EHS Annual Report FY '07

1. EHS Office Overview

EPO is the senior administrative office at MIT that is responsible for working with MIT's senior officers and presidential committees to establish MIT's vision, commitment and policies for environmental stewardship and for the health and safety of the MIT and larger community, in keeping with MIT's values. MIT's values reflect excellent EHS performance that exceeds regulatory compliance and embodies being an excellent environmental citizen of the world. EPO oversees the EHS Office, which delivers EHS services and supports and oversees day-to-day Institute-wide EHS performance.

Highlights:

- **EHS Training participation increased almost 6 fold from 4000 individual sessions per year to 23,500 per year since implementation of the EHS system began in FY 02.**
- **Hazardous Waste cost per unit decreased by 15% in FY 07 for a total reduction of 40% since the inception of the Management System in FY 02. The total volume of waste decreased by 4% in FY 07, the first decrease since FY 02.**
- **The incidence rate of total recordable injury and incidence cases for MIT increased slightly and is at the national average for the college and university sector. The incident rate for cases with days away from work continues to decrease but is still above the national average for colleges and universities.**

FY 08 Goals

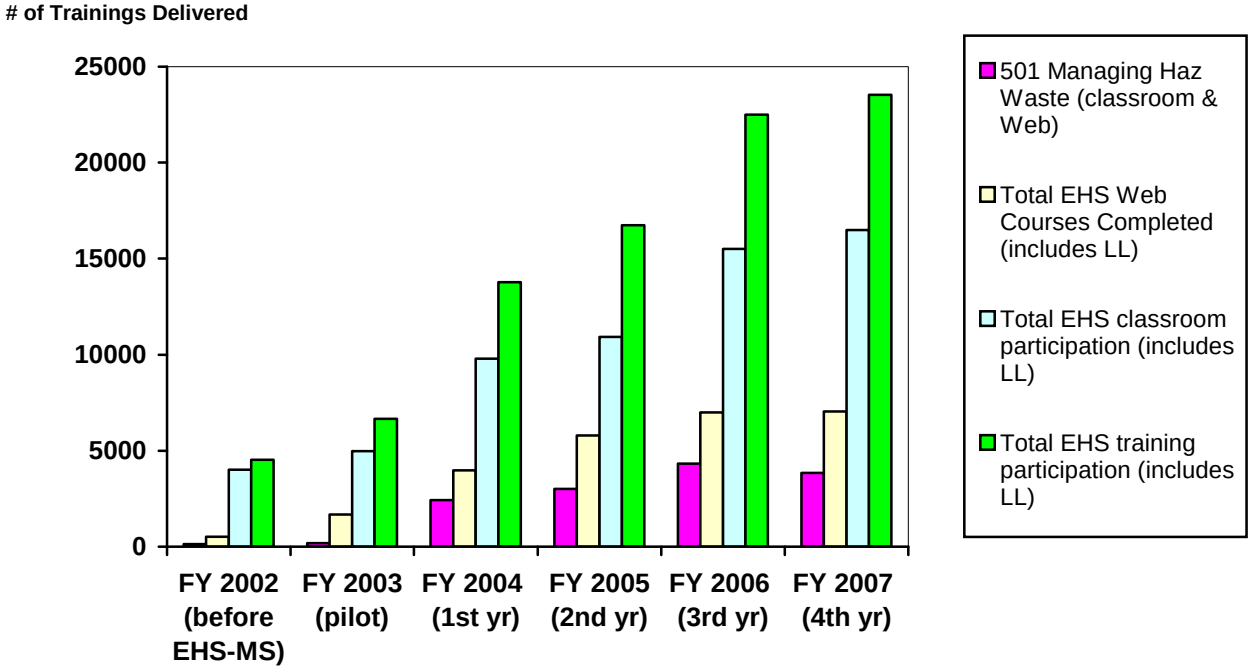
- **Conduct the biennial audit of the EHS-MS by a third party or MIT Audit Division.**
- **Maintain or increase training completion for the core EHS courses.**
- **Develop and receive approval for an upgrade to the inspection system in SAP. This upgrade will facilitate data management and provide a more consistent and efficient method to capture, report and correct findings.**
- **Enhance campus sustainability program by initiating new pollution prevention programs, decreasing hazardous waste costs, and supporting campus energy initiatives.**
- **Reduce our injury and illness rates to below the average for colleges and universities.**

2. Training

Impact of EHS-MS on EHS Training: There has been a **12-fold increase** in the number of individuals completing the Managing Hazardous Waste training sessions between FY 2002 (the year before the EHS-MS training system was launched) and FY 2007. For the same time period, overall EHS Training participation has increased almost 6-fold from 4000 individual sessions to 23,500. **See Figure 2.1.** Note: An individual might be a participant in more than 1 course.

Figure 2.1

Number of participants in EHS courses delivered by fiscal year.



- There have been 9753 individuals who have taken at least 1 EHS course since FY 2002. In FY 07, 2033 took a course for the first time.
- **There was a 34 percent increase** in EHS course participants between FY '05and FY '06 following a 20% increase from FY 04 to FY 05. This increase has begun to level off with a 4% increase from FY 06 to FY 07. We believe we are now reaching almost all of those who need EHS training.
- Training requirements can now be set based on academic courses and special groups. This new capability brought 800 undergraduate students into the EHS-MS Training system between the fall and spring semesters.
- For FY 07, **30 percent** of EHS training was web delivered compared to 31% in FY 05 and 30% in FY 06.
- Total training time for participants was approximately 35,300 contact hours compared to 25,101 for FY 05 and 33,747 hours for FY 06**.**
- Total time for EHS Trainers (EHS Office only) was approximately **2860** hours **or 1.5 FTE.** This was similar to FY 06 and represents a >25% increase in efficiency from FY 05 as more people were trained using less resources.
- Web-based training costs increased 16% from $15.50 to $17.50 per student.
- EHS Cost per student in classroom was approximately **$10.75/**session similar to FY 06 and a 15% decrease from FY 05 due to increased class sizes**.**
- MIT's "Environmental Virtual Campus," a compliance and good practices web site for colleges and universities that won the 2003 Environmental Business Council of New England's Award for Outstanding Environmental Education, continued to be extremely successful in its second year. Over the past twelve months, the site received more than 1 million "hits" from tens of thousands of visitors around the world. In all, the site has hosted visits from more than 100 countries.
- Web courses currently available are Managing Hazardous Waste, RCRA, SPCC (Oil Spill Prevention), HAZCOM (Hazard Communication), Chemical Hygiene, Bloodborne

Pathogens, Hydrofluoric Acid, and Nuclear Reactor Radiation Safety. Three web modules (RCRA, Chemical Hygiene, and Hydrofluoric Acid) have been customized as a separate course for Lincoln Laboratories.

