

Management Review of Occupational Safety and Health (OSH), Environmental (E), Security (S) and Self Assessment (SA) Management Systems

Ed Lessard

Mike Bebon

Ray Karol

Mel Van Essendelft

Dave Passarello

Joel Scott

Senior Managers, Group Leaders and Supervisors

Collider-Accelerator Department
October 11, 2006

Introduction

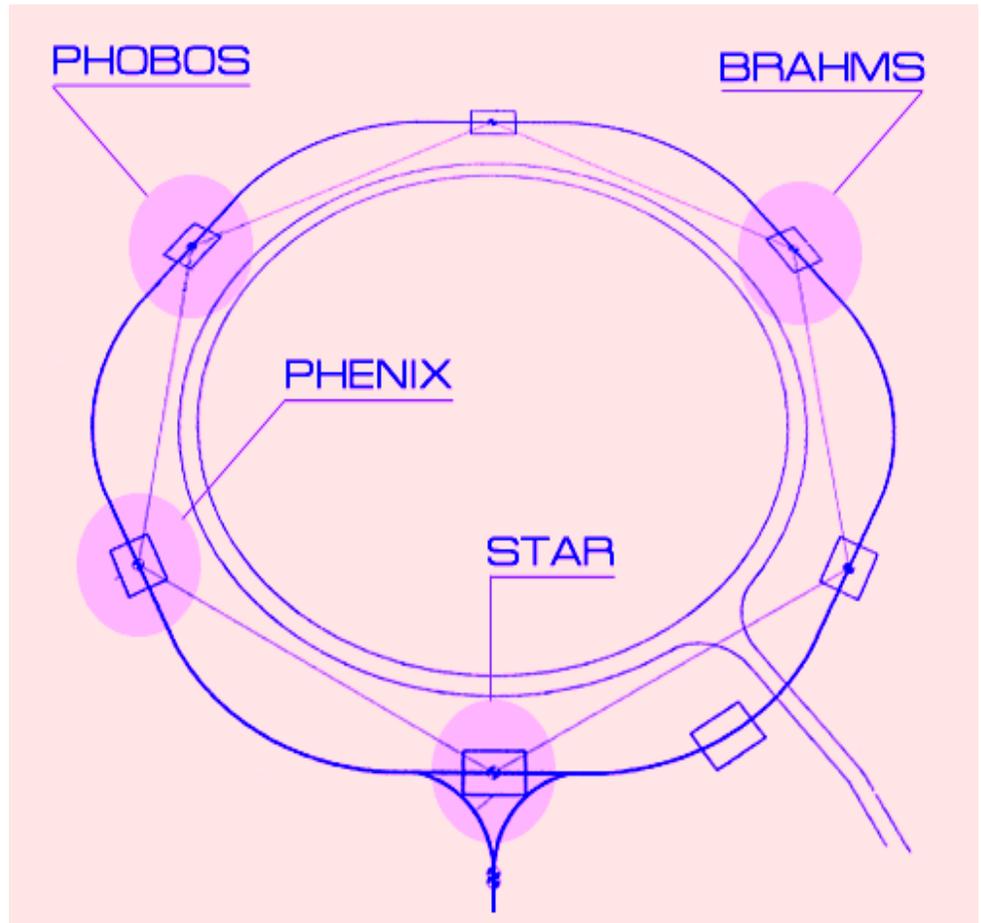
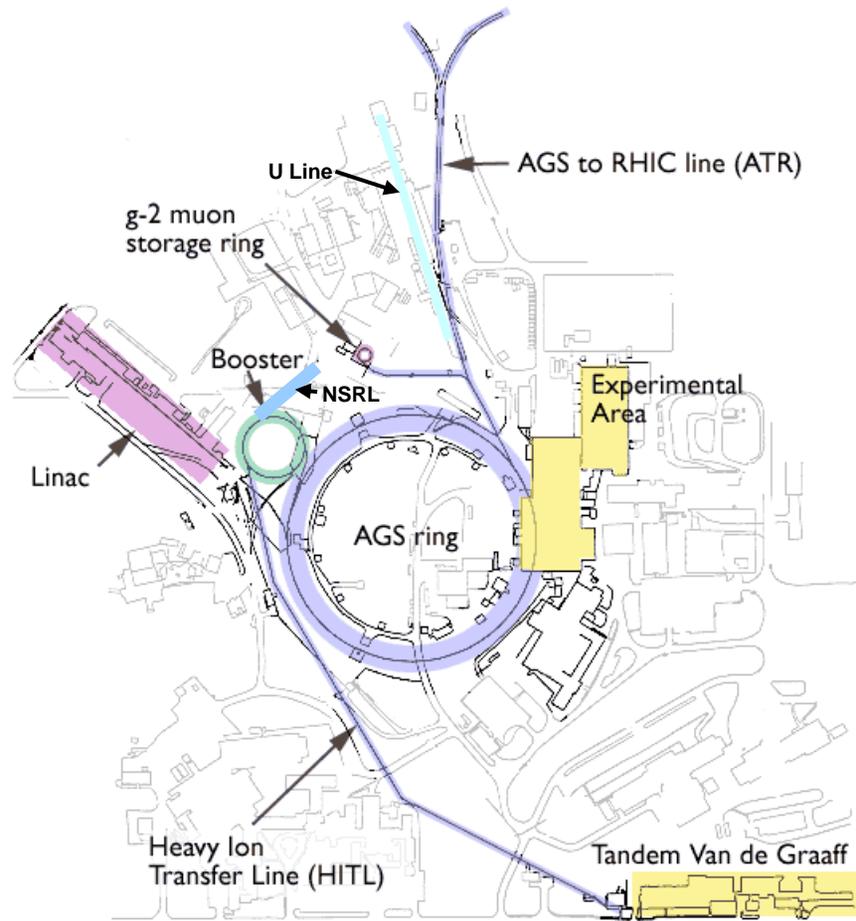
- C-AD Mission and Demographics
- Purpose of Management Review
- Agenda

C-A Department Mission

- **Mission**

- Develop, improve and operate ion accelerators
- Support the experimental program
- Design and construct new accelerator facilities
- Excellence in environmental responsibility and safety

C-A Department Facilities



C-A Department Workers and Users

Category	FY03	FY04	FY05	FY06
Scientific	48	49	48	51
Postdocs/Fellows	2	6	3	1
Professionals	158	144	130	122
Technical	227	196	185	172
Administrative	25	24	21	22
Users	1528	1348	1646	1576
Others (Students)	11	8	5	5
Total	1999	1775	2038	1946
C-AD Worker Total	460	419	387	369

Purpose

- Annually senior C-A management shall review its environmental, occupational safety and health. And security performance, both qualitatively and quantitatively, for the purpose of identifying key improvement opportunities in these management systems
- C-A managers shall conduct an annual review of organizational performance versus objectives and measures defined in their self-assessment program

Management Review Agenda

- Mike Bebon (ISM and Human Performance Programs in 2007)
- Ed Lessard (Performance on Objectives and Targets in 2006)
- Dave Passarello (Results of Audits, Security and Self Assessment)
- Ray Karol (Injuries, Tier 1, Concerns, Improvements, Initiatives)
- Mel Van Essendelft (Environmental Performance, Groundwater)
- Joel Scott (Waste Management Performance)
- Ed Lessard (Financial Investment in ESSHQ)
- Senior Managers and Others (Senior Manager Evaluation)

*Presentation to Collider Accelerator Department
Management Review*

**Upcoming Integrated Safety Management
and Emergency Management Reviews
&
Human Performance Initiative at BNL**

**Michael J. Bebon
Deputy Director for Operations
October 11, 2006**

Review of Two Key ES&H Programs Planned

- **Integrated Safety Management (ISM)**
 - The structure and processes we use to ensure we work safely
 - Last reviewed formally by DOE in 2000
- **Emergency Management**
 - The planning and response capability that ensures we protect people on and offsite from unplanned events
 - Last reviewed formally by DOE in 2004

Review Team

- **DOE's (newly formed) Office of Health, Safety and Security (HSS)**
 - Office of Emergency Management Oversight (HS-63)
 - Office of ES&H Evaluations (HS-64)
 - About 18-23 DOE persons and consultants; onsite for 2 weeks

Review Schedule: 2007

- **Combined Integrated Safety Management and Emergency Management Team**
 - Scoping Visit: May 8th & 9th
 - Planning Visit: August 6th – 20th
 - On-site Data Collection August 20th – 31st
 - Validation/Closeout September 19th – 21st

BNL's Preparations

- **Fall 2005 ISM Self Assessment**
 - Identified Gaps
 - Recommendations
- **Review Reports from other Sites**
- **Meet with DOE ES&H Evaluators**
- **ISM/Safety Improvement Plan (5/06) addresses:**
 - ISM Self Assessment findings & recommendations
 - Ongoing corrective actions (e.g. Material handling)
 - DOE mandates (e.g. Worker Safety Rule, NRTL)
 - Arc Flash Type B restart actions
 - BNL initiatives (e.g. work observation)

Expected Emphasis Areas

■ **ISM**

- Institutional Feedback & Improvement
- Work Planning and Control (“all work is planned”)
- Electrical Safety
- Subcontractor Safety
- Corrective Action Management

■ **Emergency Management**

- Hazards Surveys & Analyses
- EOC Operations
- Emergency Response Organization - Integration

How are we doing? – Lots of Progress!

- **ISM**

- Lab Strategic Plan and Annual Lab Plan
- Quarterly Performance Reporting
- ISM flow-down to subcontractors
- Events/Issues management process
- Arc Flash corrective actions

- **Emergency Management**

- Hazards Surveys & EPHAs (Hazards Analyses)
- Emergency Action Levels/Protective Action Guides
- ERO Training
- New EOC

But much more to do in both areas!

