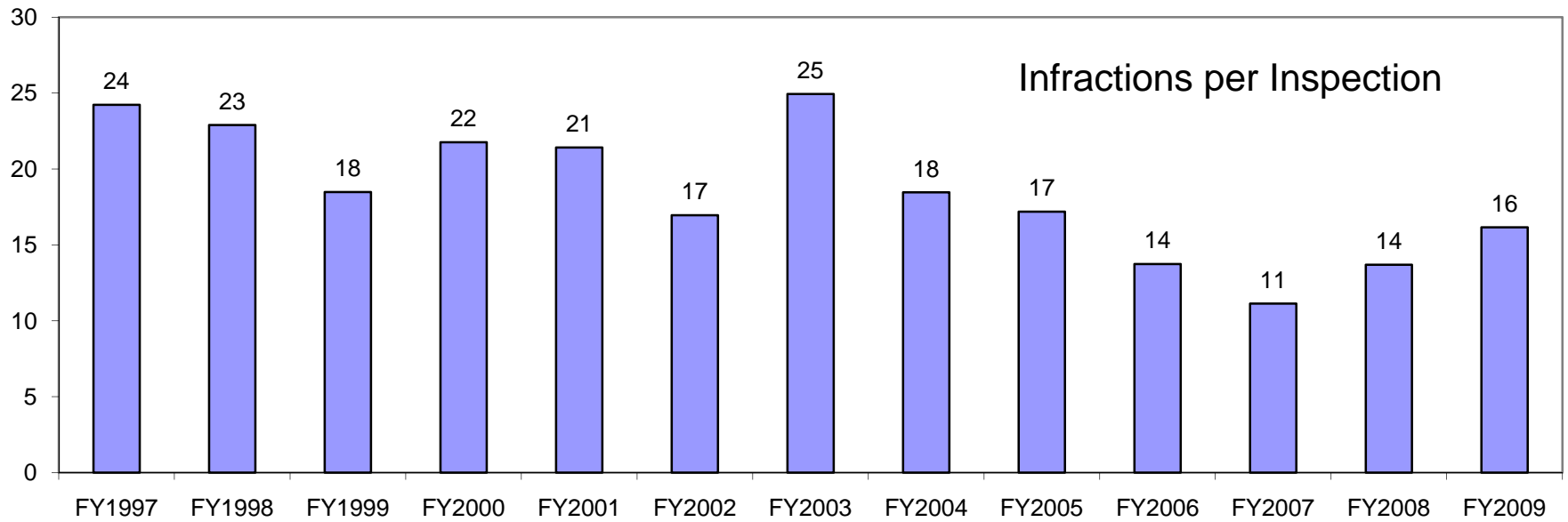


# ESH Performance Measures

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- Progress on ESH Targets
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- **Tier I**
- Traffic violations
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# Tier I Summary