Core courses training completion metrics – for the first time this year, what we considered EHS core course metrics, were calculated across the Institute. The May 7, 2007 data is presented **Table 2.1**.

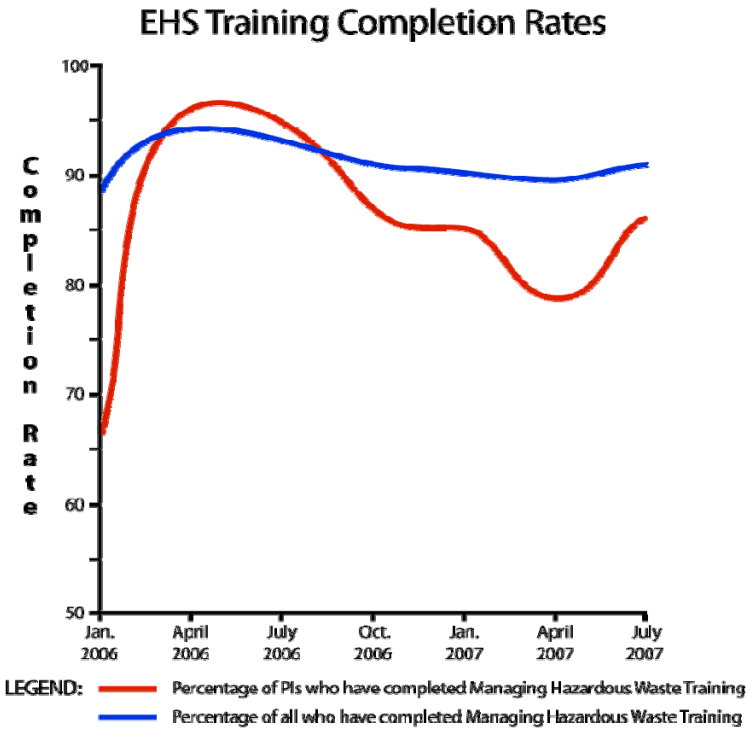
Table 2.1 Completion rates for core EHS courses.

Course	# Attending	Completion Rate
General Chem. Hygiene and Haz Com (100 and 120)[1]	4568	96%
Lab Specific Chem. Hygiene and Haz Com (110 and 121)[2]	3314	85%
Bloodborne Pathogens (200 and 210)[1]	1526	92%
General Biosafety (260)[2]	2688	97%
Radiation Safety (301)[2]	1074	96%
Laser Safety (371)[2]	962	96%
Managing Hazardous Waste (501 and LL 506)[1]	3918	87%

[1] Live and WEB course
[2] Live only

- PI completion rates for Managing Hazardous Waste dropped steadily throughout the year with a final completion rate of 79%. Hazardous waste overall hovered around a 90% completion rate for most of the year (See Figure 2.2).

Figure 2.2



* **Note**: It is unlikely the system will ever show 100% statistical compliance because 1.) people leave the Institute or space and their training expires but the system believes they are still here unless they are physically removed from the system, 2.) individuals sometimes fill out their training needs assessments incorrectly and do not need some of the training identified and 3.) people may fill out the training needs assessment well

before they actually begin work and wait until that time to complete training. A new data reconciliation procedure instituted in FY 06 has helped to rectify this issue. These data indicate that at any point in time all those who need core EHS training have received it or are working under the supervision of someone who has.

3. Inspections

The EHS-MS Audit/Inspection program is a key component of the Management System promoting, monitoring and focusing on the effectiveness of regulatory training and compliance as well as good practices to achieve environmental sustainability. This program consists of three tiers of inspection designed to assess performance, correct problems and prioritize areas for improvement.

The Level I inspection is conducted by the DLC person assigned that role and is reviewed at the time of the Level II program. The Level II program is a DLC-wide inspection conducted twice each year in research DLC's and on an annual basis in non-research areas by the local DLC EHS Coordinator and the EHS Office. The Level III audit is a third-party audit conducted on a two-year cycle which can be focused on the overall system or a specific element(s). The next Level III audit is scheduled to be completed by the end of CY 2008.

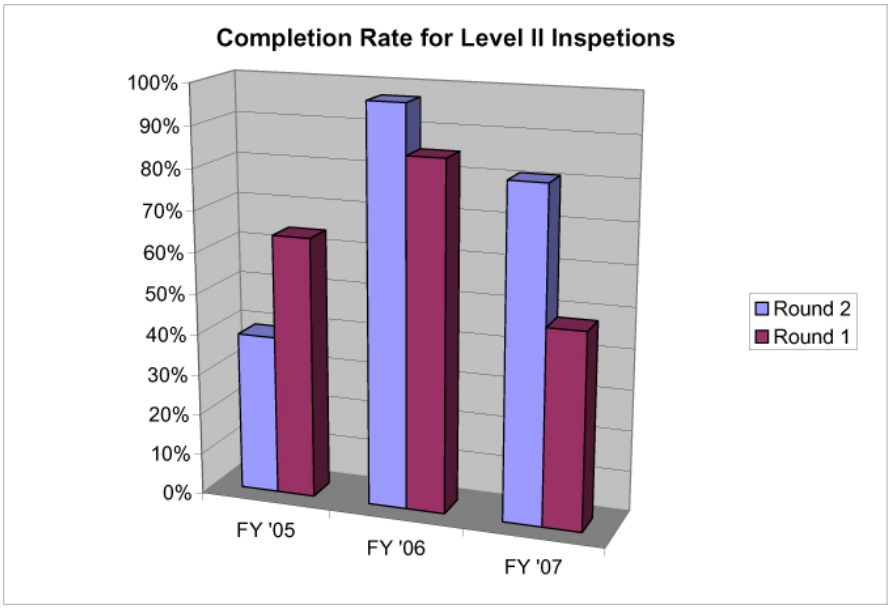
3.1. On-Going Programs

3.1.a Level II Inspections/Performance Metrics

Two rounds of Level II inspections were conducted in research areas and one in operations (Facilities, Student Life, and DCM) areas in FY 07. Completion metrics for each round in research

DLC's are shown in Figure 3.1.a. It should be noted that the January-June 2007 round 1 (displayed as the second round in FY 07) is currently in process and results are current as of the date of this report. In general, results indicate that approximately 80% of registered space was inspected this past fiscal year, a level consistent with that of the previous year. Similar results were found in Operation areas for FY 07. The total number of spaces inspected at least once this year was 2345.