Human Performance Initiative

- Basic idea: We all make mistakes (actually about 5 per hour!)
- Organizational weaknesses and error - likely situations lead to incidents/injuries
- Look at how we as managers put people in a situation where they make logical choices that lead to incidents/accidents
- Most of our injuries are related to judgments and decisions our people are making

Human Performance Initiative

- Used in Arc Flash Investigation – Fisher Technologies/BNL/INL Team
- Follow - on working session August 06
 - How do we integrate HPI into the way we do work?
- Next steps:
 - White paper for Lab Director on roll-out strategy
 - Develop in-house expertise through training
 - Start with a few key functions

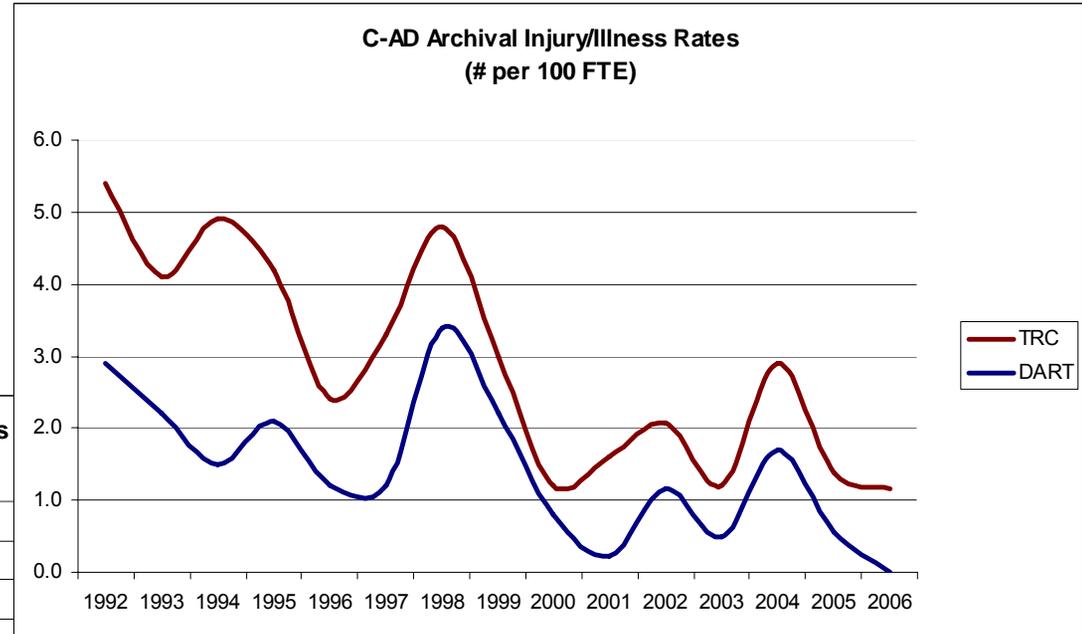
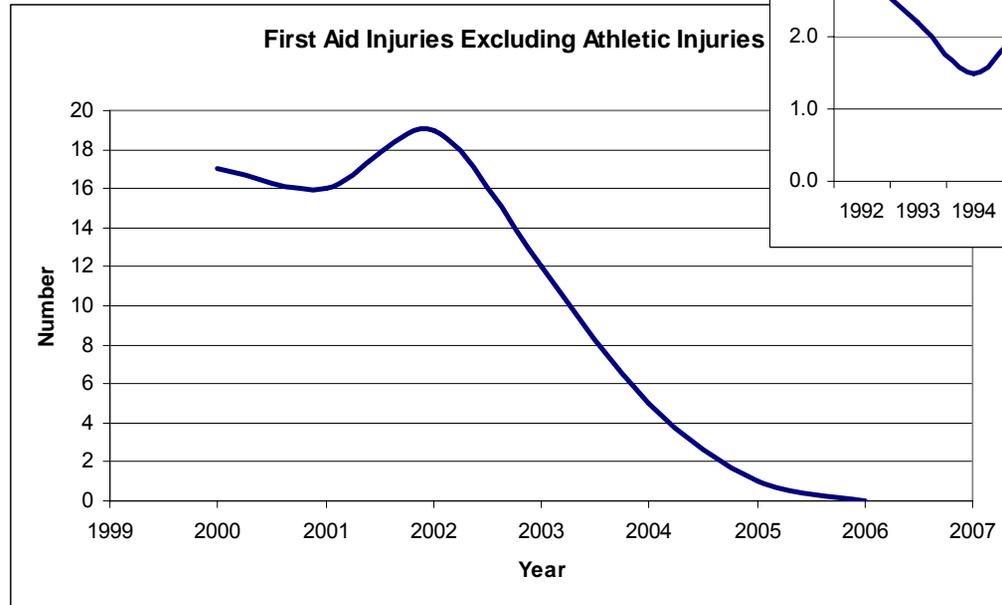
How can you help? A few thoughts...

- Focus on work planning
 - Emphasize “all work is planned” (at some level)
 - Be mindful of changes
- Don’t let time pressures get in the way of safety
- Encourage worker feedback and use it to make improvements
- Follow up on corrective actions and ensure they are closed out; go back later and evaluate if they worked

Ed Lessard

- What was the performance on FY06 objectives and targets?

Congratulations on Injury Performance



Format of Slides on FY06 Objectives and Targets

- Objective is given in slide title
- Black letters mean target may or may not have been accomplished or it may be significant in FY07
- Grey letters mean target was accomplished or nearly accomplished

FY06 OSH Targets for Implementing OSH Items from Prior Management Review

- Reduce injuries toward zero, DART ≤ 0.35 and TRCR ≤ 0.87
 - Met DART goal, did not meet TRCR goal
- Finish repairing roof over Building 912
 - Further repairs on hold
 - Estimated cost is \$1,700,000 for roof over EEBA
 - Example issue: water leaks onto 480 V crane rails
- Perform arc flash calculations, as per NFPA 70E
 - Data gathered, consultant hired; all done by 2008; STAR and PHENIX first
- Achieve OHSAS 18001 re-registration
 - Done June 2006
- Reduce repeated types of OSHA violations. The goal is zero repeats
 - Overall trend is down but unsafe behaviors observed (blocking breakers)
- Perform more baseline industrial hygiene surveys in FY06
 - About 70% of IH baseline studies completed

FY06 OSH Targets for Implementing OSH Items from Prior Management Review

- Promote the understanding of just culture; reduce reluctance to report
 - Implemented OPM 1.26.1 Criteria for Application of Disciplinary Action
 - Implemented OPM 1.26 Standards for Disciplinary Action
 - Implemented Manager Walk Around Program
- Implement ergonomic methods to reduce potential injuries
 - Design Group done plus 4 requests done
- Remove potential sources of beryllium exposure
 - Survey completed; one suspect item removed
- Promote the advantages of periodic physicals at OMC
 - Done by default because we have so many required medical surveillances
- Capture required medical surveillances and JAFs in BTMS database
 - Done for required protocols (Pb, noise, ODH, material handling, etc.)

FY06 OSH Targets for Implementing OSH Items from Prior Management Review

- Improve housekeeping programs
 - Trend is improving; mixed results, not near management expectation
- Review worker planned jobs to ensure that they are low hazard jobs
 - Retrained work planners and workers in work planning
- Request the OMC to use electronic forms for the JAF
 - Done
- Improve the pre-job briefing program to help reduce errors and injuries
 - 2-hour Human Performance training used to improve pre-job briefings
- Increase ESHQ productivity by streamlining management systems
 - Combined OSH, E and SA to extent practicable; integrated ISM

FY06 OSH Targets for Implementing OSH Items from Prior Management Review

- Establish targets for preparation for the ISM review
 - BNL and C-AD have ISM project plans in place; ISM expected 8-07
- Establish targets to address removal of aging cable in the AGS Ring
 - Summer cable project removed small fraction; ongoing project over years
- Support the use of RCTs to perform IH baseline work
 - RCTs trained and participated in IH baseline surveys
- Request the Lab to ensure that Skill of the Worker jobs are low hazard
 - SBMS Form Screening Guidelines for Work Permit Determination was updated
- Coordinate and closeout OSHA violations with PE
 - 96% fixed or mitigated; 4% pending with PE - on track to be closed
- Establish targets to prepare ERL and EBIS authorization documents
 - ERL SAD/ASE by 12/07 and EBIS SAD/ASE by 6/08

FY06 OSH Targets for Implementing OSH Items from Prior Management Review

- Reinforce worker involvement
 - Examples: all hands input on 10 rules, Security Committee, Safety Week
- Perform post job reviews and solicit worker feedback on work permits
 - Supervisors are recording examples of feedback for worker planned work
 - Green Work Permit being used for feedback for moderate and high hazard jobs
- Request the Laboratory to identify, prioritize, and track Tier 1 violations
 - C-AD now reports Tier 1 findings to BNL's QMO
- Institute an annual Safety Week similar to the one performed in FY05
 - Safety Week held in January/February 06; 136 issues raised
- Improve the C-AD worker self-evaluation program
 - Reduced number of annual evaluations; 6 done in 2006 with good quality

FY06 OSH Targets for Implementing OSH Items from Prior Management Review

- Establish targets to comply with 10CFR851
 - Gaps identified at lab level; major actions for C-AD are:
 - Identify and gather documents for existing pressure systems
 - Identify facility/equipment violations not previously found by OSHA team
 - Complete IH baseline monitoring
 - Complete material handling equipment inspections (e.g., cranes)
 - Complete Fire Hazard Analyses
- Request Lab combine multiple OSH management systems
 - Several management systems planned to be combined at Lab level
- Review Facility Use Agreements and update as necessary
 - 30% updated at C-AD; rate is 6 per month

FY06 OSH Targets for Implementing OSH Items from Prior Management Review

- Request the Lab establish performance measures to improve fire protection, speed fire protection improvements, provide a real commitment for fire alarm/detection upgrades
 - Replaced several fire alarm panels (Bldg 921, 555, 515, 449); ~ \$500k
 - Completed 3 Fire Hazard Analyses with outside contractors (555, 911, 463)
 - 53 more need to be performed on site and funding has not been assigned
 - Performed a 10 CFR 851 Gap Analysis that identified fire protection issues
 - Identified ~ 50 million dollars of corrective work
 - Resolved severe problems with the communications system; ~ \$100k
 - Started to design a replacement network to integrate fiber optics and wire
 - BNL can integrate Security, Energy Management and Fire into one system
 - Saves money, decision will be made in the future by BNL management

FY06 OSH Target for Reducing Accidents and Illnesses

- Explore a method to investigate *near misses*
 - C-AD will use the new Event/Issues Management Subject Area

