NSLS ESH Program
FY08 Management Review

November 7, 2008

A. Ackerman

Scope of Discussion

- ESH&Q Management Systems
- ESH Performance Measures
- Stakeholder Involvement
- Financial Costs
- Goals for FY 09

- 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 Management System**
- ESH Performance Measures
- Stakeholder Involvement
- Financial Costs
- Targets for FY 09

ESH&Q Personnel

NSLS

ESH

ESH Coordinator

Safety Officer

Deputy Safety Officer

Safety Engineer

Quality

QA Coordinator

QA Administrator

Training

Training Coordinator (0.75 FTE)

Matrixed

RCD

Facility Support Rep

Radiation Control Tech (0.75 FTE)

SHSD

IH Representative (0.3 FTE)

EWMSD

Env. Compliance Rep (0.3 FTE)

NSLS II

Sr. Health Physics (0.1 FTE)

Health Physics (0.1 FTE)

ESH Coord. (0.1 FTE)

NSLS ESH&Q Organization Chart

11 people
9.3 FTE

Chairman
C-C. Kao

ESH&Q Manager
A. Ackerman

DOE/BHSO Facility Representative
P. Kelly

ES&H Coordinator
L. Stiegler

QA Representative
M. Buckley

Quality Control Coordinator:
Charlotte Nielsen

Safety Officer
J. Aloi

Training Coordinator
M. A. Corwin

Deputy Safety Officer & Local Emergency Coordinator:
R. Chmiel

ESH Engineer:
K. Klaus

Environmental Compliance Representative:
D. Bauer

Industrial Hygienist:
C. Weilandics

Radiological Control Division:
Rep: F. Zafonte
Tech: K. Hayes

COMMITTEES

ALARA Committee Coordinator
Chair: W. R. Casey

Beamline Review Committee
Chair: L. Berman

Electrical Safety Advisory Committee
Chair: J. Aloi

EMS/OHSAS Committee
Chair: A. Ackerman

ES&H Committee
Chair: L. Stiegler

ES&H Improvement Committee
Chair: L. Stiegler

Interlock Working Group
Chair: W. R. Casey

Work Planning/ Permit Review Committee
Chair: A. Boerner
Deputy: R. Kiss
Primary Reviewer: R. Chmiel

Approved on February 6, 2008

_____ _____

Andrew Ackerman, ESH&Q Manager

Matrixed personnel are represented by dashed boxes

ESH&Q Program Responsibilities

- 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
- Document control

Overview of EMS Program

Significant Environmental Aspects:

- Wastes
- Chemical storage
- Liquid discharges
- Air Discharges
- Soil activation *
- Electrical consumption *
- Radioactive material *
- Water use *

* Present but not significant

Aspect activities
Machine shop work
Water systems maintenance
Vacuum pump maintenance
Crystal etching facility
Photographic dark room
Synchrotron operation
Elec/Mech maintenance
Some experiments

FY08 Activity

- Process assessments (7) reviewed / revised
- Manual retired; key info on web page
- Updated to include NSLS II

Overview of OHSAS Program

- Task specific risks evaluated for 38 Activities = JRA's
- Facility risks evaluated for 9 topics = FRA's
- JRA's linked with
  - Worker Qualification
  - Work Planning
- Strong worker involvement in:
  - Development of **Worker Qualification Matrices**
  - Risk assessment (JRA / FRA)
  - Work planning
  - ESH Improvement Committee

FY08 Activity

- All FRA's reviewed / revised
- 25 JRA's reviewed / revised
- Manual retired; key info on web page
- Updated to include NSLS II

ISM / Work Planning / Experiment Review
Overview

- Work Planning (40 Enhanced Work Plans; FY08)
  - Manager – Boerner (Operations Division)
  - 25 Work Control Coordinators (WCC's) (100's screened)
  - Primary Reviewer – Chmiel (ESH&Q Division)
  - New 'Request Tracker' system – WCC's included

ALL Work Is Planned

- Experiment Review (~ 1200 SAF's; FY08)
  - Experiment Review Coordinators
    - Aloi (primary)
    - Stiegler
    - Klaus
  - Extended Reviews
    - More discussion; written plans
    - Ad Hoc Committee
    - FY08
      - Powder gun
      - Pu diamond anvil cell

- NSLS ESH Management System
- **ESH Performance Measures**
- Stakeholder Involvement
- Financial Costs
- Targets for FY 08

ESH Performance Measures

- Progress on FY08 ESH Targets
- Assessments and audits
- Tier I
- Traffic violations
- Training
- Injuries
- Incidents
- STOP Observations
- Radiation exposure
- Hazardous waste generation

ESH Performance Measures

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

ESH&Q Improvement Plan

- 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)
- FY08
  - 16 goals
  - 39 targets

ESH&Q Improvement Plan
FY08; 16 Goals

- Human Performance
- Improve wet chemistry laboratory management
- PPE requirements
- Increase accident / injury awareness (Complete)
- Pollution prevention (P2) proposal (Complete)
- Enable Energy Star® enabled for monitors (Complete)
- Energy Star® for all electronic purchases *(Continuing)*
- Analyze Tier I data (Complete)
- ODH risk analysis; MX hutches (Complete)
- SBMS Fire safety action plan (Complete)
- Evaluate booster beam loss (Closed)
- Industrial Hygiene baseline exposure monitoring (Complete)
- EMS / OHSAS documentation improvement (Complete)
- Job training assessment (JTA) questionnaire *(Continuing)*
- Address ISM audit findings *(Continuing)*
- Analyze interlock reliability *(Continuing)*

Human Performance
FY08

- Initial goal = Train management & Work Control Coordinators (Completed)

- Training expanded
  - 4 Advocates (2 scientists; 2 safety)
  - 1 trainer
  - ~60% of entire directorate trained
- Advocate BNL committee involvement
  - Integration
  - Communications

- Presentations
  - All staff
  - Management meetings
  - Town meeting
  - User Executive Committee
  - Science Advisory Committee
- Newsletter article

More to come

- Complete training (CY08)
- Implementation group established
- Include with beam line safety envelopes
  (routine beam line tasks – rule based; checklists / procedures)

Wet Chemistry Laboratories

- Clean out
  - ~600 lbs lead acid batteries recycled
  - 3 truckloads of computers / electronics recycled
  - 20 cu. yds. scrap metal recycled
  - ~300 lbs industrial & hazardous wastes disposed
- Safety envelopes (1/2 done)
- R2A2's:
  - Steward
  - Deputy Steward
  - Implemented through tenure review

PPE

- NSLS task force established
  - Scientists, engineers, technical
  - 3 meetings
    - Define needs / priorities
    - Evaluate
      - Work area entry
      - Cryogen use
- Detailed cryogen use risk & regulatory requirements analysis
- Participate on BNL PPE working group

FY07 ESH&Q Management Review

Open items from 07 meeting:

- Nano-science being considered as EMS significant aspect.
  (note added to NSLS matrix)
- Few STOP observations; how will that be improved?
  (tracked, reminders, much better)
- Why so many electrical Tier I findings? Training?
  (slides added to NSLS specific training; notices posted at stock room for power strip use)

ESH Performance Measures

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

Audits / Assessments

21 Total

- Triennial Assessment on Posting & Labeling, and Entry/Exit Control
- Material Balance Area inventory
- BURF Review
- Waste Management
- EMS Internal
- Software Quality Assurance
- Suspect Counterfeit Items
- **DOE Nano-science Safety Assessment**
- OHSAS Internal Assessment
- Follow-up Assessment on Controlled Document Review Process
- Work Planning and Control Effectiveness
- Flammable Cabinet Assessment
- Emergency Management Program
- IH Self Assessment
- DOE Review
- Machine Shop
- BNL Internal Nano-science Safety Audit
- LOTO Self-Assessment
- Emergency Drill
- EMS Process Assessments
- JRA / FRA Review

- Few findings
- Value = self-assessment preparation
- ~1,400 person hours in prep and conduct

Office of Science
U.S. DEPARTMENT OF ENERGY

BROOKHAVEN NATIONAL LABORATORY
BROOKHAVEN SCIENCE ASSOCIATES

DOE Nano-science Safety Assessment

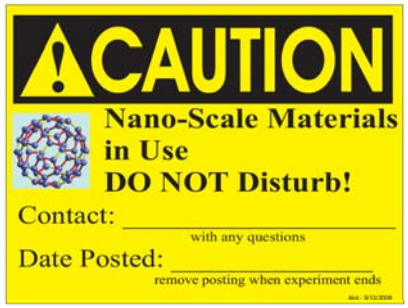
- NSLS contributed much to BNL success
- Distilled SBMS requirements
- HEPA hood & glove box installed
- Experiment review
  - Characterize and control
    - Fixed, solution, free particulate
  - Identify nano-science workers
  - 'In-person' briefing
- Training
  - All Users and technical staff
  - 'Read & sign' directions for HEPA hood and glove box
  - BTMS
- PPE
- Waste handling

NSLS Nano-science Safety Requirements LS-PRM-1.3.5a Section 7, Effective Date 5/16/2008

The only official copy of this file is the one on-line. Before using a printed copy, verify that it is the most current version by checking the effective date.