Figure 3.1.a

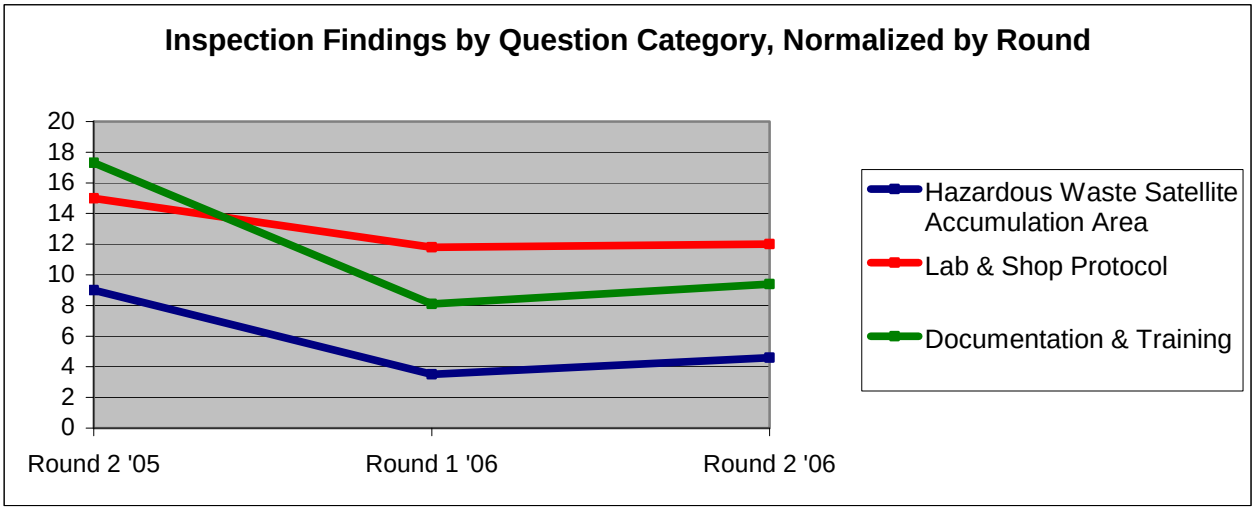


An area of focus this past fiscal year was to improve the consistency in performing the various elements of the Inspection program. Efforts have included: question review, developing a process to address difficult-to-resolve issues, revising the Level II SOP and developing a proposal to enhance the overall management of the program.

3.1.b Level II Inspection/Findings Metrics

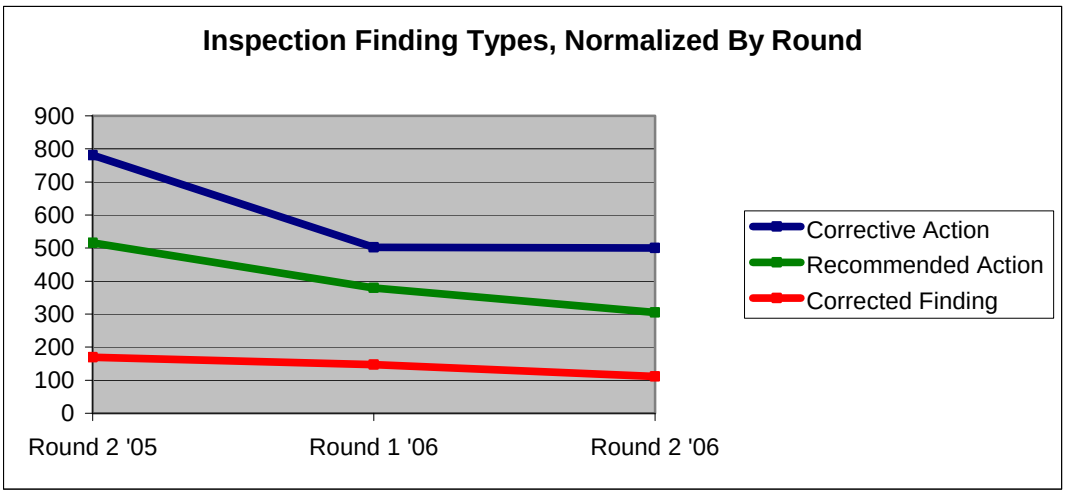
A DLC-specific checklist is created based on registered hazard(s) for the spaces. Findings, items which must be corrected, are either corrected at the time of inspection or assigned to someone for correction. The total number of findings in the first round in FY 07(CY round 2-2006) for three key question categories (Hazardous Waste Satellite Accumulation Area, Lab Shop Protocol, Documentation/Training) is again consistent with that of round 1-2006 and significantly reduced from round 2-2005. To provide comparison across rounds, the data are normalized to the fraction of space subject to inspection for the given round. When corrected for the number of questions in a category, results in Table 3.1.b indicate an equivalent number of findings across the three categories. The consistency in the reduced number of findings from 2005 is evidence of the continued benefits of training and overall awareness of EHS issues across MIT.

Table 3.1.b



Findings are categorized into one of two general classes: recommended actions for minor findings and corrective actions for the more significant findings. Inspection teams consistently identify most findings as requiring a corrective action. The findings corrected at the time of inspection are categorized as corrected findings. The assigned findings by category are shown in Table 3.1.c and shows a decrease in the number of findings with corrective as recommended actions.

Table 3.1.c



4. <u>Faculty Research Protocol Support and Compliance Committees</u>

The EHS Office's protocol development and review support is integral to our faculty's undertaking safe and legally compliant research. There are six faculty research oversight committees with significant EHS implications: the Committee on Use of Humans as Experimental Subjects, the Institutional Animal Care and Use Committee, the Radiation Protection Committee, the Toxic Chemical Committee, the Reactor Safeguards Committee, and the Committee on Assessment of Biohazards. These committees fulfill specific federal regulatory requirements in the areas of human subjects and research animal protections, and the safe use and containment of radioactive, chemical and biological materials at MIT. The Faculty Chairs of these Committees are members of the Institute Council on EHS, which oversees MIT's EHS performance and the implementation, and effectiveness of the EHS-MS. The EHS Office participates in all 6-faculty research oversight committees and serves as administrative support for the Radiation Protection Committee (RPC) and the Committee on Assessment of Biohazards (CAB). The Managing Director of the EHS Programs and Director of the EHS Office are members of the Institute Council on EHS.