FY06 OSH Target for Closing Newly Identified OSHA Violations

- Track newly self-identified pre-existing conditions
 - C-AD database established by Passarello, Cirnigliaro, Nehring
 - Hundreds of items to date from 912, Westinghouse and part of 911
 - Plan is to complete database by 1-1-07
 - No attempt to identify funding
- Track closure of identified OSHA findings that do not have funding
 - All OSHA identified findings have funds to fix or mitigate

FY06 OSH Targets for Building OHSAS 18001 Policy Awareness

- Provide OSH awareness initiative at all staff levels
 - Annual OSH/EMS forums held for all staff in 2006
- Have staff take the OSH training course, TQ-Safeaware
 - 250 took course, remaining staff took equivalent C-AD training

FY06 OSH Target for Emphasizing Traffic Safety

- Promote traffic-law compliance
 - Occasional time meeting safety topic
 - Weekly meetings, 5-minutes on safety suggested topic

FY06 OSH Targets for Emphasizing Safety Solutions Program

- Submit two safety solution project proposals 1-31-06
 - Three projects submitted to BNL S2 Program, none funded
 - One funded by C-AD; noise wall at STAR
 - Hanging hardware is purchased; contractor asked for more time
 - Total cost to C-AD will be \$25,000

FY06 OSH Targets for Improving Industrial Hygiene Program Compliance

- Participate in surveillance programs initiated at the site level
 - Done for Confined Spaces, Interlocks/LOTO and Pb Assessments
- Support the closure of IH Assessment Corrective Actions
 - Corrective Actions assigned to C-AD are closed or on track

FY06 OSH Targets for Implementing NRTL Program

- Evaluate and document progress of 5-year NRTL Plan
 - Database created and barcode system in place
 - About 1000 electrical items in 15 'classes' identified
 - 364 items bar-coded and recorded in database
 - 20,000 items in 400 'classes' estimated
 - Plan to do several 'classes' per week
 - Will meet 5-year plan but may need more inspectors
- Complete training of C-AD NRTL inspectors
 - 8 staff trained as inspectors
- Involve inspectors in experimental reviews and projects
 - Inspectors examined experimental and project equipment

FY06 OSH Target for Improving Communications

- Submit OSH examples to the lessons learned program
 - Arc-flash event lessons learned in development
 - Fisher Associates did Human Performance lessons learned

FY06 E Targets for Improving EMS

- Request Lab reinstate an expedited review of new SBMS documents
 - Expedited review implemented but does not involve cross-BNL groups
 - Department Chairs and Division Managers must review as individuals
- Achieve ISO 14001 re-registration
 - Done June 2006
- Provide an EMS awareness initiative at the supervisor and staff level
 - Annual OSH/EMS forums held for all staff in 2006

FY06 E Targets for Achieving Compliance with Applicable Environmental Requirements

- Identify one Class I or Class II Ozone Depleting Substance (ODS)
 - 9 of 18 di-chloro di-fluoro methane cylinders behind 912 removed
- Identify replacements for mercury containing devices; prepare P2 requests
 - 10 of 300 mercoird relays replaced; expensive
- Conduct a review of all solvent use, specifically methylene chloride
 - Vacuum Group found to use one product; group trained; we collect empty cans
- Evaluate effectiveness of corrective actions on Tank inspection forms
 - Done, actions effective
- Identify at least one legacy waste and disposition by 9/30/06
 - Three done: PCB caps, old magnets, 1800 ft³ of LLRW
- Communicate Satellite Accumulation Area requirements 4 times per year
 - Communications occur monthly and periodically at Supervisors meetings

FY06 E Targets for Integrating P2 Into Work Planning Processes

- Reduce the number of spills
 - Minimized the practice of parking on non-paved surfaces
 - Held staff meetings on reducing hydraulic oil spills
 - Helped ensure hydraulic hoses are inspected periodically
 - Held meetings on spills linked with overfills due to thermal expansion
 - C-AD had zero spills in FY06
- Target one Department specific waste stream for reduction
 - PCB caps at Linac/Seimens/912; to be complete next year
- Submit pollution prevention project by 12-15-05
 - Propane cylinder de-valver submitted
- Submit success stories by 9-15-06
 - Aerosol can puncturer - 1000 cans
 - Cryo plant project reduces energy consumption
 - Water systems with variable frequency drives reduces energy consumption
 - Continued the reduction of PCB containing devices

FY06 E Targets for Improving Communications and Trust

- Assist the Lab in promoting environmental successes at C-AD
 - BNL received national award for reducing mercury waste and PCBs
 - Linac staff received BNL Environmental Stewardship Award for reducing PCBs
- Highlight environmental improvements in publications
 - Annual C-AD Newsletter
- Assist the Lab in maintaining continuous public outreach
 - Outside groups, CAC and BER, informed on g-2 progress

FY06 E Targets for Fully Implementing Groundwater Protection Program

- Design, operate, and maintain facilities while protecting groundwater
 - SEM was drained and air dried; reconfigured system to reduce volume
 - Drained, dried and refilled ATR system with clean water; added PLC
 - Special Ejection System drained and dried; added warm snake to reduce SEM
 - Fast Pulse System partially drained and filled with fresh water
 - Linac Chilled Water partially drained and filled with fresh water
 - Linac RF drained and air dried
 - All water from these systems evaporated at tankers in 974
- Archive data on activated soils
 - Fixed target (Building 912) calculations completed

FY06 E Targets for Fully Implementing Groundwater Protection Program

- Ensure the Focused Feasibility Study (FFS) addresses monitoring the g-2 plume and reduced risk of plume in future
 - Five alternatives were presented to regulators in the FFS
 - BNL preferred alternative was presented as strongest candidate
 - Costs about \$1,000,000 over next 20 years
- NYS has voted yes on preferred alternative
- EPA and SCDHS vote expected soon

FY06 E Targets to Ensure Responsible Stewardship of Natural and Historical Resources Onsite

- Specify the use of native vegetation where feasible in landscaping around buildings
 - No opportunities in FY06

FY06 E and OSH Targets at SMD Completed in 2006

- Recycled excess electronic equipment
- Drained heat transfer fluid from short coil press
- Reviewed Facility Use Agreements (FUAs) and updated as needed
- Performed post job reviews and solicited worker feedback
- Performed periodic housekeeping

Dave Passarello

- Security
- Assessments
- Questions answered
 - What were the internal assessments about?
 - What were the external assessments about?
 - What are results?
 - How are findings dispositioned?

Material Security Issues

- What were the drivers
 - Two copper incidents
 - Security Assistance Report issued by DOE Chicago Safeguards & Security Office

- C-A Security Committee
 - Established
 - Security Plan Developed
 - Action Items Assigned

Material Security Issues

- Security actions
 - Consolidate all valuable materials into a few buildings
 - 918, 926, 974 and 924, 940 cable yards
 - Implement security systems for the 5 secure areas
 - Develop workable database of C-A valuable material
 - Investigate valuable material unique marking systems
 - Develop security awareness training
 - Establish system addressing worker concerns/ideas

FY06 Self Assessment Program

Objective: Provide a systematic approach to performance management

- Identifies EMS/OSH/QA and facility performance objectives
- Facilitates tracking of identified improvement actions

FY06 Self Assessment Metrics

- Leadership Commitment and Involvement
- Human Resource Development
- Customer Focus and Satisfaction
- Process Management
- Business and Operational Results
- Compliance Requirements

FY06 Required BNL Program Assessments

■ C-A required to assess implementation of the following BNL programs:

- Shelter-in-Place
- Status of Records Inventory
- Lock-Out / Tag-Out
- Interlock Safety for Protection of Personnel
- Regulatory Compliance
- EMS
- OSH

C-A 2006 Internal EMS/OSH Assessment

Purpose: Determine whether C-A and SMD's EMS/OSH Management Systems and their elements are in place and implemented

Results:

- EMS: 6 minor nonconformances identified & addressed.
- OSH: 1 minor nonconformances identified & addressed

FY06 External Assessments

BNL

- Document Control
- ISM Readiness Review
- Radioactive Waste Management
- Self-Assessment Program

NSF

- ISO 14001 surveillance audit
- OHSAS 18001 surveillance audit

FY06 External Assessments

DOE

- Arc Flash Event at BNL

BHSO Independent Assessments

- ISM (2004)
- OSHA Corrective Action Completion

BHSO/BSA Collaborative Assessment

- Welding
- Shelter-in-Place

BSA Self-Assessments With BHSO Observation

- Confined Space
- Environmental Monitoring
- Interlock/LOTO
- Lead
- Non-ionizing Radiation Assessment
- Radiological Work Planning

Status of Action Items

■ Internal (Family ATS)

- Issued 872 (1110 with ERL and EBIS hazard screens)
- Percent Closed 58%

■ External (Institutional ATS)

- Issued 22
- Percent Closed 91%

Closeout Process for Assessments

- Actions assigned to accountable individual(s)
- Internal action items entered in Family ATS
- External action items entered in Institutional or Family ATS
- Closeout requires concurrence of ESHQ Management

Ray Karol

- Illness/Injury performance
- Stakeholder concerns
- Major OSH/EMS Improvements
- S2 and P2 initiatives
- Tier 1 results
- Self-evaluation program
- Radiological Performance

Occupational Injuries in FY06

Organization	DART Rate per 100 FTE <i>BNL Goal <0.35</i>	TRC Rate per 100 FTE <i>BNL Goal <0.87</i>
C-AD	<i>ZERO!</i> 0 cases	<i>1.2</i> 4 cases
BNL	<i>~0.5</i> 12 cases	<i>~1.4</i> 33 cases

C-AD Days Away Restricted Duty (DART)

No Cases in FY 06

- As of today, we have gone **642** days without a DART
- Passed 1,000,000 hours without DART at end of 8/06

How do we measure our performance?