RISK →	LOW	MEDIUM	HIGH
Material Form ↓ / Requirements ↓	**Fixed Nanostructures**	**Solutions**	**Free Nanoparticles**
PPE Requirements for Handling	Standard PPE required for the work area. No additional PPE is needed for this nanomaterial work.	Standard PPE required for the work area plus: • Gauntlet-type nitrile gloves "or" wrist length disposable nitrile gloves with extended sleeves • Eye protection: Safety glasses with side shields for handling powders only. Chemical splash goggle for handling either powders or liquids.	
Handling Requirements	• For work outside of a HEPA filtered exhaust hood: o No Mechanical abrasion. o No thermal stresses o Cover samples when practical to protect the sample, e.g., (slide cover) • Store in sealed container when not in use.	• Volumes must be limited to the milliliter range (<200 ml). • If there is a potential for particle aerosol formation manipulate within a HEPA filtered laboratory exhaust hood over adsorbent paper to capture any spills. • Solutions brought to the beamline must be: o Transported in sealed containers. o Manipulated over an absorbent paper to capture any spills. o Kept wet (do not allow solutions to dry out and form particulates) • Work surfaces must be wiped with a dampened adsorbent paper towels at the completion of the experiment (aqueous soap solution).	• Total particle masses must be limited to the milligram range (<200 mg) and be manipulated within a HEPA filtered laboratory exhaust hood over water soaked absorbent paper to capture any spilled materials. • Exhaust hood work surfaces must be wiped with a dampened adsorbent paper towels at the completion of the experiment (aqueous soap solution). • When ejecting samples from a capillary, that sample must be directed to water for capture. Compressed nitrogen (< 5 psi) or other inert gas must be used to eject the sample from the capillary tube. A covered beaker is best to contain any splash. This must be completed within a laboratory HEPA exhaust hood. • Nano-scale materials brought to the beam line must be: o Sealed within a sample holder, a capillary tube, or with at least two layers of Kapton, Mylar or cellophane tape. Only sealed containers are allowed at the beam lines for storage during an experiment. o Experiments that involve gas flow over particles must include a water scrub of the gas exhaust to provide a final barrier to particle loss.

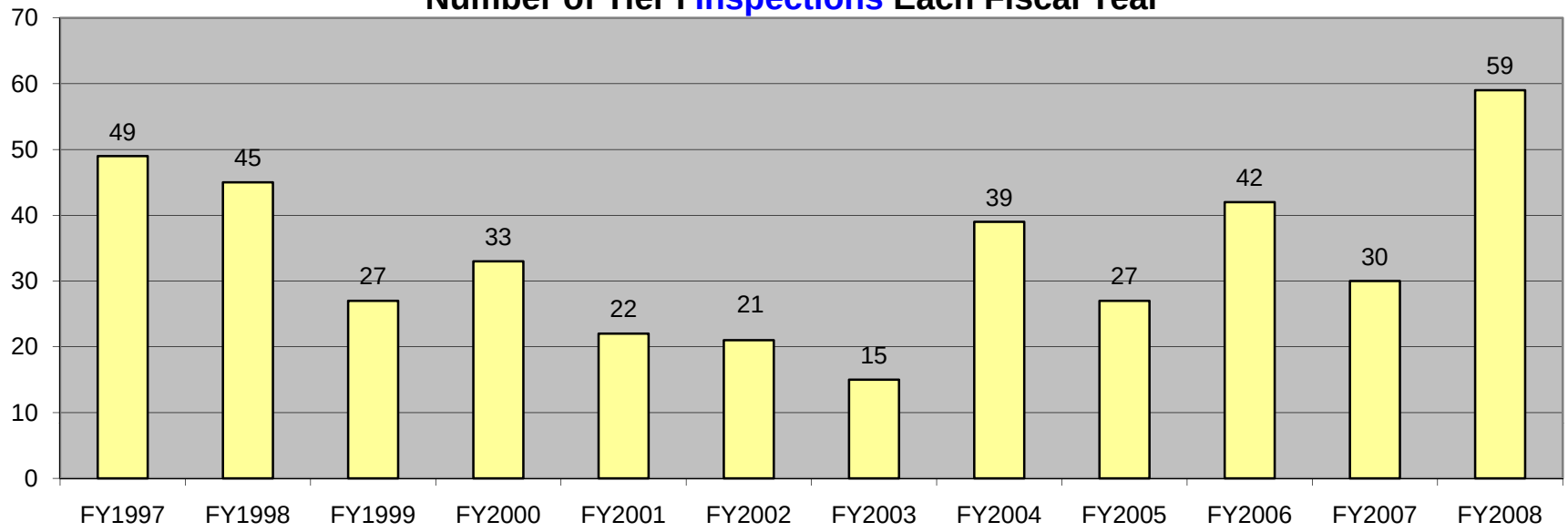
Page 1 of 3 *Prepared By: A. Ackerman and J.Aloi*



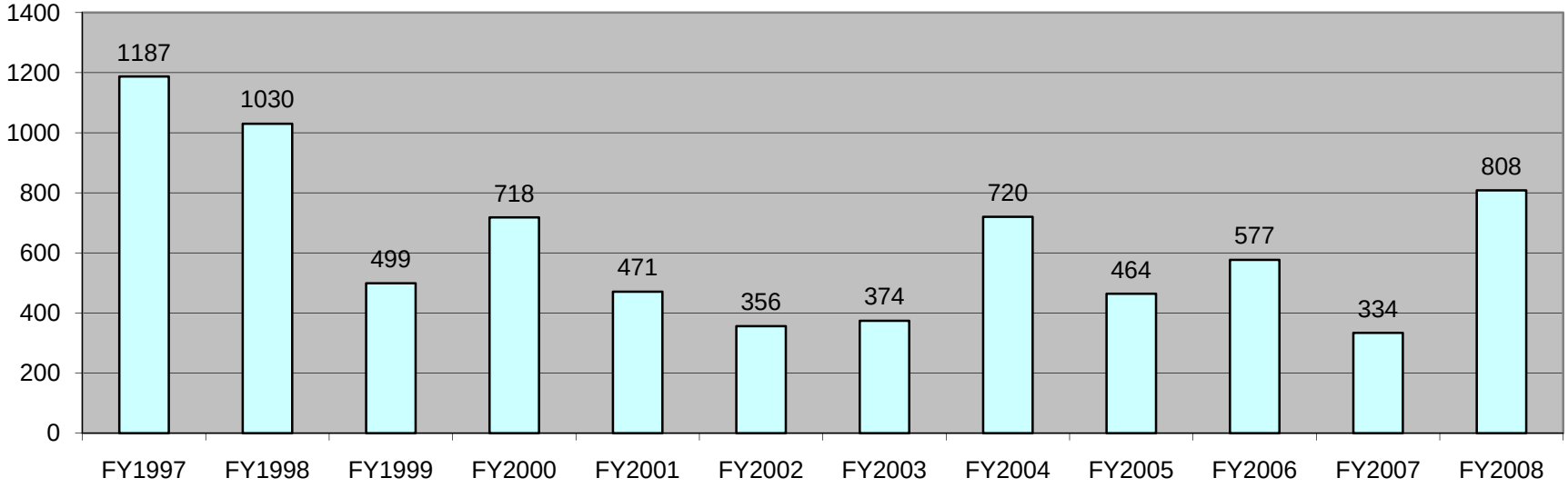
ESH Performance Measures

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

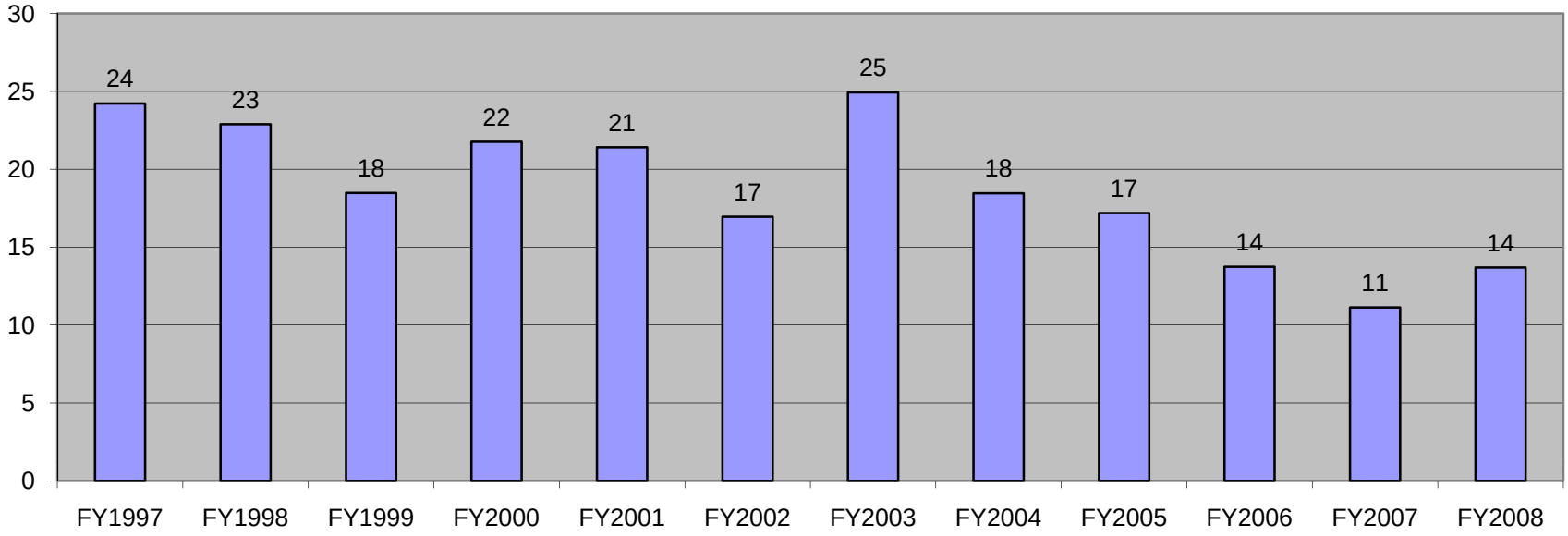
Number of Tier I Inspections Each Fiscal Year