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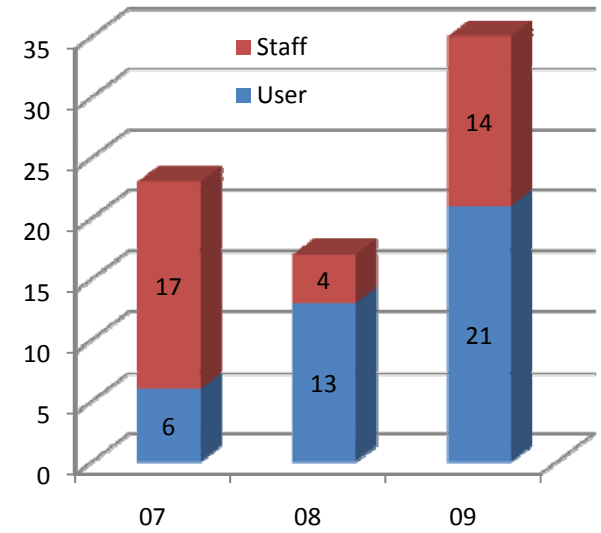
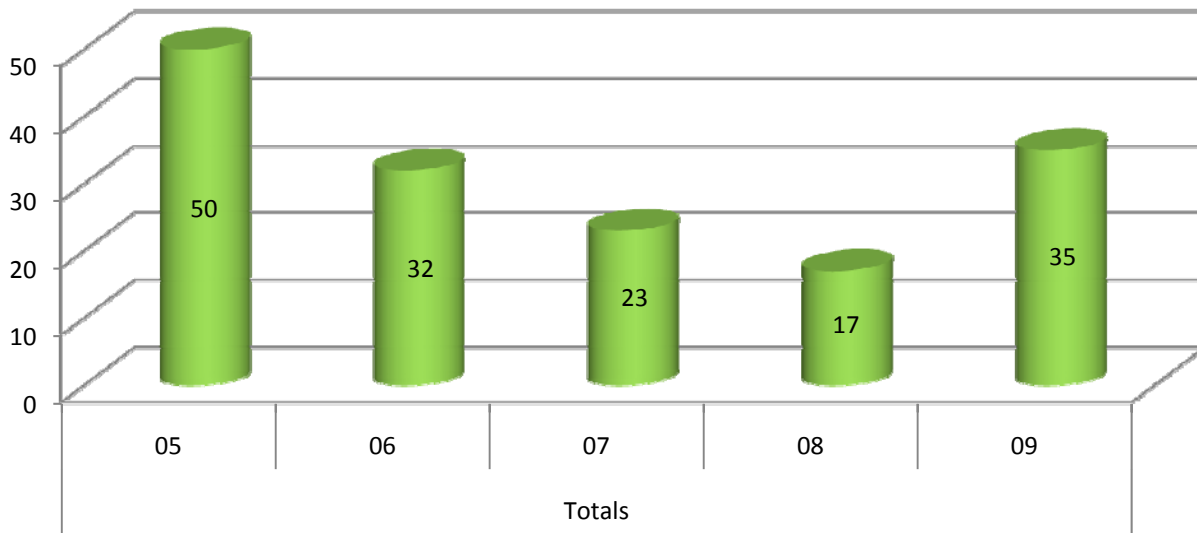
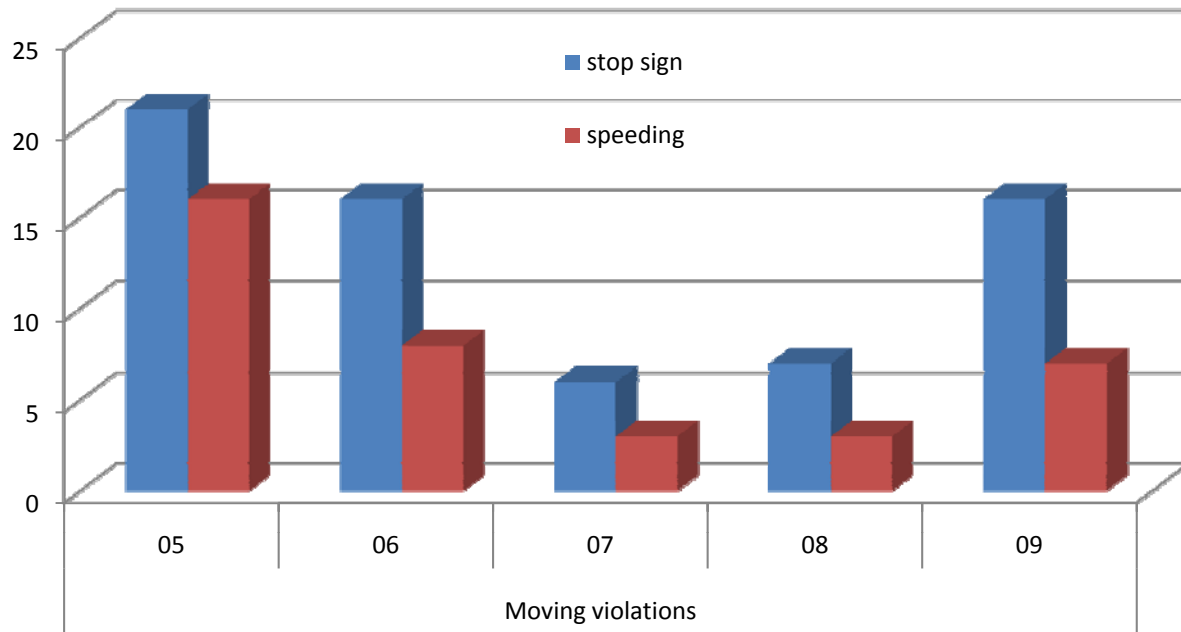
- Comprehensive review of work locations through-out the department
- Expert core team and involvement with staff
  - 10 Area representatives assigned
  - Inspection notices to NSLS, BNL, and DOE staff
- All findings are assigned and tracked until closed.
  - Detailed reports; successive notification; review of past findings; action plans
- Excellent trending
- Engaged with the lab-wide improvement effort