- Since DART slope is now zero are we doing the right things or are we lucky?
- Need to develop forward looking indicators
- Thoughts:
 - The % of senior management performing safety observations
 - The annual number of safety observations being performed/100 FTE
 - The annual number of pre-job briefings per 100 FTE
 - The annual number of supervisor hours spent in the field per 100 FTE
 - The % of supervisors and workers on Tier 1 Teams
 - The annual number of safety-related awards per 100 FTE

C-AD Recordable Cases

4 Cases in FY 06

- Stitches in cut shin while climbing ladder
- Arc flash injury – 1st and 2nd degree burns
- Hearing Shift
- Cracked index finger when hit with mallet

C-AD First Aid Cases

No First Aid Case in FY 06

- Had three recorded as first aid but spoke to BNL SHSD in Spring and determined that they should follow OSHA criteria so we reduced our cases from 3 to zero

Stakeholder Concerns

- Community
 - g-2 tritium plume
- Regulators
 - g-2 tritium plume
 - 10 CFR 851 regulations
- Activists
 - None

Major OSH/EMS Improvements

- Upgrades from Arc Blast event
 - Replacing GE Spectra switches
 - Arc blast calculations
 - Implemented improved electrical PPE
 - Remote ground monitoring at MCR/CAS
- Issued Discipline Policy and Just Cause OPMs
- Introduced staff to Human Performance
 - Disciplined approach to work planning and feedback
 - Trained ~325 staff in four two hour sessions
- Issued OPM on Pre-job Briefing, Walk Downs and Post-Job Feedback (human performance)
- Reviewed new expectations in work planning for skill-of-worker tasks with all work planners

Major OSH/EMS Improvements

- Correcting OSHA findings
- Ergonomic reviews increased
- NRTL program being implemented
- Formed Standing C-AD Security Committee
- Un-needed materials and chemicals inventoried and scheduled for disposal
- Continued reduction in PCB inventory
- IH Base lining

FY06 Safety Solutions (S2) Proposals

- FY05 S2 completed in FY06
 - Lighting over machine shop at 1005S
 - Defibrillators at STAR and PHENIX
- Submitted 3 in FY06, none funded

FY 06 Pollution Prevention

- Propane Cylinder De-Valver
 - Over 50 cylinders for over \$15,000 saving to date
- Water System Group installed variable speed drive on main magnet water and a TVDG pump for shutdown energy savings
 - Saves \$30,000 per year
- Aerosol Can Puncturer
 - Over 1000 cans for a \$20,000 savings to date
- Reduced RHIC refrigerator load by 2.1 MW (\$3500/d) – Phase 3
(previous phase 1 and 2 upgrades saved 2 MW)
- Reduced baseline electrical load during shutdown by about 0.9 MW (\$1570/d)

FY 06 Pollution Prevention

- Tritium inventory reduction through draining and refilling of cooling water systems
- Recycle metals to Crestwood during cleanup
 - About 20 roll-offs or 35,000 ft³
- NSRL photo-processing stopped
- Continued Hg reduction (EPA program)
- BNL received EPA National Partnership for Environmental Priorities Award for Hg and PCB reductions
- Saved 100 ft³ waste by having Waste Technician sort waste

C-AD Tier 1

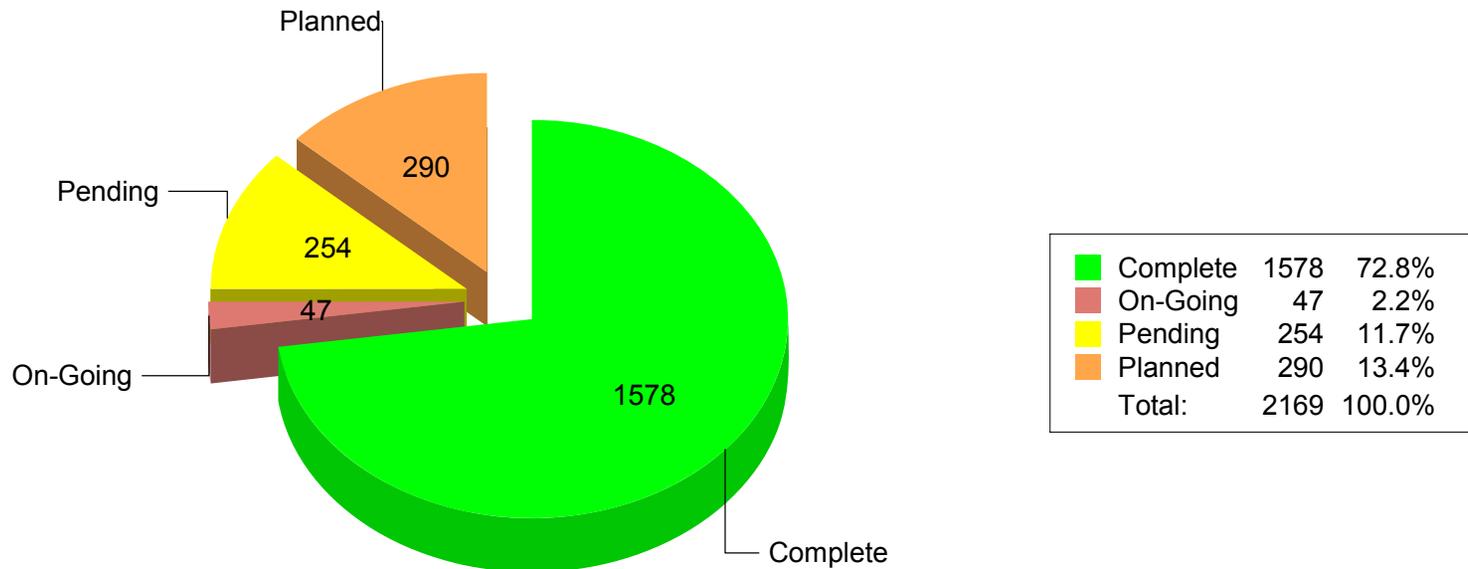
- Tier 1 inspections are similar to OSHA inspections
- Weekly Tier 1 inspections cover over 120 buildings
- Findings tracked in ATS

C-AD Tier 1 Process

- Reports distributed after inspection to all staff
- Findings assigned to responsible individual
- 36 Tier 1s conducted in FY06

Status of C-A OSHA Corrective Actions End of FY05

OSHA Abatement Status (Number of Instances)



C-AD assigned 647

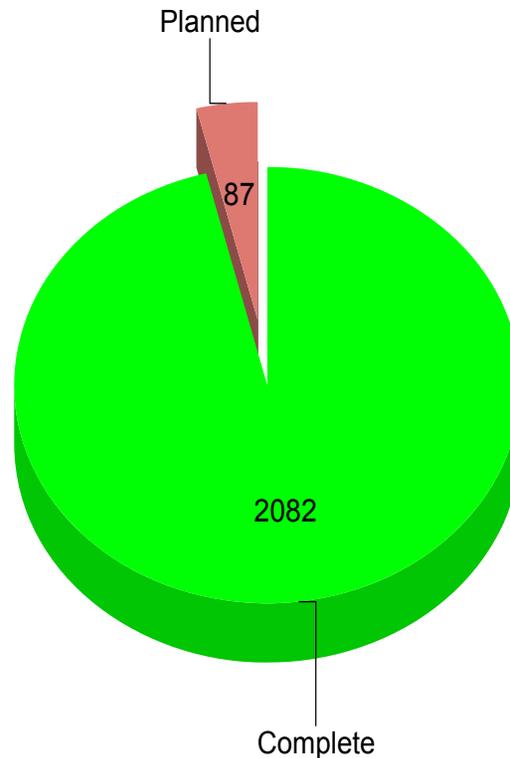
636 – complete

1 – pending

10 planned

Status of C-A OSHA Corrective Actions End of FY06

OSHA Abatement Status (Number of Instances)



Complete	2082	96.0%
Planned	87	4.0%
Total:	2169	100.0%

C-AD assigned 647

All completed

C-AD Self-Evaluation Program

- Individuals assess tasks and identify improvements
- Managers, supervisors and technical staff participate
- Six self-evaluations performed in FY06
- Corrective actions tracked in ATS

Worker Safety Walk Program

- 10 Safety Walks done in FY06
- Primarily a worker review of the job
- Looks at good and bad practices
- Another method to obtain worker feedback
- Corrective actions tracked in ATS

Manager Walkaround and Safety Observation

- Started this summer based upon recent DuPont Training
- Directorate-wide program
- C-AD OPM in place
- Performed 10 times per year
- Two completed at C-AD in FY06