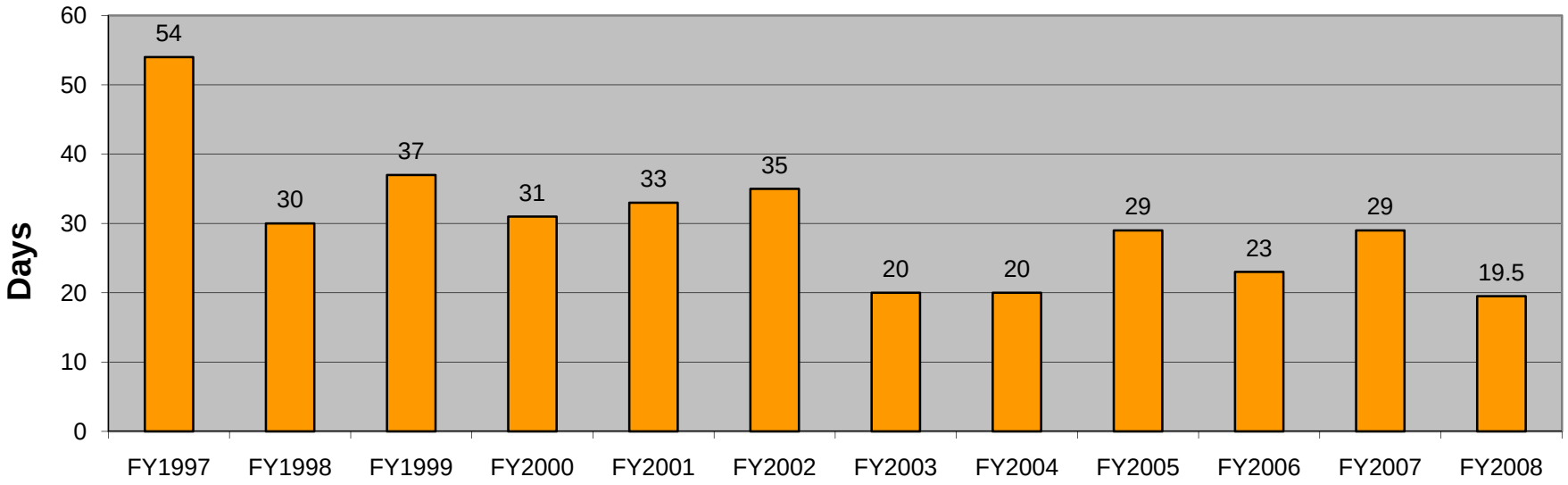
Number of Tier I Infractions Each Fiscal Year



Number of Infractions per Inspection



Turnaround Time: Notification to Correction



Tier I Summary

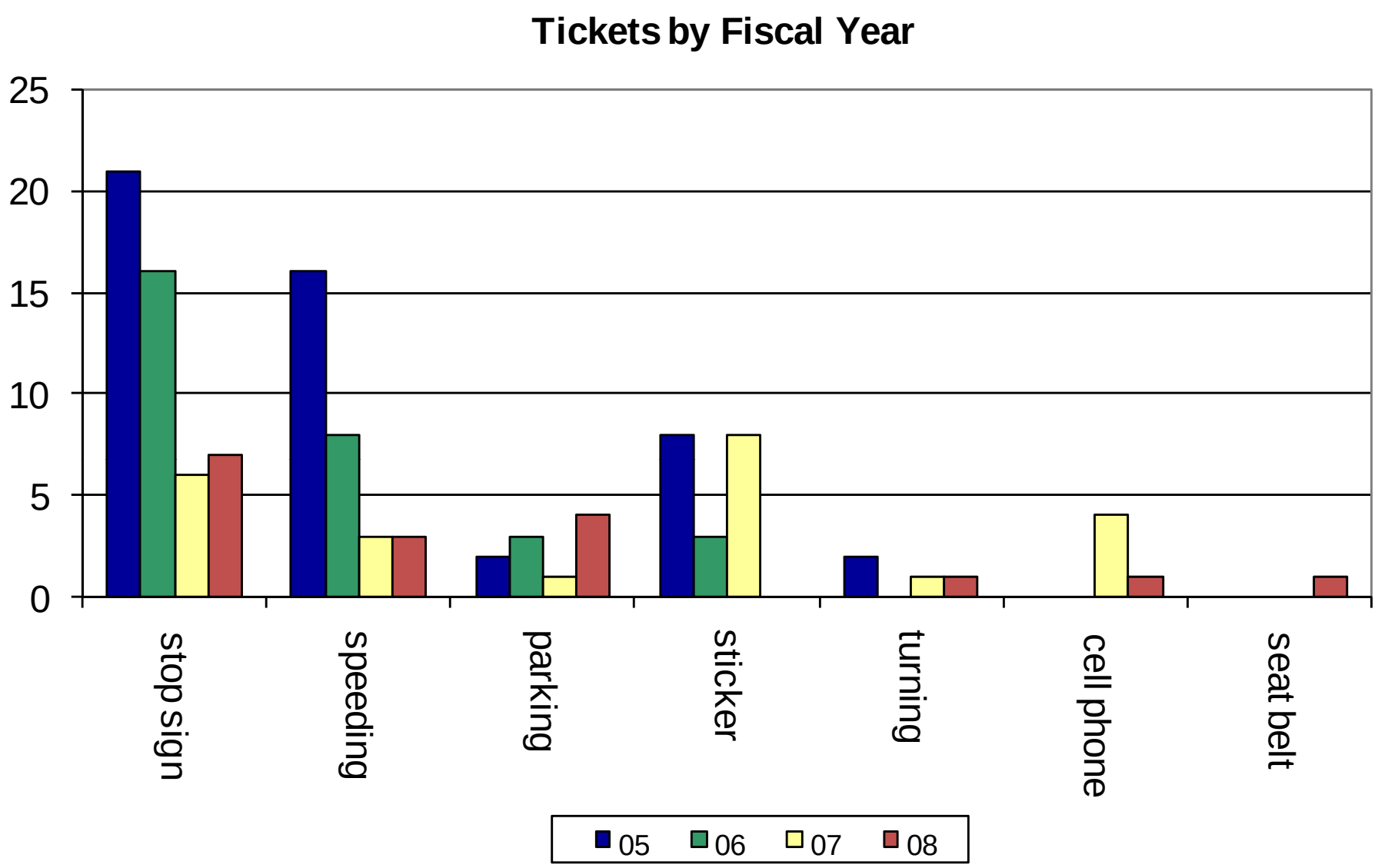
- Comprehensive review of work locations through-out the department
- Expert core team and involvement with staff
  - 10 Area representatives assigned
  - Inspection notices to NSLS, BNL, and DOE staff
- All findings are assigned and tracked until closed.
  - Detailed reports; successive notification;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

Conclusion:

- Program is exemplary
- Adequate resources assigned

ESH Performance Measures

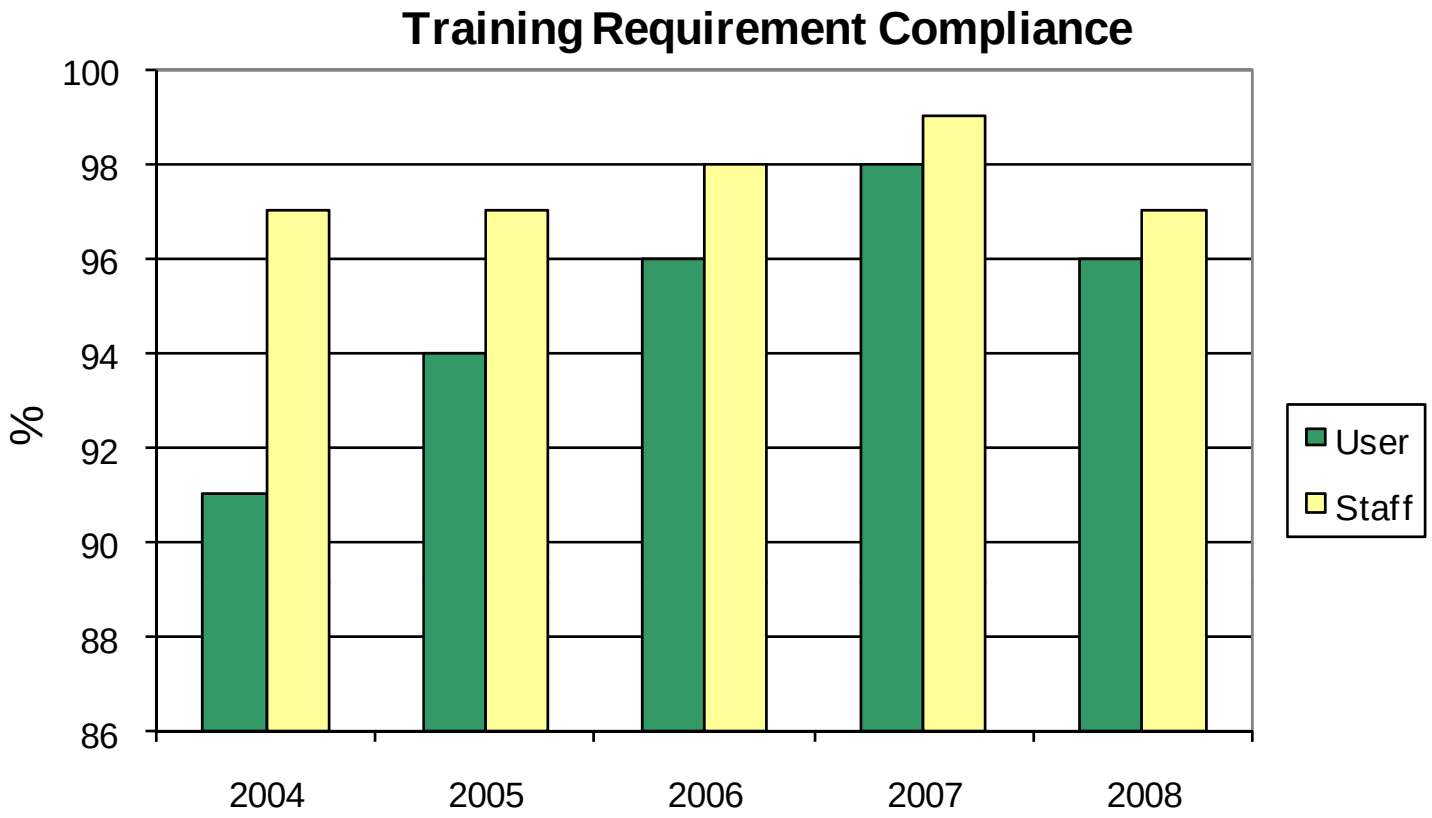
- Progress on ESH Targets
- Assessments and audits
- Tier I
- **Traffic violations**
- Training
- Injuries
- Incidents
- STOP Observations
- Radiation exposure
- Hazardous waste generation



FY05: 50
FY06: 32
FY07: 23
FY08: 17

ESH Performance Measures

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



~ 4500 Staff course requirements
~ 1800 User / Guest course requirements

FY08 Improvement

- NSLS & NSLS II policy *rewritten* (concise, easy to update)
- 'Read & Signs' moved to BTMS
- Questionnaire completed to include all risks = specific JTA's
- BLOSA / HPI upgrade completed

ESH Performance Measures

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

NSLS Injuries
FY08

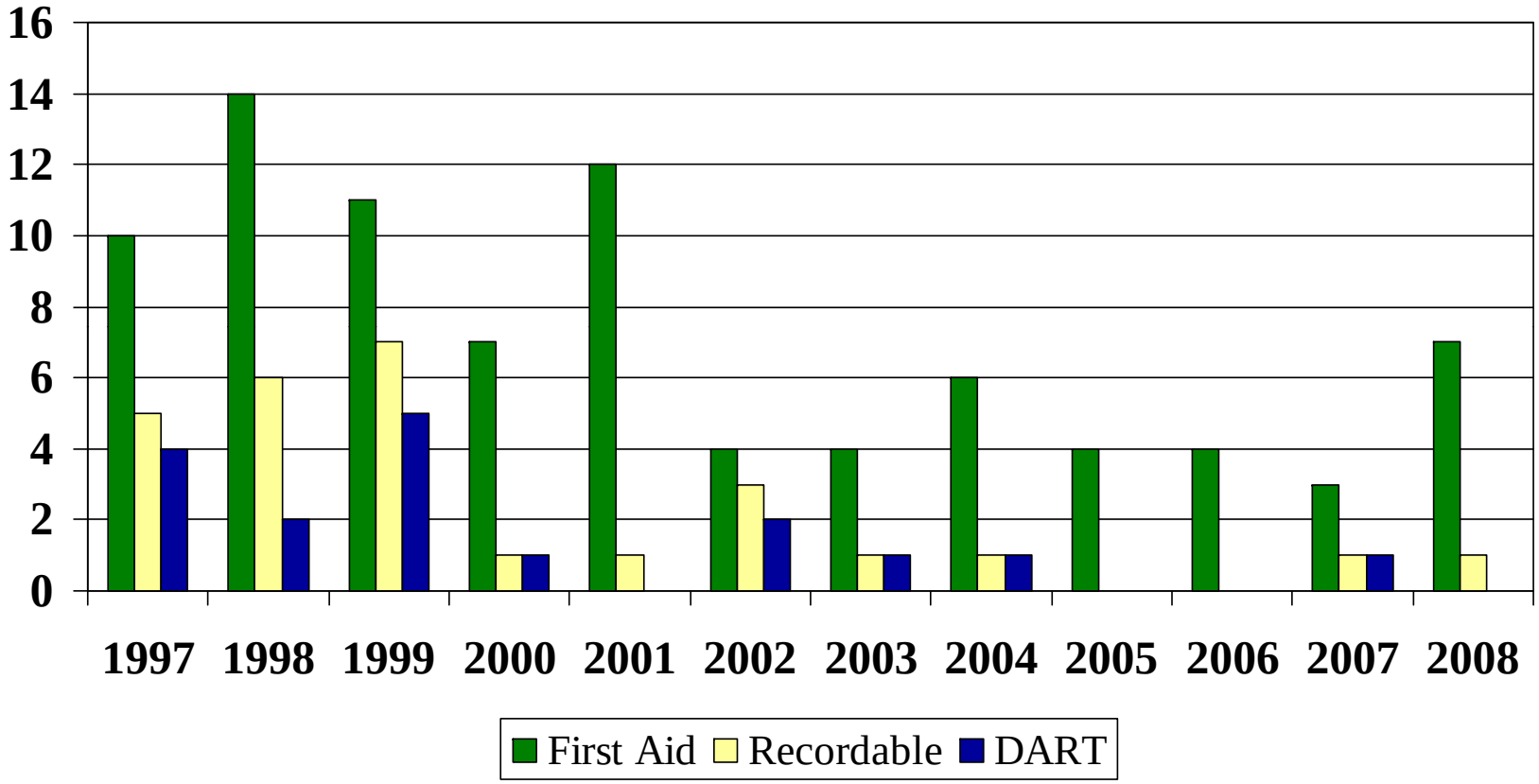
- 7 “First Aid” cases
  - Bumped elbow (hit desk drawer while turning chair)
  - Bumped chest (power supply tipped)
  - Bumped head (hit low shelf when standing)
  - Cut finger (microtome)
  - Burned hand (cold He release from Dewar)
  - Strained arm (pushed high equipment)
  - Strained chest (lift from poor position)

Users

- 1 “OSHA Recordable” case
  - Cut finger (cut finger with razor; sutures)
- 0 DART cases

- All investigated
- Corrective actions tracked in Family ATS

NSLS Injury Cases
FY 97 to FY 08



No DART 05, 06, 08

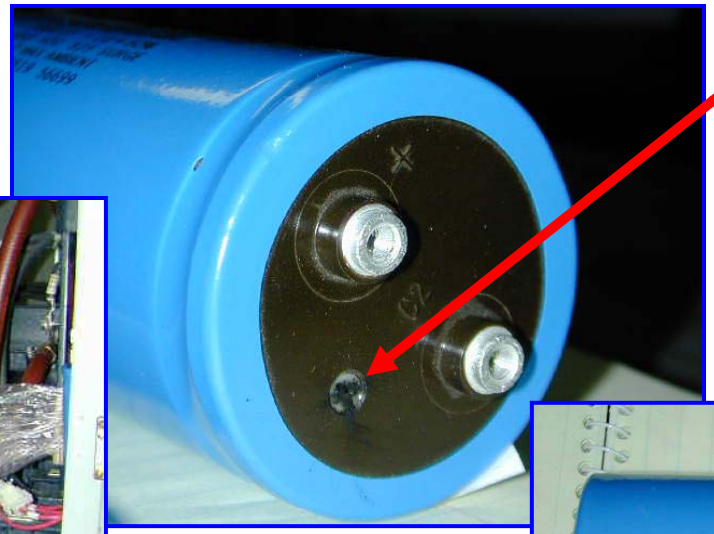
ESH Performance Measures

- Progress on ESH Targets
- Assessments and audits
- Tier I
- Traffic violations
- Training
- Injuries
- **Incidents (2 minor; no ORPS)**
- STOP Observations
- Radiation exposure
- Hazardous waste generation