# ESH Performance Measures

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- Progress on ESH Targets
- Assessments and audits
- Tier I
- **Traffic violations**
- Injuries
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# Traffic Violations



# ESH Performance Measures

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- Progress on ESH Targets
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- **Injuries**
- Events
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# NSLS Injuries

Fiscal Year **2009** cases

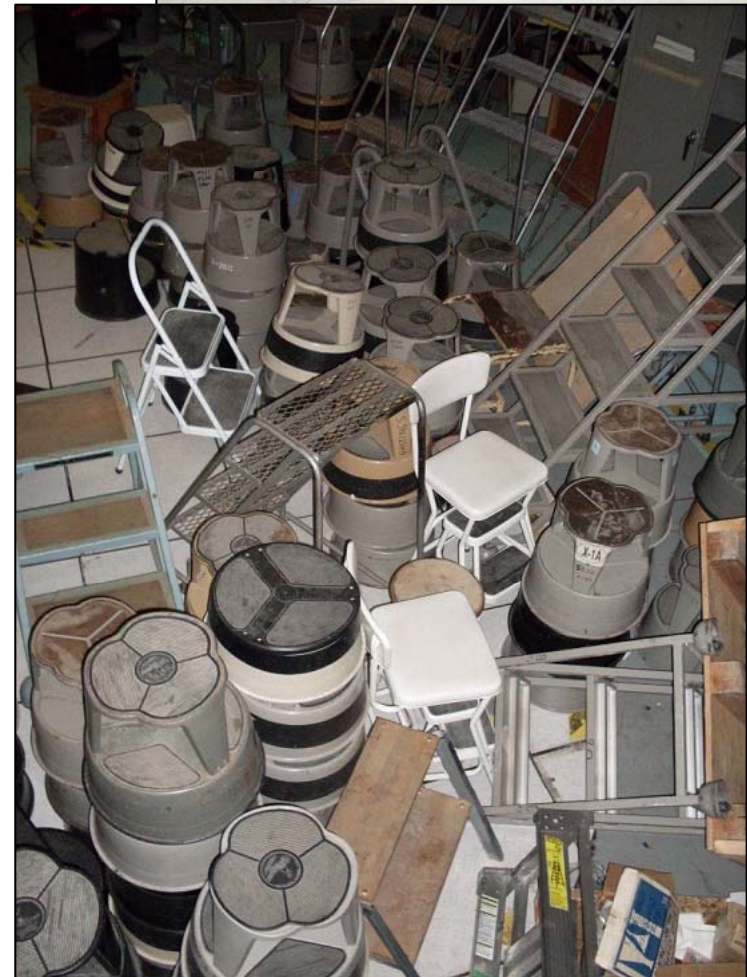
**6**

(4 First Aid; 2 DART)

- Cut hand on fan 1<sup>st</sup> Qtr (Staff; first aid)
- Fall from stool 2<sup>nd</sup> Qtr (User; sutures, no lost time)
- Chemical smell 2<sup>nd</sup> Qtr (F&O) (DART)
- Fall from ladder 2<sup>nd</sup> Qtr (Staff) (DART)
- Cut hand on cabinet 4<sup>th</sup> Qtr (User; first aid)
- Chemical splash 4<sup>th</sup> Qtr (F&O; first aid)

- Investigated
- Actions tracked in Family ATS

Item	Inspected	Left in Service	Scrapped	Repaired	Pending Repair
(Kik-Step) Step Stool	156	44	99	13	0
Ladder Stands	40	25	4	6	5





### Location

Bldg. 725; Experiment floor; X16

### Injury

Injury arm; torn bicep ligament

### Description:

Employee was working on the third step of a six foot ladder. He was taking measurements on an adjacent hoist crane. He turned to complete the task, lost his balance, and began to fall. He grabbed the ladder and hoist chain before falling and was able to lower himself to the ground, but hurt his left arm in the process. DART case; 12 days lost; 15 days restricted duty to date

### Analysis:

Use of a ladder is an acceptable and reasonable approach to complete this task. The ladder was set up properly and was supported by another employee. The injured employee is qualified and trained for ladder use. The ladder used is a light-duty OSHA Type III device (maximum load rating is 200 lbs). It was chosen because of the proximity to the work location (**HPI Error Precursor**).