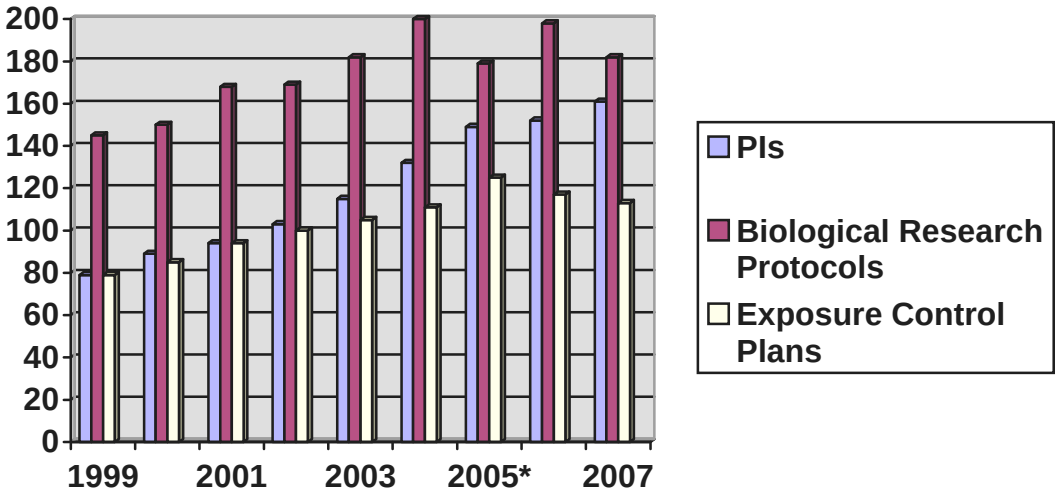
The EHS Biosafety Program and the Lincoln Laboratory (LL) administration established an internal LL Biosafety Committee. This committee focuses on development and implementation of site-specific safety policies and procedures. All protocol reviews and approvals are the purview of the MIT CAB.

The EHS Biosafety Program also administers the Institutional Biosafety Committee for the Draper Laboratories. The Institute's Radiation Protection Committee also functions as the Whitehead Institute's Radiation Committee.

Overall, the EHS Office has direct contact with almost 50% of the faculty in Science, Engineering and Research. During the past five years, the biosafety and radiation safety services (as measured by protocol and authorization reviews, inspections and training) have grown almost 10 times faster than the growth in faculty. This is due to the EHS Office's consistent efforts to interact with researchers, to optimize services and oversight through their respective registration and research tracking programs, and to the continued growth in research at MIT. For example, (DHHS) funding at MIT grew by 12% over last year (see Office of the Provost, Institutional Research web page for data). In the past 7 years the number of PIs enrolled in the "Biological and rDNA Research Project Registration Program" has increased by 71% and the number of research protocols reviewed by the EHS Office and approved by the Committees has increased by 32%. By comparison, the number of tenured and tenure-track faculty at MIT has only increased by 6% within the Schools of Science and Engineering

and the Vice President for Research areas. Figure 4.1 shows the growth in biological research as measured by the number of PI's and protocols registered in our system.

Figure 4.1 Increase in Biological Research Registrations and Principal Investigators in Science, Engineering and VP for Research from FY 99 to FY 07



*Prior to 2005 the Whitehead Institute's Biosafety Program was administered through MIT's EHS. In 2004 the Whitehead Institute implemented their own biosafety program removing 13 PI's and 20 protocols that had been reviewed in 2004.

In comparison to 2006, there is continued growth in the number of faculty engaged in biological research. The number of new faculty engaged in biorelated research is up by 10%. This growth in bioresearch is also reflected in the level of DHHS funding which is up by 12% over last year (see Office of the Provost, Institutional Research web page for data). The projected growth in research space utilized for biological research at MIT has fulfilled expectations (see below from last year). However, the growth in research space is not just due to the new buildings outlined below but we have also seen the renovation of a number of non research spaces into biolabs e.g. the recent bio researchers in labs in the Media building. We mentioned the addition of many new faculty members engaged in bioresearch last year, we expect this to continue as we already have 3 new faculty in the process of registering their research with their lab renovations underway that will be included in the data for 2007-2008.

The MIT Office of Sponsored Programs provided the following information:

-**2003** total assignable bioresearch space	= 340,173 sq ft
-**2006** additional assignable bioresearch space in building 46	= 111,522 sq ft
-**2006** additional assignable bioresearch space in Broad Institute (7 CC)	= 105,000 sq ft
Total 2006 Assignable Bioresearch Space	**= 556,695 sq ft**
Total Percent of Increase 2003 - 2006	**= 63.6%**

The growth of bioresearch at MIT dramatically increases the workload of the EHS Office, Biosafety Program staff. This coupled with the development of several new research technologies (synthetic

biology, nanoparticle delivery of biological materials, development and use of hES cells) will challenge Biosafety Program staff to develop the needed expertise to provide the appropriate level of collaboration and oversight for these projects while maintaining the expected level of performance in all the other areas.

The Institute Biosafety Officer lead an effort to reduce the burden on researchers using Established Human Cell Lines. COUHES (Committee on the Use of Humans as Experimental Subjects) has agreed that the use of established human cell lines from commercial sources or where no identifying information concerning the original cell or tumor donor is available to the researcher does not require registration or review by COUHES. Use of these established human cell lines is not considered human subjects research by OHRP (Office for Human Research Protections) nor by NIH. This agreement removes the conflict with NIH grant process created by the old COUHES requirement. MIT Biosafety Program will refer investigators that use human materials that might be traced back to a donor to COUHES for review and approval. Between 80-90 investigators no longer require COUHES registration and approval reducing their administrative burden.

The Radiation Protection Program of the EHS Office reviewed/renewed 90 applications or amendments for authorizations to use radiation-producing material under MIT's license. The total number of authorizations currently in effect is 129 used in 648 laboratories by approximately 1500 researchers. Each authorization covers one to several protocols and is required to be reviewed biennially. There are currently 385 protocols on file for use of radioactive material.