Incidents

Booster quadrupole power supply capacitor failure

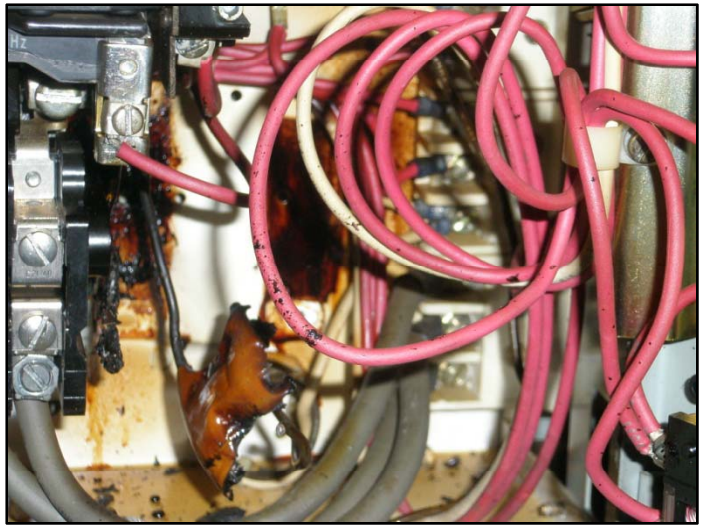
- Smoke (No Fire)
- Smoke alarm sounded bells; building evacuated
- Categorizer called: No report
- ‘Routine’ failure

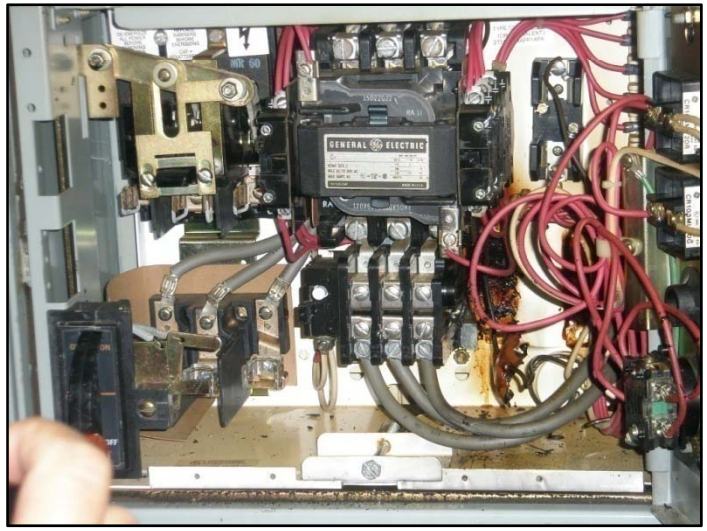


Incidents

Overheated transformer MER4

- Smoke (No Fire)
- Fire / Rescue notified; no evacuation
- Power interruption just before failure
- Motor Control Center (MCC) tagged out
- Adjacent MCC's returned to service after fire protection engineer inspection
- Categorizer called: No report





ESH Performance Measures

- Progress on ESH Targets
- Assessments and audits
- Tier I
- Traffic violations
- Training
- Injuries
- Incidents (2 minor; no ORPS)
- **STOP Observations**
- Radiation exposure
- Hazardous waste generation

STOP

- Chairman & 6 ‘Level III’ managers
- 100% met the goal (1 obs/month)
- 144 individual observations
- 3,625 minutes = 60.5 hours

1st place:	32	Murphy, Accelerator & Operations
2nd place:	26 (tie)	Kao, Chairman & Ackerman ESH&Q
3rd place:	19	Hulbert, Experimental Systems

ESH Performance Measures

- Progress on ESH Targets
- Assessments and audits
- Tier I
- Traffic violations
- Training
- Injuries
- Incidents (2 minor; no ORPS)
- STOP Observations
- **Radiation exposure**
- Hazardous waste generation

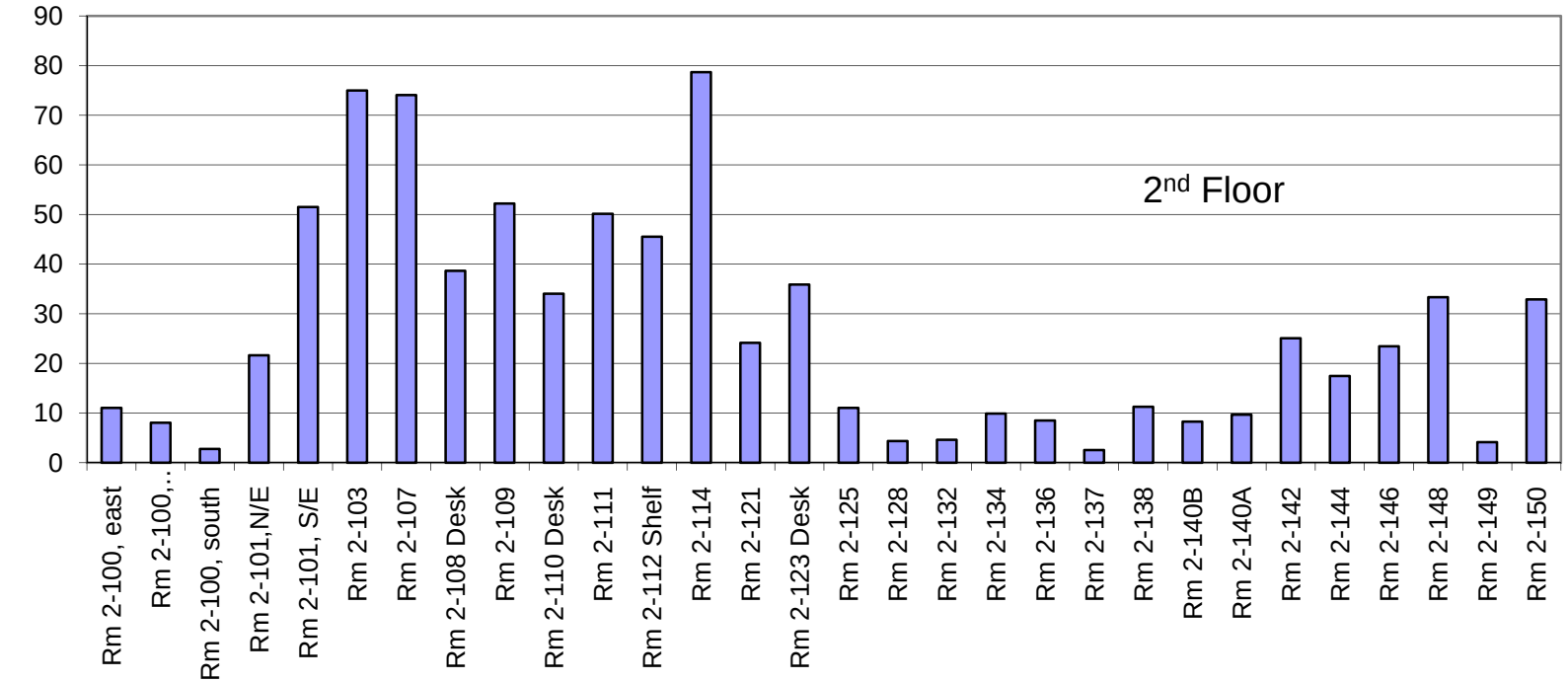
Radiation Monitoring

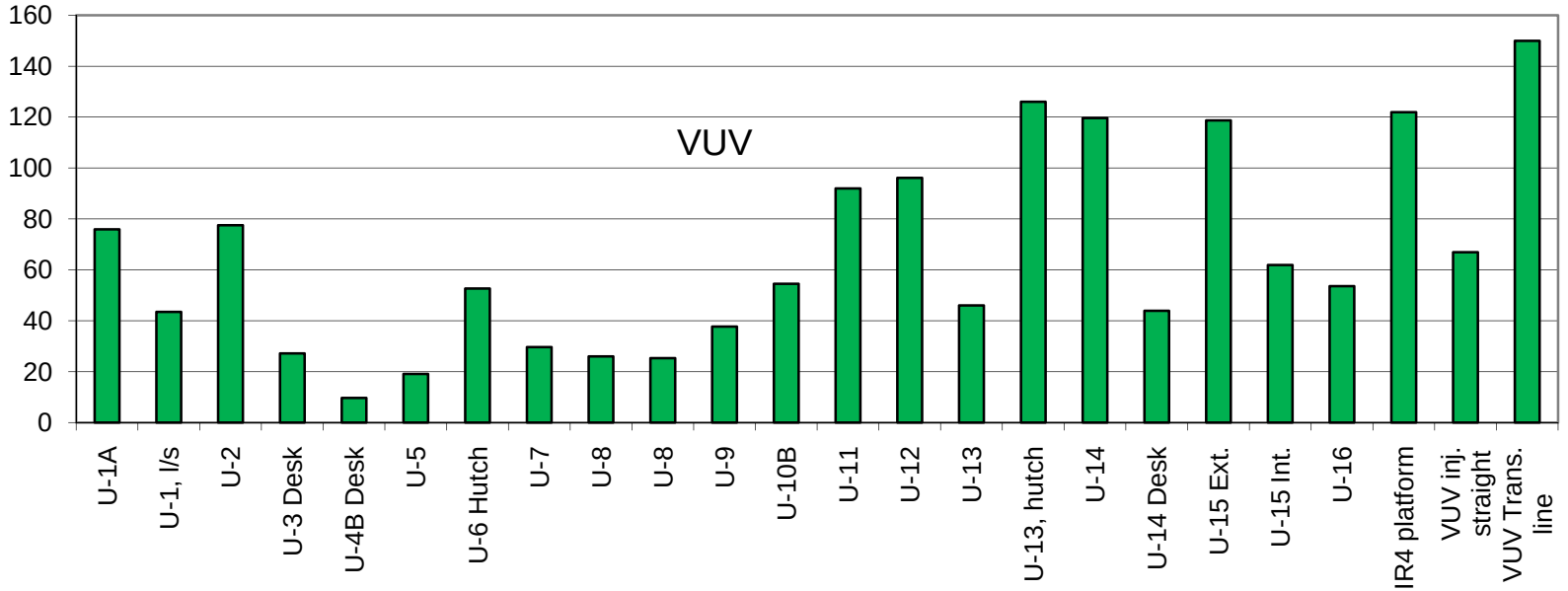
- Dose to personnel very low
  - Collective dose (through 8/2008) = **68 mRem** (33 N; 35 G)
  - Distributed over 2,334 badges
- Area monitoring continues
  - 25 Chipmunks
    - Read out and alarm; locally and in the control room
    - History files
  - ~60 TLD's distributed throughout the facility
  - 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