Collective Radiation Dose

- FY 06 C-AD Collective Radiation Dose

0.445 person-rem

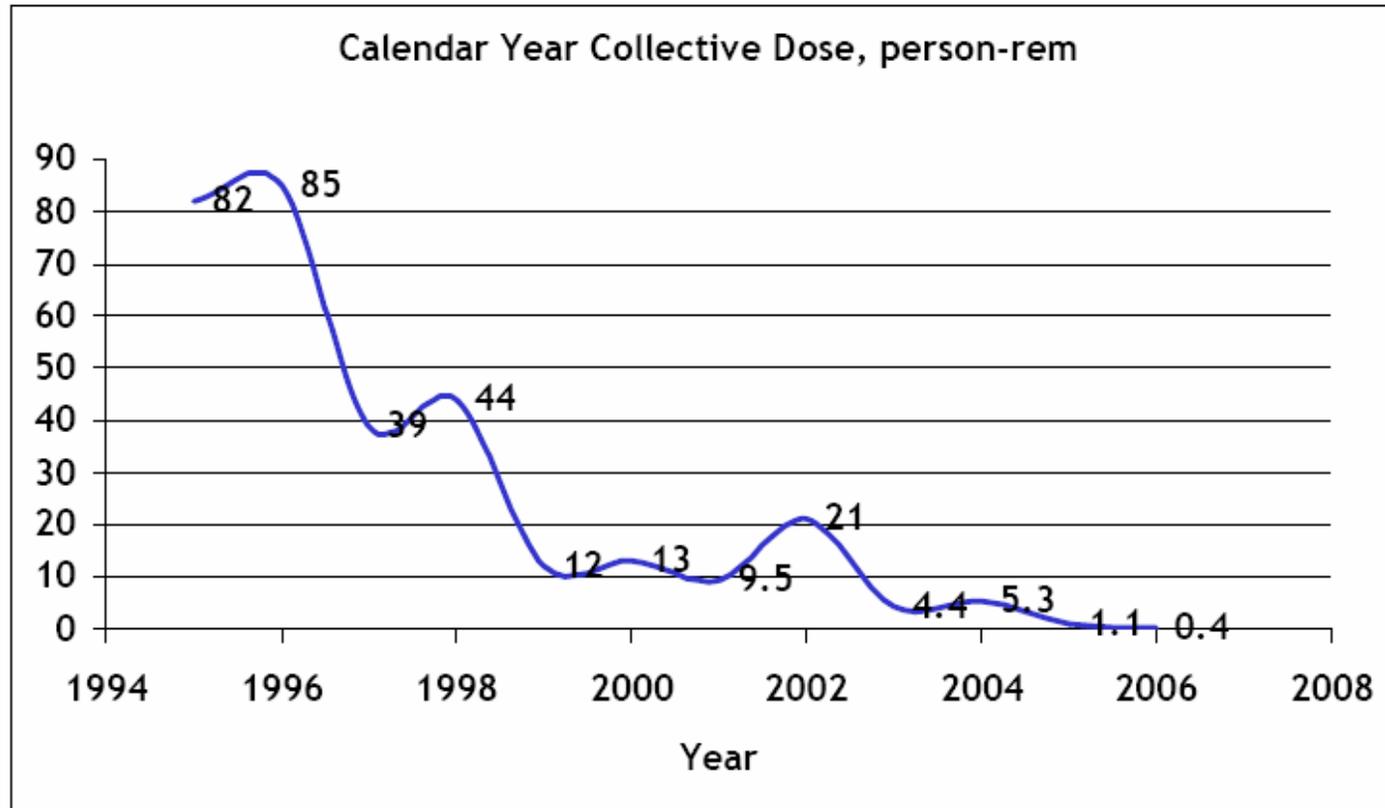
- Maximum individual dose

41 mrem

- Number of individuals with dose > 0

55 out of 368

Comparison with Prior Years



Reason for Lower Collective Dose

- **Experienced Workforce**
- **Activation of Machine Components Significantly Less**
 - Not operating high-intensity protons since 2002
 - Fewer machine breakdowns
 - Dose rate surveys indicate Booster and AGS less than 25% FY02 levels

Radiological Compliance

- One Radiological Awareness Report
- One Radiological Occurrence Report
 - ASE Violation – Chipmunk bypassed
- No 10CFR835 Non-Compliance Issues

Mel Van Essendelft

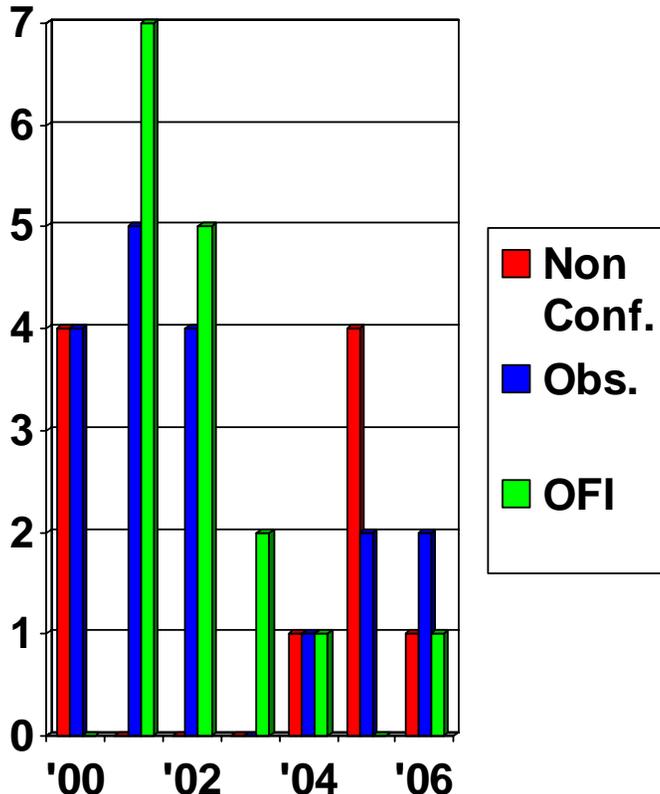
EMS Audits and Compliance Audits

C-A, Laboratory and NSF EMS Audits
Environmental Services Compliance Audits

Environmental Monitoring & Performance

Air & Water Discharge Monitoring
Spill Performance
Environmental Monitoring (RSS Program, g-2)

Internal EMS Audit by C-AD



'06 Audit Results

1 Non-conformance

Effectiveness of corrective actions not evaluated –
Mechanism established to perform this but it was not done

2 Observations

Objectives and targets as listed on the web were not current to include both the C-A and the SMD objectives and targets

No process in-place to ensure laboratory level ATS action items resulting from assessments are readily available at the department level for review and for auditing purposes

1 OFI

Policy plaques have been placed in numerous locations – the department should document locations in the event that the policy needs to be updated

Laboratory EMS Assessment

- Lab-level Assessment performed by BNL auditors:
 - 5 Non-conformances
 - Several employees interviewed did not demonstrate awareness of the content of the ESSH Policy
 - Old postings (2002) in work areas containing legal requirements not managed as controlled documents
 - Inconsistent dates between official web document and signed paper version/ Out-of-date EMS Postings observed in work areas
 - The present method for establishing and documenting operational controls is not sufficient to prevent improper labeling and storage of hazardous waste
 - Operations check list not managed within organization's records management system
 - 2 Opportunity for Improvement
 - Assure all objectives and targets have measurable indicators that show improvement in performance and/or continual improvement
 - Assure that workers who keep records are aware of retention times, and destroy records when they reach the end of the retention period

NSF EMS Assessment

- Positive Practices:
 - The auditors noted positive feedback on the review of past CAD/Magnet Management Review outputs (ROD Process) and the use of ATS to ensure actions are addressed
- 1 Non-conformance:
 - The Magnet Division did not cover two of the required inputs during their management review

Compliance Audits (Multi-Topic Assessment)

- Process Assessments and ESR
 - 1 Observation – The Magnet Cleaning Process Assessment did not include on of the processes used.
 - 1 OFI - Evaluate long-term storage of chemicals to avoid a legacy waste situation
- Universal & Industrial Waste
 - 1 Non-conformance - A container used for the accumulation of “Universal wastes – lithium batteries” did NOT have its top on securely and waste batteries were not protected from shorting
- QA of Environmental Sampling
 - 1 Observation – OPM required to detail steps of sample collection
 - 1 OFI – An OPM should be developed for reviewing analytical data

Results for Wastewater Discharge to Outfalls (Table 3-4)

Analyte		Outfall 002B (RHIC)	Outfall HN (RHIC)	Outfall HO (AGS)	Outfall HT-e (LINAC)	Outfall HT-w (AGS)	SPDES Limit	No. of exceedances
pH	Min.	6.3	7.1	NA	6.5	6.4	-	1
	Max.	8.3	8.9	NA	8.8	9.4	9	
Oil and Grease (mg/L)	Min.	<1.0	<.94	NA	<.97	<.94	-	1
	Max.	8.5	6.4	NA	16.1	6.3	15	
Hydroxyethylidene- diphosphonic Acid (mg/L)	Max.	<0.05	<0.05	NA	<0.05	<0.05	.5	0
Tolytriazole (mg/L)	Max.	<0.005	<0.005	NA	<0.005	<0.005	0.2	0

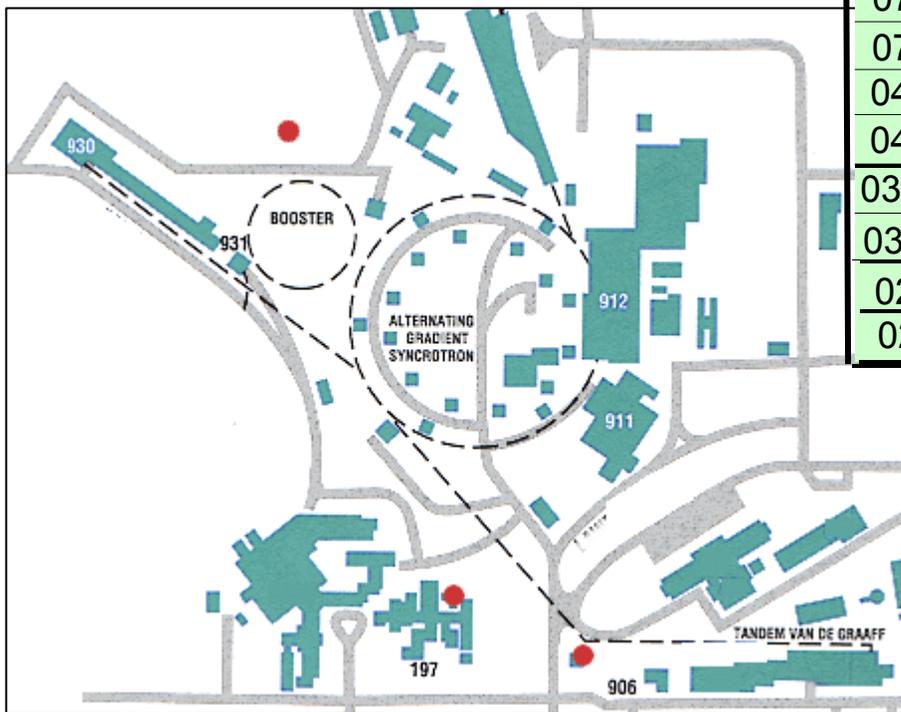
Water Quality Results for Recharge Basins (Table 5-5)

Location		Chlorides mg/L	Sulfates mg/L	Nitrate as N (b) mg/L
HN (RHIC Recharge)	Max.	62.4	23.4	1.3
	Avg.	37.8	14.7	0.9
HO (HFBR-AGS)	Max.	28.7	11.0	0.9
	Avg.	25.1	9.8	0.6
HT-e (AGS)	Max.	3260	48.5	0.9
	Avg.	883.2	36.7	0.8
HT-w (LINAC)	Max.	40.5	15.9	1.2
	Avg.	29.3	12.3	0.7
NYSDEC Effluent Standard		500	500	10

Radiological Results for Recharge Basins (Table 5-4)

Basin		Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Tritium (pCi/L)
HN	Max.	<1.9	5.1 ± 1.4	<400
	Avg.	0.5 ± 0.5	3.0 ± 1.4	52.5 ± 95.5
HO	Max.	1.3 ± 0.8	3.2 ± 1.3	640 ± 230
	Avg.	0.5 ± 0.6	1.9 ± 0.9	120 ± 359.4
HT-e	Max.	< 39	< 36	<260
	Avg.	3.7 ± 4.2	12.2 ± 8.8	10 ± 173.3
HT-w	Max.	< 1.1	4.5 ± 1.1	< 220
	Avg.	0.2 ± 0.5	2.8 ± 1.5	27.5 ± 37
SDWA Limit		15	50	20,000