### Causes:

- > Worker inattention to maintaining three point contact on the ladder.
- > Inappropriate ladder choice. Type III ladder stability inadequate.

### Corrective Actions (tracked in NSLS family ATS):

- > Ladder removed from service; Extent of condition inspection completed; two additional Type III ladders removed from service.
- > Distribute NSLS ESH&Q Highlight (**communicate event**)
- > Update NSLS requirements to indicate Type III ladders not allowed (**establish written policy**)
- > Add item to Tier I checklist to remove Type III ladders from service (**continued vigilance**)
- > Worker to repeat TQ-LADDER training
- > Manager completed TQ-LADDER; issues noted; note to be sent to SME and BNL training (**feedback**)

# ESH Performance Measures

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- Progress on ESH Targets
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## Events

### FY 09 ORPS Categorizer Calls

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- Waste water pump failure; electrical; SC3 (closed)
- Smoke condition; overheated magnet; SCBNL (closed)
- Suspect legacy shackle found; SC4 (closed)

Not reportable

- Broken Be window
- Spilled LN2
- ODH Alarm; faulty detector

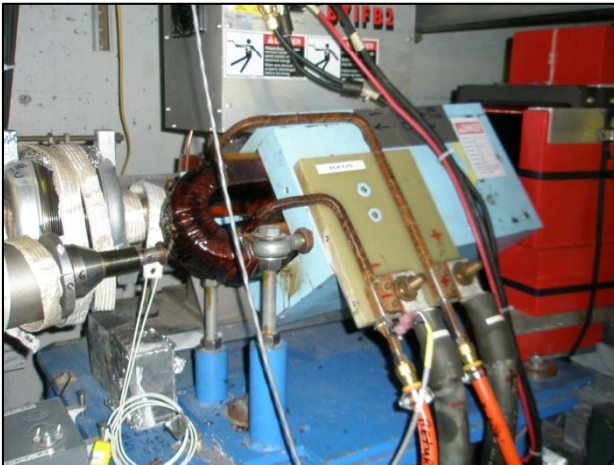
# Smoke Condition BXD5

## Event:

- Power dips
- Water pumps tripped; magnet cooling lost
- Magnet overheat; epoxy – smoke
- Evacuation; no fire; no injury

## Response:

- Investigated
  - Equipment protection interlock failed – relay
- Similar equipment located
- New design; 2 high reliability relays in parallel



# ESH Performance Measures

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- Progress on ESH Targets
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- Training
- Injuries
- Events
- **STOP Observations**
- Radiation exposure
- Hazardous waste generation

# STOP

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- Chairman & 7 'Level III' managers
- 100% met the goal
- 111 individual observations
- 2,640 minutes = 44 hours

1<sup>st</sup> place: 17 (tie) [Ackerman](#), ESH&Q  
[Murphy](#), Accelerator &Ops



2<sup>nd</sup> place: 14 [Kao](#), Chairman

3<sup>rd</sup> place: 13 (tie) [Miller](#), Life/Env Sci  
[Nasta](#), User Admin  
[Pindak](#), Phys/Chem Sci

# ESH Performance Measures

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## Radiation Dose Measurements January to October 2009

- Shallow Dose 94 mRem on 5 TLDs
- Lens Dose 15 mRem on 1 TLDs
- Neutron Dose (N) 5 mRem on 1 TLDs
- Deep Dose (D) 22 mRem on 3 TLDs\*

On average:

- 287 badges issued each month
- 3441 for the year

**Collective Dose = 10 Person – mRem** (2008 = 68 Person-mRem)

\*17 mRem due to NSLS II construction. Workers performing soil density tests. TLD's were temporarily assigned to NSLS badge boards. *Dose to be transferred.*

### 2009

- Booster neutron shielding added
- New magnet in Booster to X-ray transport = improved injection efficiency

# Radiation Monitoring

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- Area monitoring continues
  - 25 Chipmunks
    - Read out and alarm; locally and in the control room
    - History files
  - ~60 TLD's distributed throughout the facility
  - Hand held surveys
- Administrative controls in place
  - Scheduled injection
  - Announce injection
  - Posting
  - Interlocked enunciators in problem areas
  - Operations response procedure (Chipmunks)