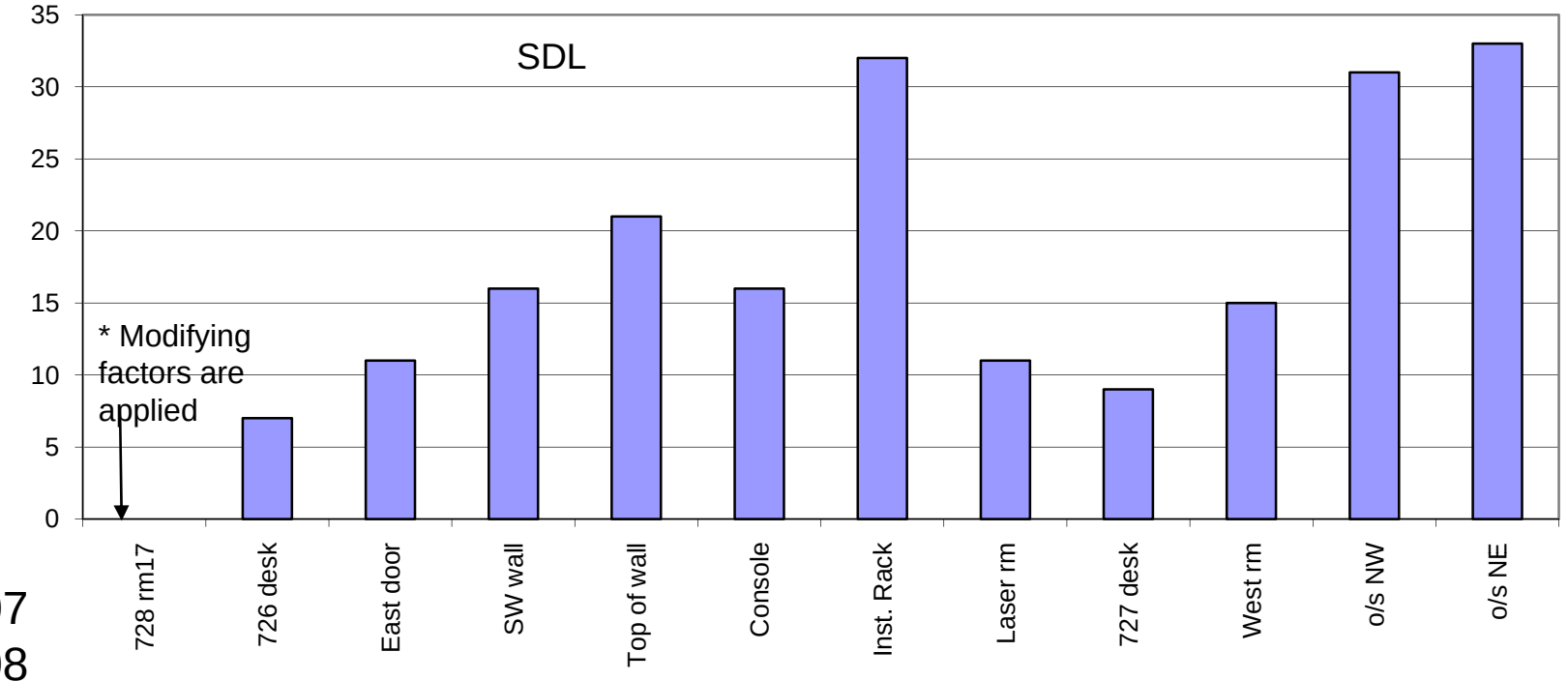
Borated Poly added to booster

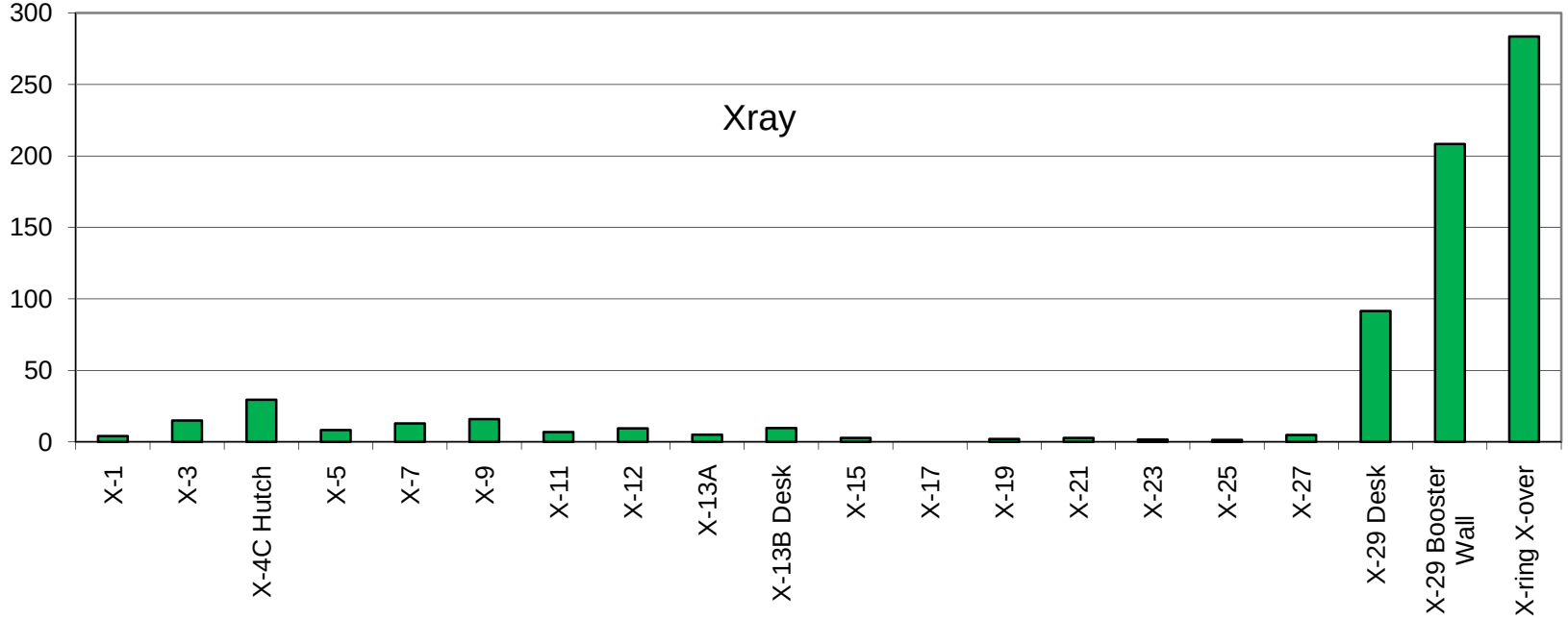
mRem
Qtr 3&4 07
Qtr 1&2 08





mRem
Qtr 3&4 07
Qtr 1&2 08

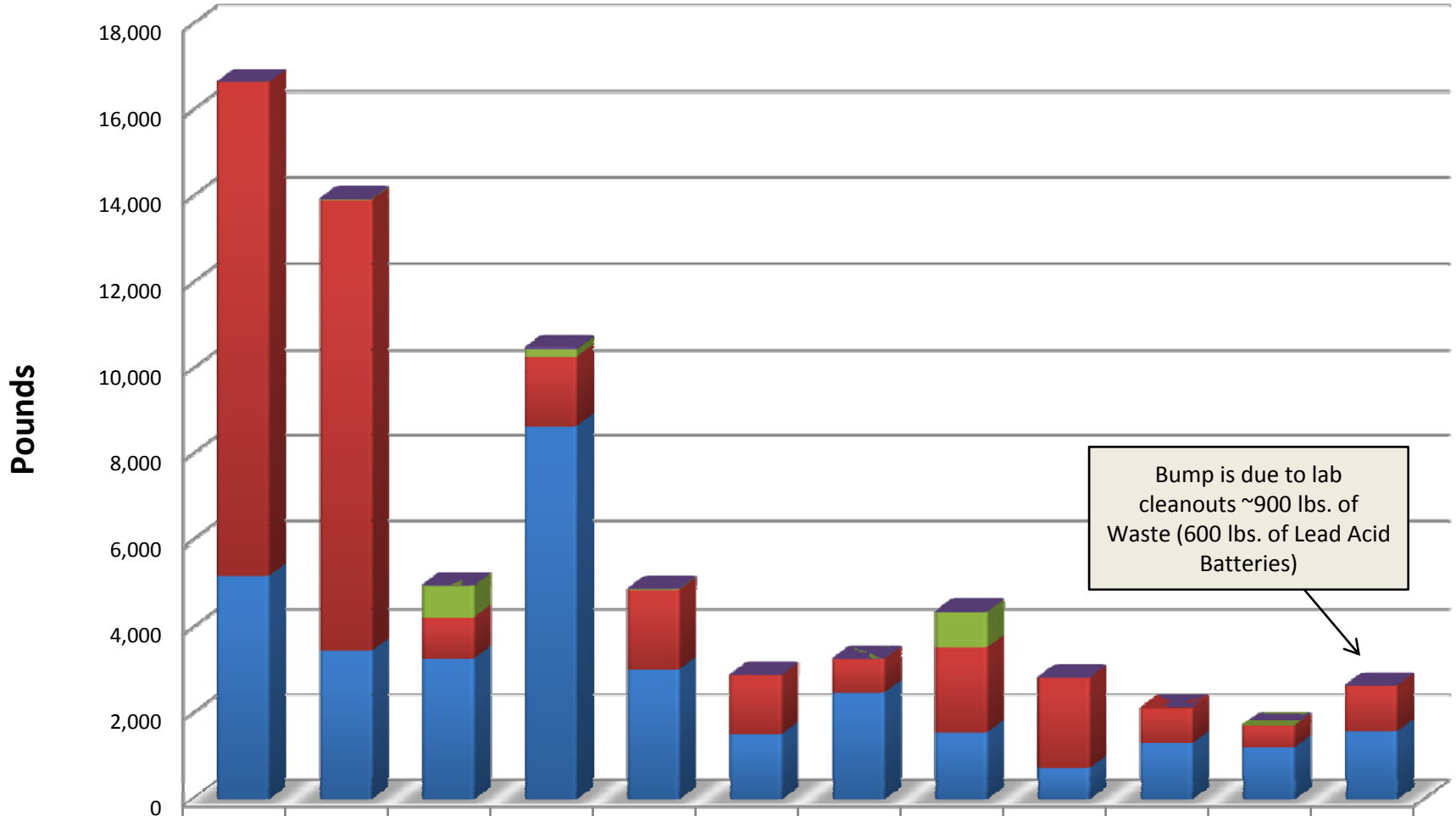




ESH Performance Measures