2004 Skyshine Results (mrem) (Table 8-1)



TLD / Location	QTR 1	QTR 2	QTR 3	QTR 4
075-000 (Background)	9.0	8.6	9.3	8.9
074-TLD1 (Bldg. 560)	17.9	17.4	16.1	19.2
074-TLD2 (Bldg. 907)	17.7	16.1	14.9	16.1
045-TLD1 (Bldg. 1005)	17.2	14.9	15.0	16.7
044-TLD1 (Bldg. 1006)	16.7	14.5	14.5	18.2
034-TLD1 (Bldg. 1008, C2)	17.7	15.3	14.5	18.2
034-TLD2 (Bldg. 1008, C4)	16.6	15.5	14.4	18.2
025-TLD1 (Bldg. 1010)	16.2	14.0	15.0	18.5
025-TLD4 (Bldg. 1010)	16.9	13.9	13.7	18.9

C-AD/SMD

Spill Performance

- **C-AD had zero reported spills for CY 2006**
- **SMD had one reportable spill during the draining of the short coil press oil (June '06)**

End of FY06 Run - Soil Sample Results

Location	Soil Na-22 (pCi/g)	Estimated Buildup of Nuclide in Soil Sample H-3 ^{1,2} (pCi/L)	Estimated Buildup of Nuclide in Soil Sample Na-22 ^{1,2} (pCi/L)
L20 BtA, 90°	4.32 (4.92 – 95%) ³	3,391 (3,862)	322 (367)
J10 AGS, 90°	15.4 (17.3 – 95%) ³	12,089 (13,581)	1,147 (1,289)
LINAC HEBT Beam Stop, 67°	6.40 (7.22 – 95%) ³	3,349 (3,778)	318 (359)
RHIC W Line Dump, 67°	< MDL	< MDL	< MDL
Injection Septum, Blue	< MDL	< MDL	< MDL
Injection Septum, Yellow	.325 (.420 – 95%) ³	255 (330)	24 (32)
1006 Collimator, 90°	< MDL	< MDL	< MDL
1006 Collimator, 67°	< MDL	< MDL	< MDL

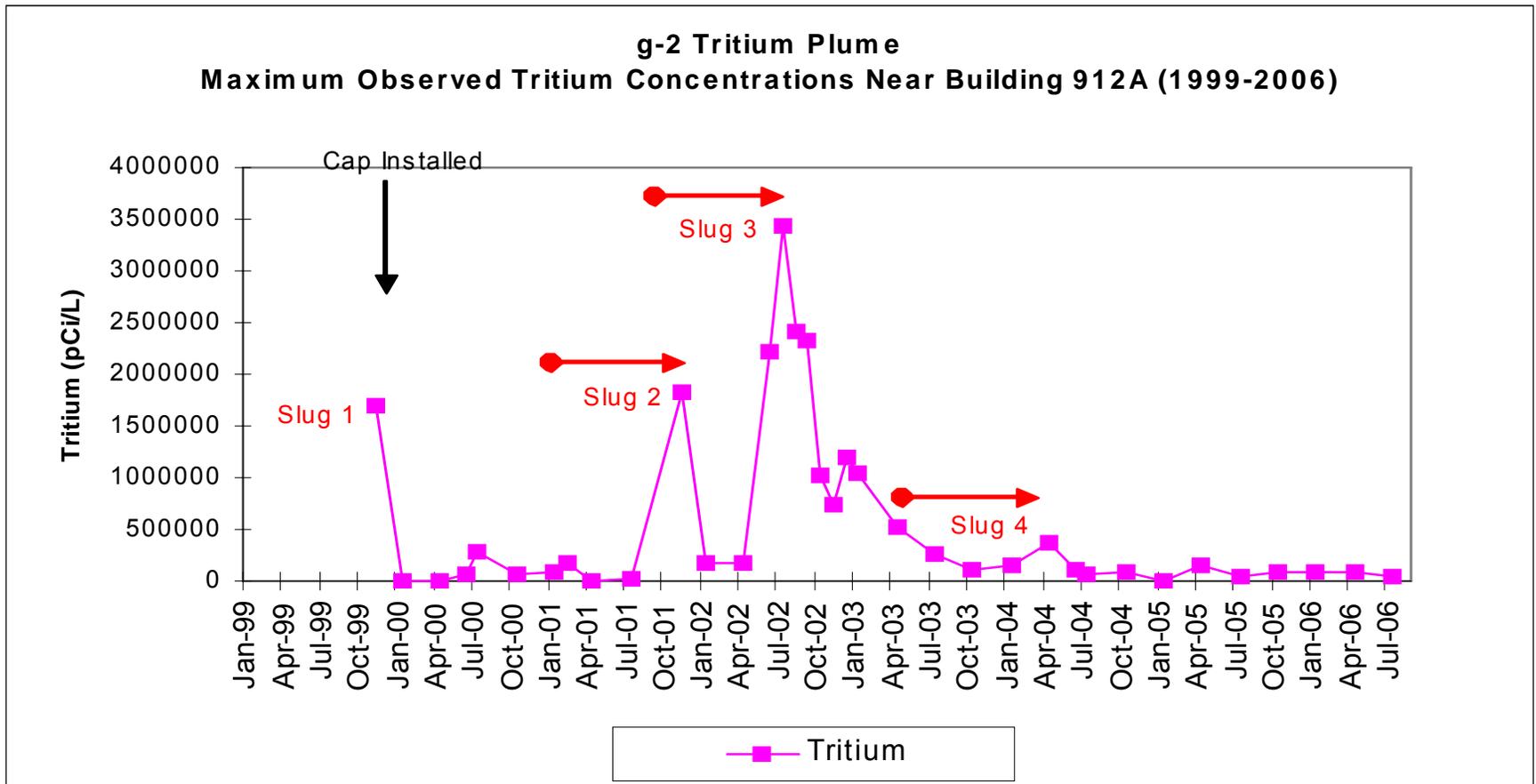
DWS H-3 = 20,000 pCi/L Action Level = 5,000 pCi/L
DWS Na-22 = 400 pCi/L Action Level = 20 pCi/L

1 Computed using current Subject Area Leachate Model dated 9/15/2000
2 Integration calculation based on date placed
3 95% confidence that actual value does not exceed the result reported in parentheses

Well Sampling Program Costs

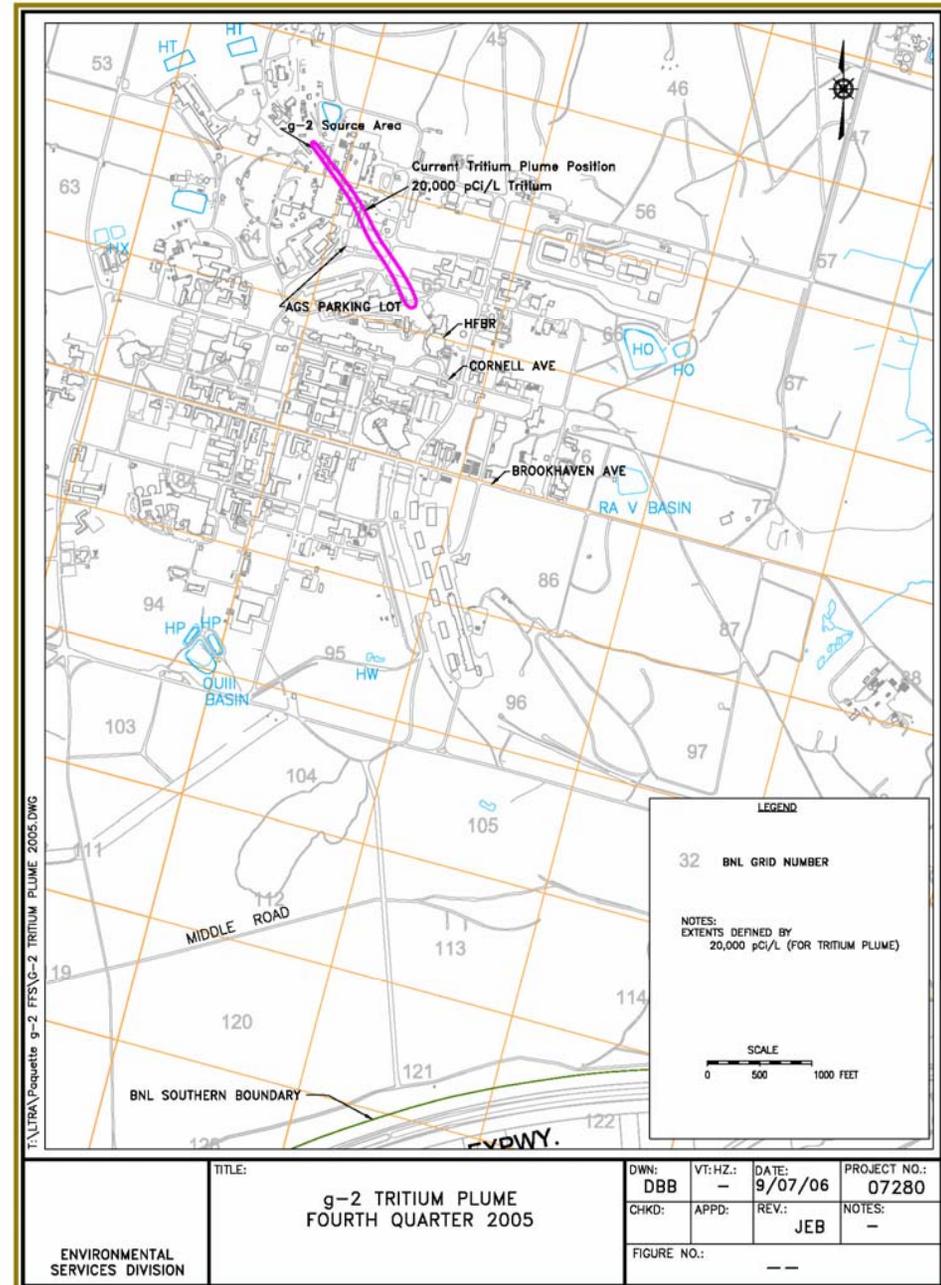
<u>FY</u>	<u>Cost</u>
03	\$72,600
04	\$65,900
05	\$69,900
06	\$56,000
07	\$57,000 (Estimated)