5. Hazardous Waste Metrics

In FY 07, the EHS Office requested bids for all hazardous waste services provided to MIT. The Environmental Management Program (EMP) selection committee followed a thorough process in choosing MIT's next environmental management service provider. A request for proposals was sent out to all of the top service providers in the area. Based on the selection process and criteria, the EMP committee concluded that MIT present Triumvirate Environmental, Inc. (TEI) with the full three year contract. The selection criteria and key improvements in the new contract include:

1. **Cost of Services –** TEI has proposed a 10-15% reduction in current rates billed to MIT for the next three years.
2. **Technical & Readiness Qualifications -** TEI's 13 year history at MIT has created a strong relationship with the MIT community; this includes members of the EHS Office, EMP, and laboratory and facility managers throughout the MIT campus.
3. **Quality of Service** - TEI's experience and commitment to pollution prevention initiatives at MIT and other universities has set them apart from their competition.
4. **RFP Response** - TEI provided a complete and relevant RFP response. All questions and requests were answered upon request.
5. **Limit Liability, Indemnification & Compliance History** - TEI fulfills the requirements to minimize risk over the long term for hazardous waste disposal.

The most important outcome from this accomplishment is a strong and complete contractual agreement between MIT and the hazardous waste vendor, a significant step forward in this program. This contract will enable MIT to reduce the overall costs associated with the services provided, while improving upon the quality and reducing the risk of liability.

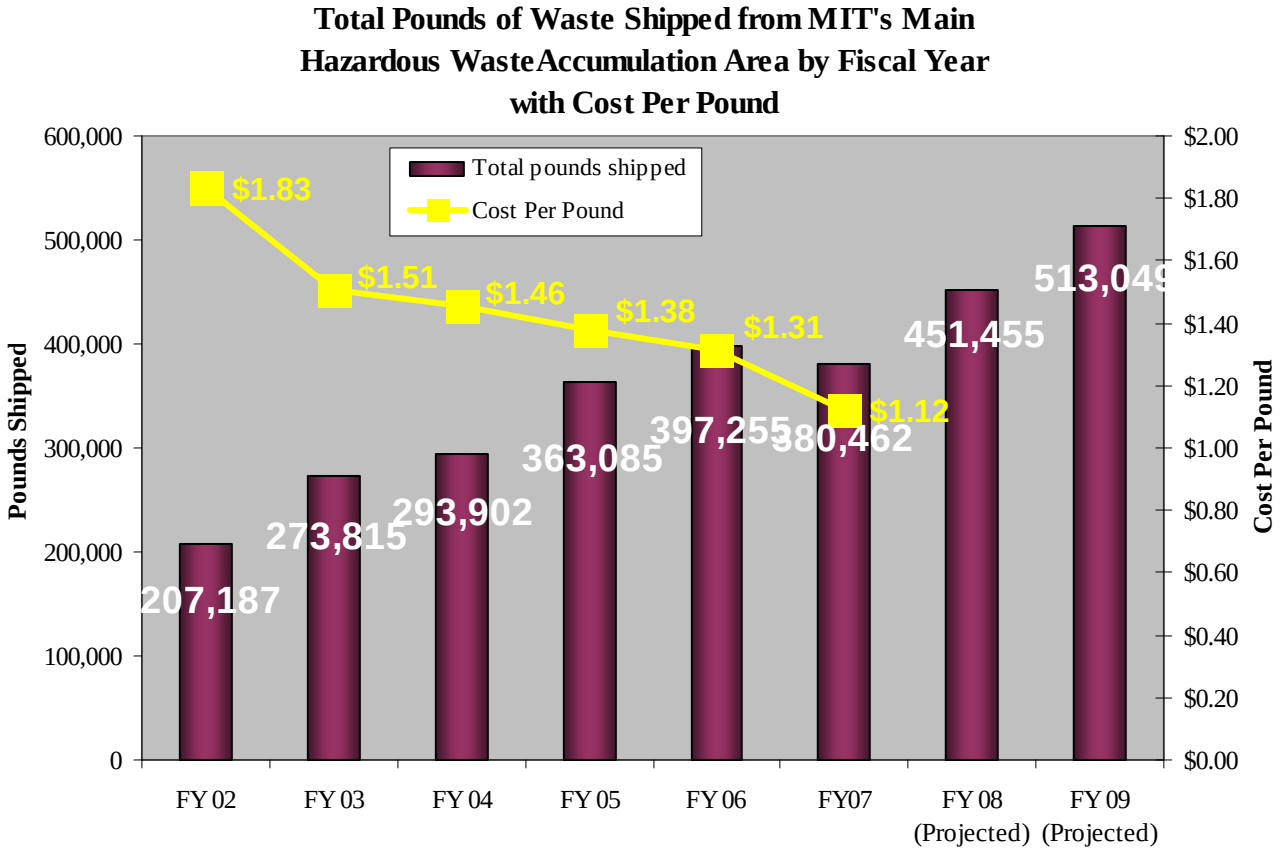
In FY 07 MIT continued the trend of unprecedented waste generation due in part to growth in both research and infrastructure. To confront this issue, a goal of waste reduction was set for the hazardous waste program using a balanced scorecard approach. Using an improved waste tracking system, focused strategic objectives were developed for departments, labs and centers with the highest waste generation. One objective worked on the consolidation of liquid effluent wastes from

certain lab procedures and lab equipment. Consolidation of these waste streams improve compliance in labs, reduce clutter, reduce waste and save money. There are several installations on campus and the program continues to catch on. One indicator of this success is the hazardous waste unit costs have consistently been reduced every fiscal year. These savings total between $7,000-$10,000 per month and will only improve with the new contract in place starting in FY08. Other program efficiencies leading to waste and cost reduction included:

- Increasing storage in the main hazardous waste accumulation area to reduce the number of pickups by 50%.
- Lab specific waste generation analysis.
- Fully staffed hazardous waste team.
- Improved communication and guidance.

As a result of all of these efficiencies, MIT achieved the first ever reduction in hazardous waste generation when compared with the previous fiscal year. Overall, hazardous waste generation (measured in pounds) at MIT decreased by 4% between FY06-07. Figure 5.1 shows the history of hazardous waste generation and disposal costs per unit. There has been a 15% reduction in costs per pound in FY 07 and an overall reduction of 40% since FY 02.

Figure 5.1



6. Ergonomics

The EHS Office has collaborated with MIT programs and departments to reduce repetitive stress and other injuries and lost workdays. The intended outcomes are an increase in productivity, a reduction in medical and disability costs, and, most importantly, reduced pain and suffering by members of the MIT community. The Ergonomics Committee, an ad hoc collaborative effort among the Libraries,

Information Systems, Human Resources, Facilities, Lincoln Laboratory, the Whitehead Institute, and MIT Medical as well as a student representative, and led by the EHS Office, introduced a web based training course in FY 05. In FY 07, 30 computer users at MIT have taken the training bringing the total, since launch in 2/04, to1326. In FY 07, the ergonomic web based training course experienced problems as a result of the introduction of new software by the service provider. Consequently, there was limited access with 30 people completing the program.