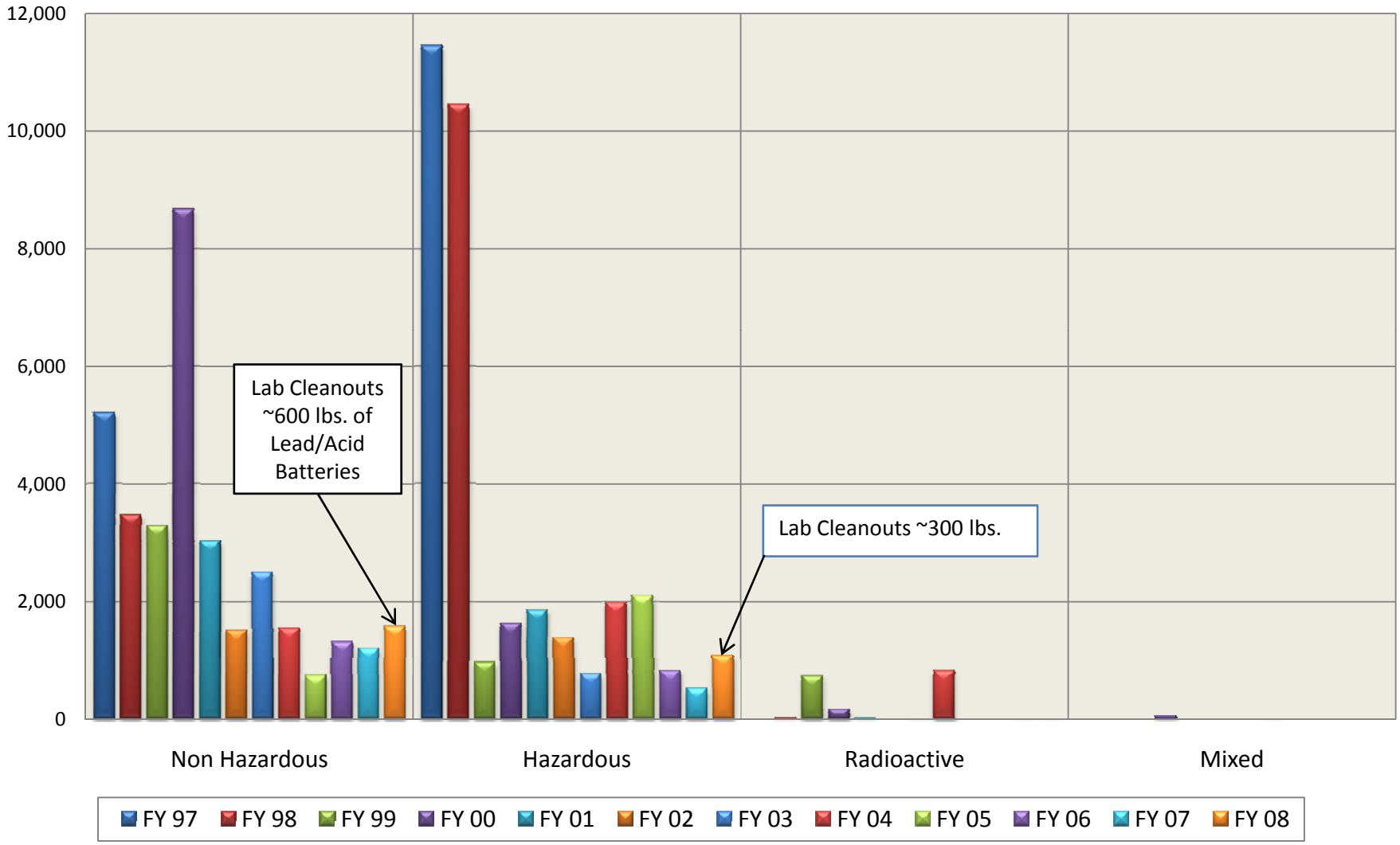
- Progress on ESH Targets
- Assessments and audits
- Tier I
- Traffic violations
- Training
- Injuries
- Incidents (2 minor; no ORPS)
- STOP Observations
- Radiation exposure
- **Hazardous waste generation**