g-2 Tritium Plume



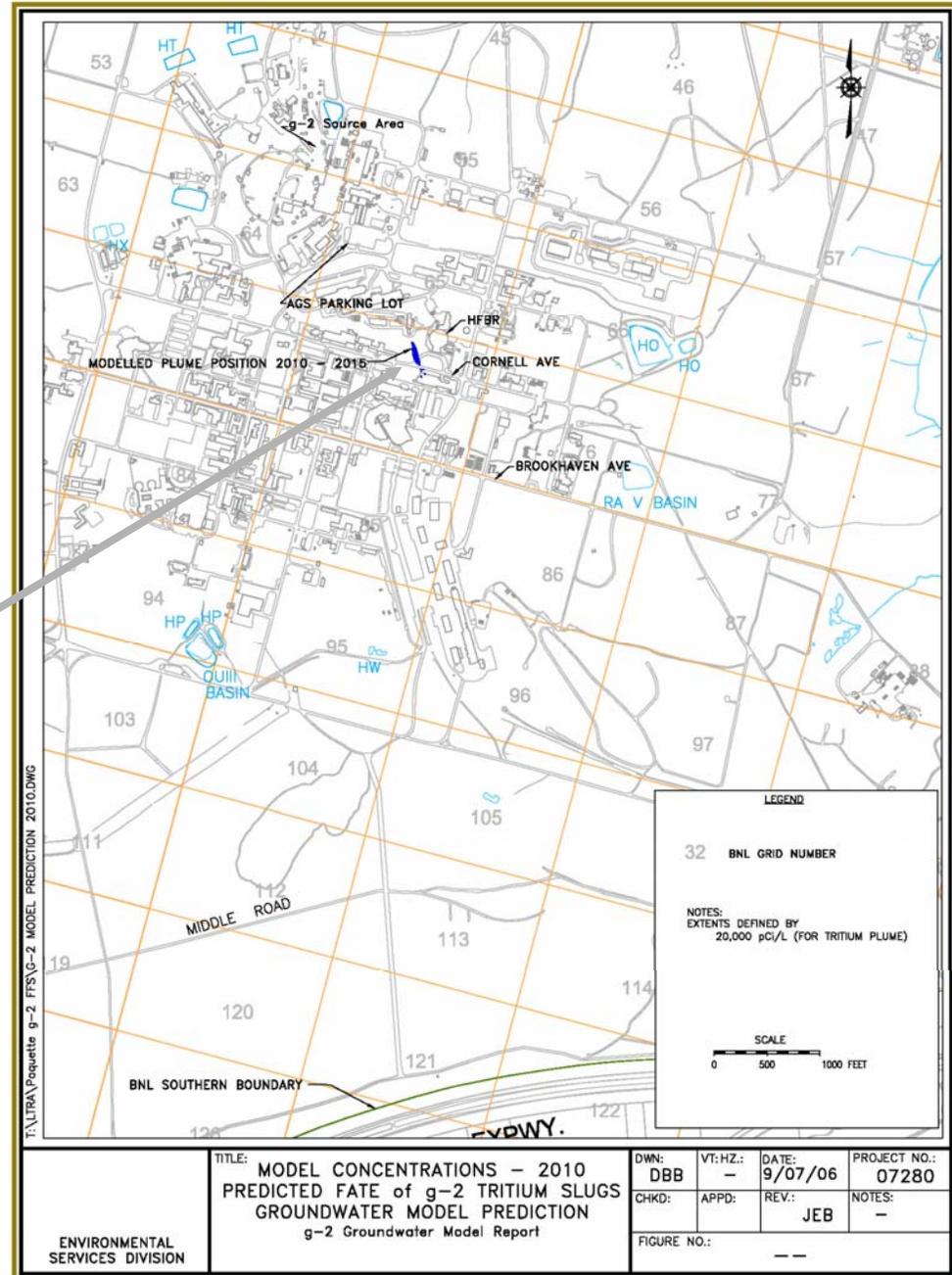
Position of g-2 Plume

- Plume is in central portion of BNL site
 - Located more than one mile north of the BNL southern Boundary
 - Tritium levels currently less than 60,000 pCi/L at first set of wells downgradient of source area
 - Plume is attenuating by natural radioactive decay and dispersion
- Not a threat to drinking water wells
 - One BNL supply well was shut down to control groundwater flow directions in the AGS area
 - Plume is expected to attenuate to non-detectable levels entirely on site



Plume in 2010 - 2015

- BNL Groundwater Model used to help evaluate fate of the plume
 - Experience with other plumes help validate model predictions
- Model results indicate existing tritium concentrations are projected to drop to below the 20,000 pCi/L drinking water standard by 2010-2015, onsite near Cornell Avenue
- Over one mile north of BNL southern boundary



Five Remedial Alternatives Described in the Focused Feasibility Study For g-2

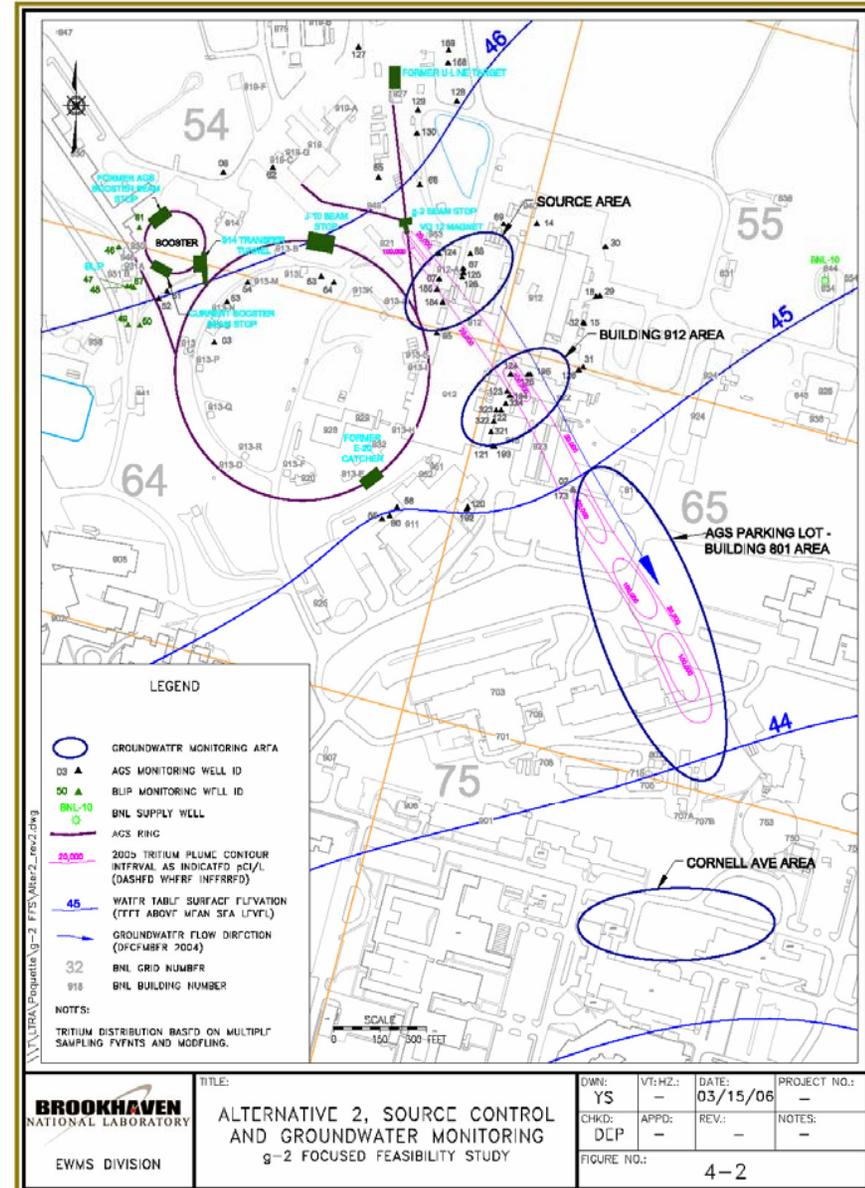
- **Alternative 1** – Continued maintenance of the cap (source control)
- **Alternative 2** – Continued source control and groundwater monitoring, with contingency actions
- **Alternative 3** – High-flow pumping with on-site recharge, continued source control and groundwater monitoring
- **Alternative 4** – Low-flow pumping with off-site disposal, continued source control and groundwater monitoring
- **Alternative 5** – Source removal, and continued groundwater monitoring

Evaluation of Alternatives

- The five alternatives were evaluated using nine CERCLA criteria for selecting remedial actions. The following criteria remain open:
 - Regulatory Acceptance (to be determined)
 - DEC, EPA, & Suffolk County
 - Community Acceptance (to be determined)

FFS Alternative 2 – Source Control and Groundwater Monitoring

- Maintain cap over activated soils, monitor groundwater near source and downgradient, and establish contingency actions
- Strength
 - Maintains source controls
 - Allows decay in place
 - Doesn't transfer contamination
 - Monitoring verifies source control and model predictions
 - Contingency plans established if unexpected levels of tritium are found
- Weakness
 - Active control of the plume only as a contingency
- Cost: \$964,000 over 30 years



Proposed Schedule

- **CAC Presentation on the PRAP: October 12**
- **Public Comment Period: October 12 – November 13**
- **Poster Sessions for Employees and Public: October 18**
- **Public Meeting: October 25**
- **CAC Discussion/Caucus on PRAP: November 9**
- **Prepare Responsiveness Summary and Record of Decision**
- **Finalize Record of Decision: Spring 2007**

Joel Scott

- Routine Waste
- Waste Minimization P2
- Legacy Waste Efforts
- Unneeded Materials and Chemicals
- Future Legacy Waste Efforts

Routine Waste

Waste Category	Actual	Comments
Hazardous/Industrial – Lab Pak	1397 lbs	OSHA driven cleanups Below allocation estimate
Hazardous/Industrial - Barreled	40,000 lbs	Slightly above allocation but no chargeback. 20,000 lbs were PCB capacitors from Linac
Low-level Radioactive – Solid	2400 ft ³	On allocation 1800 cu ft. of legacy waste
Mixed Radioactive and Hazardous	10 ft ³	Below allocation
Low-level Radioactive – Liquid	291 gal	Below allocation