A key feature of this WEB course is to provide a risk assessment for each participant, classified as high, moderate and low and provides immediate feedback on corrective action they can take. If they complete the corrective actions, the program reclassifies them. In FY 07, 20 people were initially classified as high risk and after they made changes 5 (25%) were reclassified to a lower risk. Those remaining in high risk were contacted by the EHS Office for a site visit. There were 152 onsite visits conducted in FY '07. A follow-up survey indicated greater than 90% experienced improvement in their work environment.

DLCs with a high incidence of repetitive strain injuries collaborated with the EHS Office and Ergonomics Committee to develop programs to identify, correct, and prevent future injury. These involved detailed surveys and reviews of specific work sites and activities, the development of materials including PowerPoint presentations and videos, and the implementation of training. This program was implemented in the Department of Facilities, the Department of Student Life, and the Division of Comparative Medicine, the three DLC's with the highest injury rates.

7. <u>Construction Safety Program</u>

This is the fifth full year of the EHS Office's collaborative effort with funding from the Department of Facilities to provide EHS expertise to new construction and renovation projects. The objectives of the program are to assure that EHS requirements are addressed for new construction and renovations, to protect the MIT community during construction and renovation activities on campus, and to strengthen MIT's relationship with Cambridge authorities responsible for regulating these activities. This program involves an initial review of design and construction plans; close communication with Facilities project managers, contractors, and City of Cambridge Fire Department and Inspectional Services; and ongoing inspections of the construction sites. The advantages of the program include fewer regulatory inspections, fewer time delays, and cost savings. During FY 07, 6 major projects and 44 renovations were reviewed.

8. <u>Injury and Illness Reduction Initiative</u>

The EHS Office continues to work with MIT Departments, Labs and Centers (DLCs) to use the new incident reporting and investigation system completed in FY '06, which centralizes and electronically links all information related to an incident, facilitates data handling, and provides online access to reports on injuries to DOF Management, EHS Office staff, and DLC EHS Coordinators. Major focuses in FY '07 were continuing to introduce this new system to supervisors and using the information collected to design strategies to minimize future incidents. A program to certify a number of EHS Office staff in Incident Investigation was developed and implemented.

The incidence rate of total recordable injury and illness cases for CY '06, 2.5, is shown in Figure 8.1, along with data for the previous three years. While the downward trend in the incidence rate which had occurred over the previous three years did not continue for 2006 primarily due to the major fire at One Broadway, the incidence rate is still well below the CY '05 (latest available data) incidence rate for private industry (4.6) and equal to the incidence rate for colleges and universities (2.5). The focus of an initiative for CY '06 was to work with supervisors and employees to obtain a significant decrease in the number of days away from work. The number of days away from work

decreased by 33% from CY ’05 to CY ’06 and has decreased by 49% from CY ‘03 to CY ‘06. MIT saved an estimated $433,000 in CY ’06 relative to costs of lost productivity if the number of days away had remained the same as CY ’03, and an estimated $766,000 over the past 3 years (see Figure 8.2).

The trend in MIT’s incidence rate of cases with days away from work is shown in Figure 8.3. MIT’s rate continues to decrease and approach the national rate for colleges and universities, which has held steady for several years at 0.8. If MIT were at that 0.8 rate instead of the 1.1 rate, estimated, additional annual savings would be approximately $116,000 (details of calculation are shown in Figure 8.4).

Figure 8.1: Incidence Rate = number of injuries x 2000 hours/worker/year x 100 workers /total hours worked.

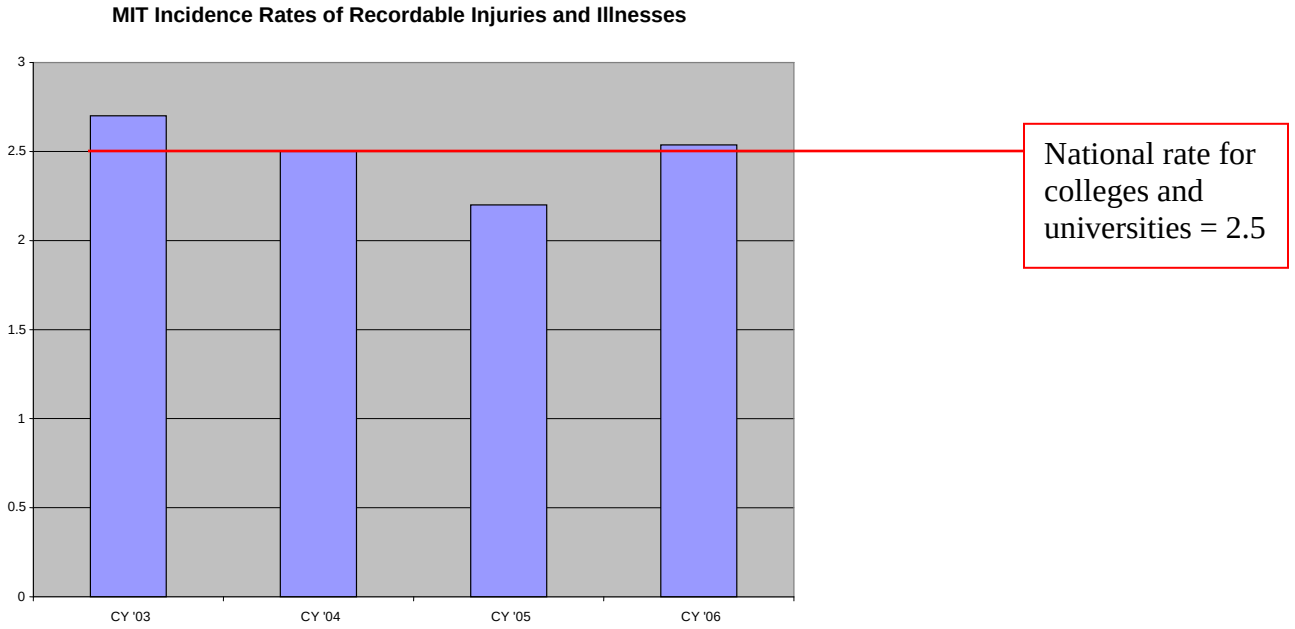


Figure 8.2.: Cost savings from reduction in number of days away

Year	Number of days away	Number of FTEs	Cost of FTEs[1]	Cost if days away equal to 2003[1]	Cost Savings
2003	2721	13.605	$816,300	$816,300	$0
2004	2295	11.475	$705,713	$836,708	$130,995
2005	2079	10.395	$654,885	$857,115	$202,230
2006	1385	6.925	$448,740	$881,604	$432,864

[1]Cost calculation uses the following estimated compensation: for 2006 -- $64,800; for 2005 -- $63,000; for 2004 -- $61,500; for 2003 -- $60,000.