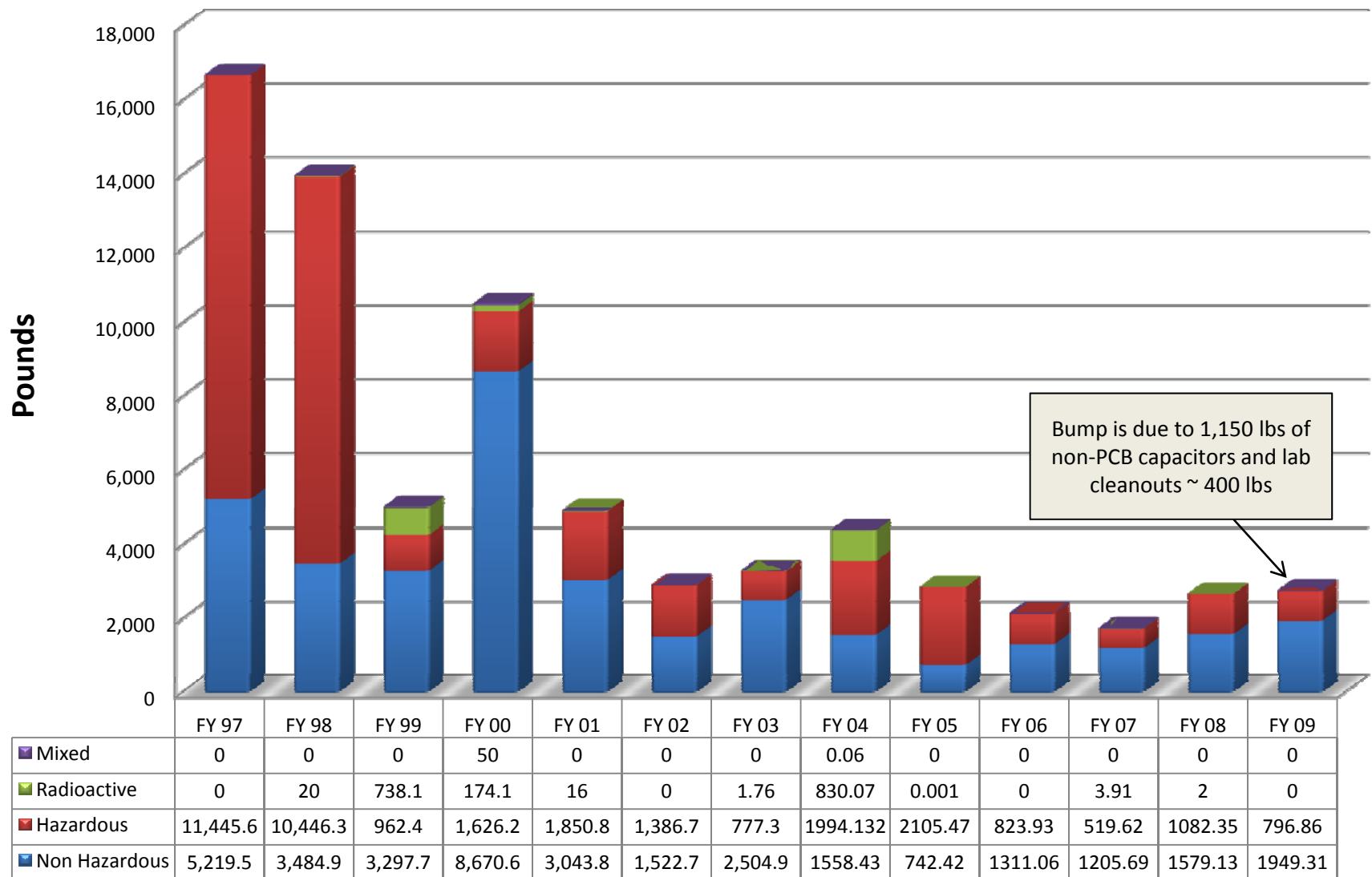
- Pattern well defined
- Injection dominates