NSLS Waste Totals by Year

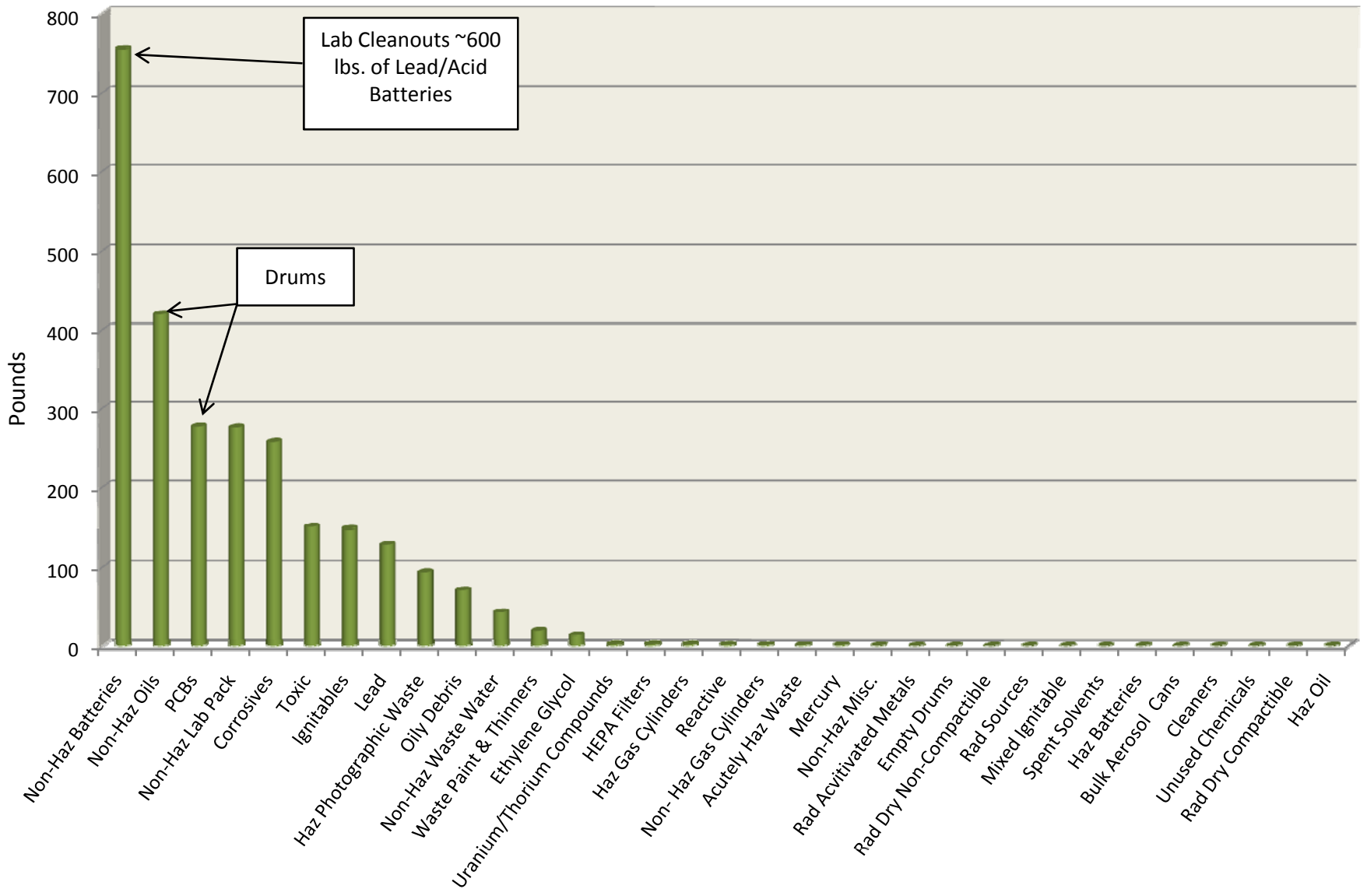


	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Mixed	0	0	0	50	0	0	0	0.06	0	0	0	0
Radioactive	0	20	738.1	174.1	16	0	1.76	830.07	0.001	0	3.91	2
Hazardous	11,445.6	10,446.3	962.4	1,626.2	1,850.8	1,386.7	777.3	1994.132	2105.47	823.93	519.62	1082.35
Non Hazardous	5,219.5	3,484.9	3,297.7	8,670.6	3,043.8	1,522.7	2,504.9	1558.43	742.42	1311.06	1205.69	1579.13

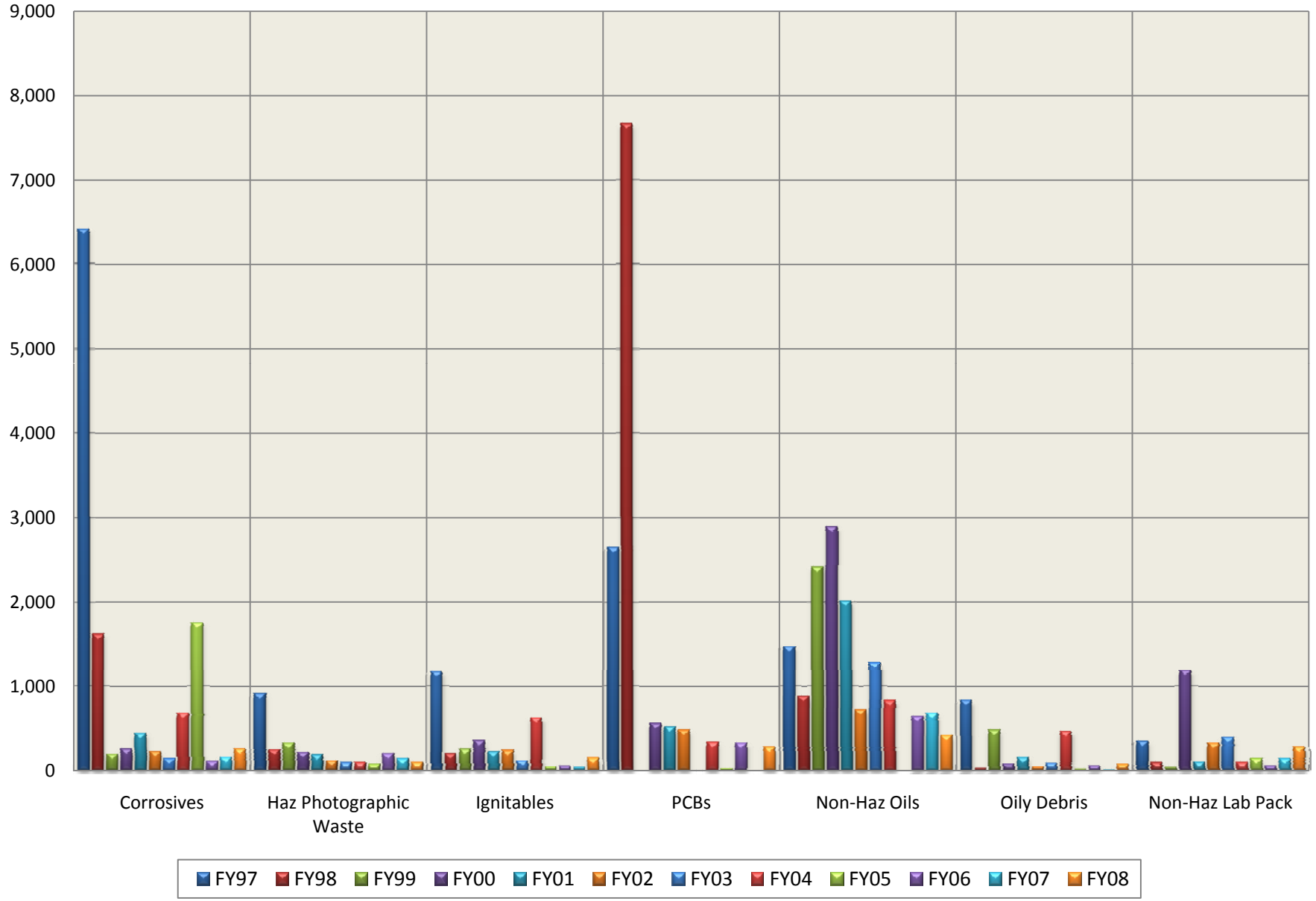
NSLS Waste History by Type of Waste in Pounds



Sorted Waste Streams



NSLS Waste Streams in Pounds



- NSLS ESH Management System
- ESH Performance Measures
- **Stakeholder Involvement**
- Financial Costs
- Targets for FY 08

Stakeholder Involvement
External

Active education program

- Users (103 Undergrads, 703 Grads, 467 Post Docs)
- Graduate Students (4 full time)
- Summer Students (11 Undergrad)
- University Workshop (2nd Annual HBCU)

Community Involvement

- “Take Our Daughters and Sons to Work”
- Summer Sunday
- 70 Facility Tours (Office of Education Programs)
- Vibrant, creative web site to tell our story (“Everyday Science”)

Our Sons & Daughters

Summer
Sunday

70 Volunteers; ~800 Visitors
14 ‘Hands-on’ displays

2nd Annual Historically Black Colleges & Universities Workshop

Stakeholder Involvement
Internal

- ESH presentations at Town Meetings
- ESH prominent at weekly User meetings
- Staff involvement in JRA & FRA development
- Safety Moments
  - Management meetings
  - Science / Professional staff meetings
  - Engineering staff meetings
- Staff involvement in ESH committees
  - ESH committee
  - Interlock Working Group
  - ALARA
  - Beam Line Review
  - ESH Improvement committee

- NSLS ESH Management System
- ESH Performance Measures
- Stakeholder Involvement
- **Financial Costs**
- Targets for FY 08

FY 2008 ESH Costs

Total Direct Cost	~ $675,000
(Not including NSLS ESH salaries)	

- RCD Program Costs
  - Personnel Support (~ 2.0 FTE) ~ $290,000
  - Dosimetry ~ $125,000
  - Instrument Calibration and Maintenance ~ $ 21,000
- EMS & OHSAS Implementation Costs
  - Laboratory overhead
    - ECR support ~ 0.3 FTE
    - SHSD support ~ 0.5 FTE
  - Direct charges for waste disposal ~ $ 43,000
- Misc
  - LDRD, G&A, Common costs ~ $166,000
  - PO's, Travel, Sensitive equip ~ $ 30,000

- NSLS ESH Management System
- ESH Performance Measures
- Stakeholder Involvement
- Financial Costs
- **Targets for FY 09**

ESH&Q Targets
FY09

Continued from FY08

- Implement recommendations from computer Energy Star report
- Survey compliance with Energy Star purchasing requirements
- Lab safety envelopes
- Lab Steward R2A2 implementation
- PPE requirements
- JTA assignment

New for FY09

- LOTO subject area gap analysis
- LHe transfer checklist implementation analysis
- Experiment sample CMS inventory requirements
- Beam line safety envelopes
- Human performance implementation
- Food on the floor requirements

Questions / Comments

Please sign the attendance sheet