Figure 8.3: MIT Incidence Rate of Cases with Days Away from Work

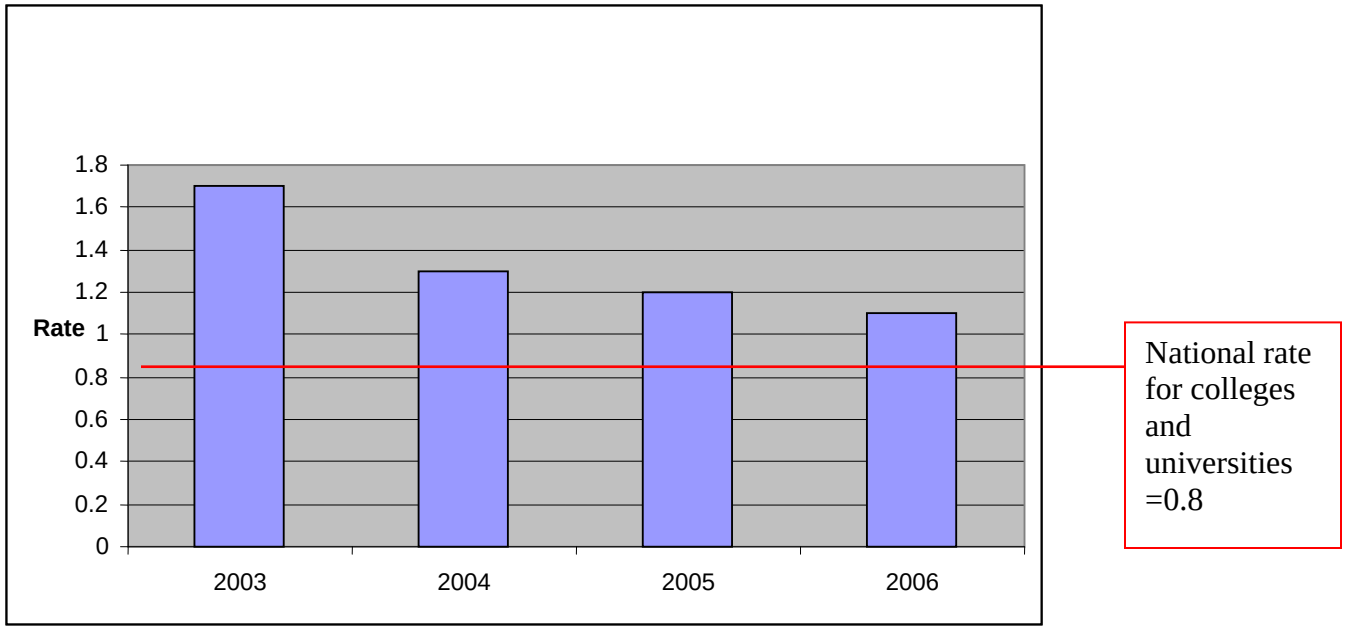


Figure 8.4: 2006 Cost savings if MIT were at the national incident rate for days away from work for Colleges and Universities (NAICS 6113)

	Days Away Rate	Number of cases	Number of FTEs lost[3]	Cost of Lost Productivity at $64,800 per FTE
MIT actual rate	1.1	116	6.90	$447,120
NAICS 6113 (university)	0.8	86[2]	5.11	$331,128
Difference	0.3	30[2]	1.79	$115,992

[2] Number of cases is calculated by rate x hours worked / (2000 hour per work year x 100 workers)

[3] MIT's average number of lost work days per lost work day case in 2006 = 11.9. FTEs is calculated by (number of cases x 11.9 lost work days/case) / 200 workdays/year/FTE

9. Select Agent Program

The passage of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 resulted in new US Department of Health and Human Services (HHS) and US Department of Agriculture (USDA) regulations, first promulgated in December of 2002, requiring tighter controls on access to, and the possession, use, transfer and disposal of, certain biological agents and toxins (called select agents and toxins in the regulation) that have been determined in regulations of the

HHS Centers for Disease Prevention and Control (CDC) and/or of the USDA Animal and Plant Health Inspector Service (APHIS) to have the potential to cause significant harm to the public, animal, and/or plant health or products. This act and the new regulations have had a significant impact on a small number of MIT laboratories, but have required MIT to register as an institution, to maintain strict inventory control on certain agents and toxins, to have FBI security risk assessments done on researchers and other staff who have access to such materials, and to have specially secured research spaces. The regulations have separate campus-wide and Lincoln-wide per PI toxin volume exemptions, and the EHS Office, with support by a faculty-led task force, worked with Procurement to implement central purchasing through the EHS Office Biosafety Program for all listed toxins to ensure that researchers who use these common toxins do not inadvertently exceed the volume exemptions and become subject to the regulations. All regulated agent purchases also must be made

through the EHS Office Biosafety Program Deputy Director or her alternate under the regulations. The EHS Office conducted several broad surveys of all laboratories potentially possessing or using regulated or exempt materials.

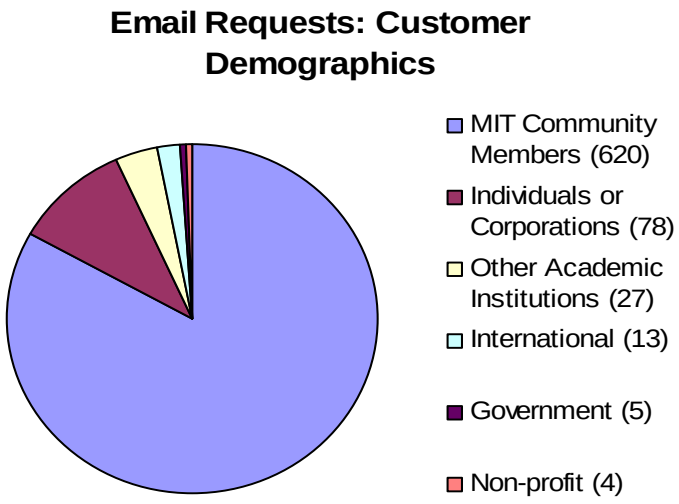
The Select Agent Program has undergone one federal agency inspections this past year. Inspections were conducted by the CDC and USDA. There were no significant findings.