# ESH Performance Measures

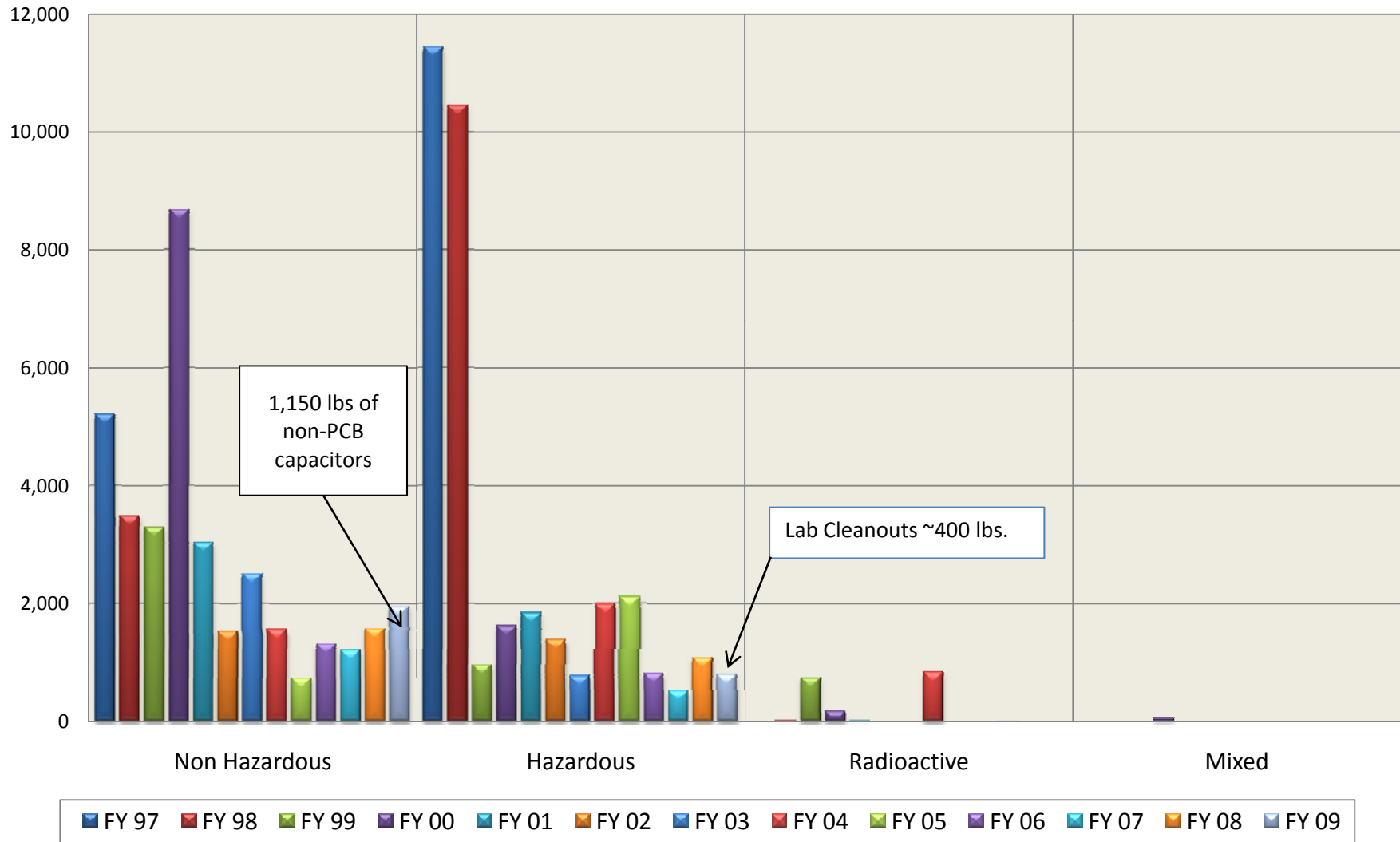
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- **Hazardous waste generation**

### NSLS Waste Totals by Year



## NSLS Waste History by Type of Waste in Pounds



- NSLS ESH Management System
- ESH Performance Measures
- **Targets for FY 10**

# ESH&Q Targets

## FY10

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### Continued from FY09

- Enhance implementation of the beam line safety envelopes
- Consolidate the laboratory Experiment Safety Reviews to working outlines
- Re-evaluate laboratory programs and steward assignment
- Incorporate HPI into procedure writing

### New for FY10

- Define User material transport requirements; establish needed resources
- Upgrade User training
- Establish a tracking mechanism for near miss events
- Enhance configuration management

## Questions / Comments

Please sign the attendance sheet