Waste Minimization P2 Savings

- Sorting waste bags
 - Saved \$5000
- Bulb crusher for activated lighting
 - Saved \$50,000
- Decay in storage of air filters
 - Saved \$7500
- Burned 850 gallons of oil
 - Saved \$4000
- Can crusher saved \$6,000
- Propane Cylinder De-valver
 - Saved \$15,600
- Total savings \$88,000



Legacy Waste Efforts

- NP/HEP supported the following waste projects:
 - 3 sea-land containers of *legacy* components
 - All components (power supplies and magnets) in 209
 - Completed removing components stored outside of 912
 - 128 large Linac capacitors and a drum of small capacitors
 - New capacitors purchased, old capacitors sent to waste
 - Chemical cleanups in
 - 922, 923, 930, 925, 1006, 928, 912, & 919B

Unneeded Materials & Chemicals

- This year BNL started the Unneeded Materials and Chemical Plan
- This project was mandated by DOE and commits BNL to remove Unneeded Materials and Chemicals by the year 2011
- C-AD has listed approximately 2 million dollars worth of unneeded materials and chemicals and all future legacy waste plans will focus on this list

Future Legacy Waste Efforts

- Purchase last of Linac PCB capacitors
 - Send replaced capacitors to waste
 - All Linac capacitors to be completed next year
- Continue with FES Division cleanup of 912
- Continue Legacy waste removal
 - Large components; i.e. g-2 target, booster beam dump, magnets
 - Radioactive shield blocks
 - Radioactive dirt from 912 block yard
- All PCB capacitors in 928 to be replaced and sent to waste
- 901A Tandem will be only C-AD area of PCB's?
- Continue with AGS cable removal

Summary of OSH, S and E Costs



FY06 Management Systems Maintenance

▪ OSH and environmental records	0.2 FTE
▪ Corrective action tracking (ATS)	0.5 FTE
Total	0.7 FTE

FY06 Pollution Prevention and OSH PPE

▪ Tritiated water-system upgrades	\$0*
▪ Safety equipment (PPE, TLDs ...)	\$400,000**
Total	\$400,000

* \$300K ADS money not used because it did not cover \$815K cost of upgrades for Fast Pulse Quad, chilled water at A through L 18-houses and B914

** 4-year average

FY06 Clean-Up

▪ HEP Waste Management	\$289,000
• Commitments at year end	\$140,000
▪ NP Waste Management allocation	\$1,274,000
• Overhead	\$379,000
• Direct expense	\$329,000
• Commitments at year end	\$40,000
Total	\$2,451,000

Fines/Violations

- None

FY06 Injury/Illness/Theft Costs

- Direct costs of \$6,646 for injuries
 - All New FY06 WC cases: \$6,976
 - Athletic Injuries:
 - Karate - \$154
 - Basketball - \$176
 - Occupational:
 - Burns - \$6500
 - Standard Threshold Shift - \$0
 - Leg-Ladder - \$146
 - Down from \$82,000 in FY04 and \$26,000 in FY05
- Direct costs of \$48,300 for copper theft
 - Copper – 2100 lbs@ \$3/lb
 - Security upgrades - \$42,000 (in process)

FY06 OSH and E Monitoring

▪ g-2 water sampling and analysis		\$10,000
▪ g-2 consultants for FFS		\$15,000
▪ Routine well sampling and analysis	0.2 FTE	\$56,000
▪ OSH measurements (noise surveys, industrial hygiene and rf measurements, etc.)	1.0 FTE	
Totals	1.2 FTE	\$81,000

FY06 Backward-Oriented Measures

▪ Performance indicator program	0.1 FTE	
▪ Critiques	0.1 FTE	
▪ Injury/Illness investigations	0.1 FTE	
▪ Occurrence investigations (~)	7.0 FTE	
• Consultants for Arc Flash Event		\$25,000
• Electricians (4 for 6 months)	2.0 FTE	
• Switches, resistors, relays		\$60,000
▪ Tier 1 inspections	0.2 FTE	
▪ NSF, OSHA and other audits	0.4 FTE	
▪ Internal OSH / EMS Audits	0.5 FTE	
Total	10.4 FTE	\$85,000

FY06 Future-Oriented Measures

▪ Management Review	0.1 FTE
▪ WOSH Committee	0.1 FTE
▪ BNL 18001 Team	0.1 FTE
▪ Safety Week	0.1 FTE
▪ ASSRC, RSC, ALARA, ESRC reviews	0.3 FTE
▪ Tier 1 and OSHA compliance reviews	0.3 FTE
▪ Review of job and facility risk assessments	0.5 FTE
▪ Review of environmental process evaluations	0.1 FTE
▪ Annual OSH/EMS training	0.1 FTE
▪ Annual review of OSH/EMS management plans	0.1 FTE
▪ Annual review of OSH/EMS controls	0.1 FTE

Totals 1.9 FTE

Technical Support

▪ Environmental Coordinator	0.5 FTE
▪ Environmental Compliance Rep.	1.0 FTE
▪ Hazardous Waste Technician	1.0 FTE
▪ Work Planning Coordinator	0.5 FTE
▪ Tier 1 Coordinator	0.5 FTE
▪ ESH Coordinator	0.5 FTE
▪ Training Coordinator	0.5 FTE
▪ Procedures Coordinator	0.5 FTE
▪ Radiological Control Techs and Super	7.0 FTE
▪ Facility Support Representative	1.0 FTE
 Total	 13 FTE

FY06 Cost Summary

Category	FTE	Expense
▪ Management Systems Maintenance	0.7	-
▪ Pollution Prevention and OSH PPE	-	\$400,000
▪ Waste Costs	-	\$2,451,000
▪ Fines/Violations	-	-
▪ Injury/Illness	-	\$55,000
▪ Monitoring	1.2	\$81,000
▪ Backward-oriented measures	10.4	\$85,000
▪ Future-oriented measures	1.9	-
▪ Technical Support	13	-
▪ FY06 Totals	27.2	\$3,072,000
▪ FY05 Totals	18.2	\$3,731,000
▪ FY04 Totals	18.9	\$3,795,950

Summary of Management Review Presentations

- 6 out 62 OSH and E Targets in FY06 not met (10%)
 - TRCR
 - Repeat OSHA violations
 - 912 roof
 - Housekeeping
 - Fire protection upgrades
 - BNL Chair/Manager level review of new SBMS requirements
- 10 CFR 851 passed and we need to
 - Document / fix where logistically possible existing facility-related violations (OSHA, NEC)
 - Document existing pressure systems and piping
- Copper theft shows we need to keep improving plant security
- Many successes
 - Zero spills
 - Zero DARTs
 - Zero First Aid
 - Working toward zero PCBs

Senior Management Evaluation

- Purpose: identify improvement actions and assign responsibility and resources to implement

Management Question 1

- Are the OSH/EMS/S/SA programs effective in achieving policy commitments?
 - Compliance?
 - Pollution prevention?
 - Injury/illness reduction?
 - Community outreach?
 - Clean-up?
 - Continual improvement?
 - Security?
- Issues
 - Need greater worker involvement in housekeeping
 - Need greater management commitment for Fire Hazards Analyses
 - Need to continue toward full 10 CFR 851 compliance
 - Need to continue groundwater protection and cap Linac beam stops
 - Need to continue to improve theft prevention programs (e. g., inventory)

Management Question 2

- Are programs effective in achieving the objectives and measures?

- Issues
 - Evidence points to successful achievement of most targets
 - Improve pre-job briefing program to reduce errors and injuries
 - Identify and gather documents for existing pressure systems
 - Identify facility/equipment violations not previously found by OSHA team
 - Complete IH baseline monitoring
 - Complete material handling equipment inspections (e.g., cranes)
 - Complete Fire Hazard Assessments
 - Complete the arc flash calculation and labeling program
 - Continue to improve housekeeping programs
 - Continue to improve metals inventory
 - Continue to remove aging cable in AGS
 - Continue to archive data on activated soils and investigate soil capping (e.g., J10)
 - Continue to remove PCB capacitors at Linac and Building 912
 - Continue to repair Building 912 roof
 - Continue OHSAS 18001 and ISO 14001 registrations

Management Question 3

- Are the OSH/EMS/S/SA programs adequate in terms of:
 - Identifying significant environmental aspects and impacts?
 - Identifying significant occupational safety and health hazards?
 - Identifying significant security issues?
 - Resource allocation?
 - Information systems?
 - Organizational issues
 - Staff expertise?
 - Procedural requirements?
- Issues
 - Need lab questionnaires to perform Department–level 10 CFR 851 Gap analysis
 - Need resources for
 - Fire Hazards Analyses
 - Roof repairs
 - Improved metals inventory
 - OSHA violation abatement in areas not visited by OSHA
 - Staff needs training in NEC requirements

Management Question 4

- Are the objectives and measures for OSH, S and E related programs suitable in terms of:
 - Environmental impacts, occupational hazards, security and current conditions?
 - Concerns of stakeholders?
 - Current and future regulatory requirements?
 - Business interests?
 - Technological capability?
 - Internal organizational or process changes?
 - Should additional measures be established?
- Issues
 - Need objectives and targets for HU program
 - Need objectives and targets for security program

Management Question 5

- Recommended revisions to:
 - OSH policy and commitments?
 - Environmental policy and commitments?
 - Self-assessment policy and commitments?
 - Objectives and performance measures?
 - Elements of OSH, EMS, SA, Security?
- Issues
 - Need to develop forward-looking measures
 - Need a Lab-level values statement that is inclusive of safety *and* integrity
 - DuPont CA: “Safety, Concern For Others and Integrity Are Our Highest Values, and We Will Not Compromise Them”
 - New York Life: “Our Values Are Integrity And Financial Strength”
 - BNL (currently not on BNL web page): “Exploring Earth’s Mysteries, Protecting its Future”
 - LBNL: “Outstanding Science Since 1931” or “75 Years of World Class Science”
 - ANL: “... For a Brighter Future”
 - Ames Laboratory: “Solutions Through Innovative Science”
 - LLNL: “Science in the National Interest”
 - Sandia: “Securing a Peaceful and Free World Through Technology”
 - Hewlett Packard: “Look What’s New!”
 - Enron’s Mission and Values Statement!: “World’s Leading Company”