10. Enhanced Delivery of EHS Services

10.1 Automated Requests Tracking

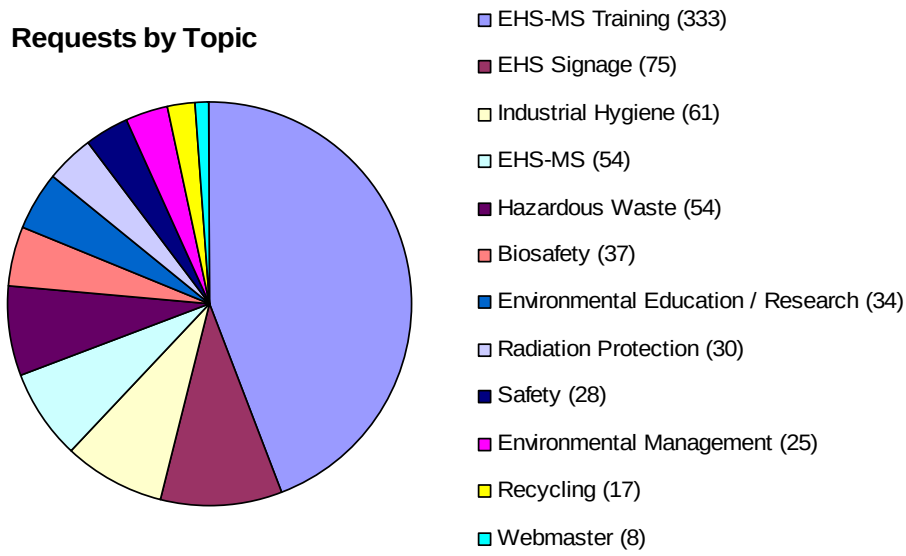
The EHS Office continues to triage and expedite its service response to internal and external customers using a single email alias for all EHS and EHS-MS questions. When customers submit requests to EHS using the environment@mit.edu email address, it submits their queries to the EHS queue in MIT's Request Tracker (RT) customer support system and emails the customer request to the EHS Office RT Administrator and backup. RT then sends an acknowledgement to the customer that their request has been received and to expect a response within 48 hours or less. The EHS staff personally assists most customers within two days, with the occasional more complex requests requiring additional time to resolve. Using this streamlined process, 747 customer requests and questions were resolved in FY '07. The source of the email request is shown below:

Figure 10.1.a



The EHS RT triage process provides information on the EHS-MS and EHS operations service areas that generate the most email requests. This helps management plan the resources required to meet customer needs. The breakout of types of requests by topic is as follows:

Figure 10.1.b



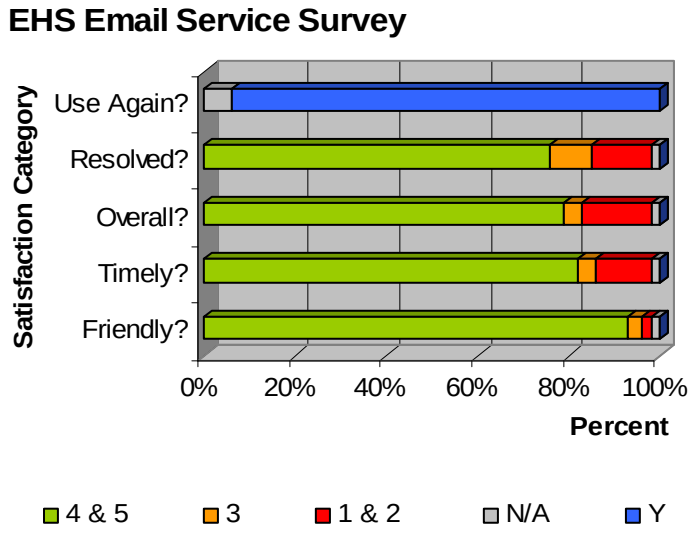
10.2 Customer Satisfaction Surveys

Once a customer request is marked as resolved, RT sends out a link to the EHS Customer Satisfaction Survey. This functionality, originally launched exclusively for EHS in FY '06, also identifies the numbers of the original requests so that EHS staff can provide additional assistance if the survey responses indicate that the services provided do not fully resolve the requests. This process supports both the EHS-MS and EHS operations continuous improvement initiatives. Monitoring and analyzing survey responses highlights types of responses that are most effective and those that could be improved. It also provides an electronic EHS "suggestion box" where customers send in ideas for improving the EHS-MS and EHS.

Of the 622 requests submitted to EHS (the survey was not operating for 18 weeks), 100 surveys were returned after the customers' requests were resolved or 16.1% of the total, a 2.9% increase from FY '06. Nine of the 100 surveys received included requests for additional service or clarification, providing EHS with the opportunity to better understand its customer's needs and to tailor its response to these individual clients' needs.

The results include 90 MIT customer surveys and 10 Non-MITers surveys. On a scale of 1 to 5 where 5 is the most positive the following illustrates the survey results:

Figure 10.2



11. Support for Special Off-Campus Projects

The EHS Office provided significant support to off-campus efforts over the past year. These activities included activities related to the Bates Linear Accelerator facility's decommissioning; extensive efforts in support of environmental activities for the Real Estate Office's portfolio properties; and support related to the Haystack Ultra-wideband Satellite Imaging Radar Upgrade Project.

During FY 05, the Bates Lab initiated a pre-D&D program as part of the DOE user facility phase-out. This program involved identifying and removing equipment, which would no longer be useful in future lab activities. As part of this effort, the EHS Office developed and implemented a screening procedure to separate those materials requiring disposal as radioactive waste from those meeting free-release criteria, representing an approximately $300,000.00 savings in D&D costs in FY '05 and $100,000 in FY '06 and $100,000 in FY 07.

12. Scope of EHS Activities

EHS Office activity metrics reflect the scope and intensity of services necessitated by both expanding research activity at MIT and a host of local, state, and federal EHS regulatory requirements that relate to this research. As MIT's research volume increased by almost 20% since FY2004, the EHS Office experienced at least a 10% or greater increase in activity. (See http://web.mit.edu/environment/ for more details regarding EHS activities.) Many EHS activities fall into the following three major groupings:

a. Surveys (typically involving measurements) to monitor the safe use of equipment and materials: Approximately 21,000 such surveys were implemented in FY '07 concerning equipment and safety practices related to the use biological and radioactive materials, chemicals, recombinant DNA technology, and infectious agents.

b. Inspections (involving detailed observations) conducted to verify the quality and compliance of EHS activity on campus and investigations initiated at the request of MIT programs and laboratories: approximately 7,000 such inspections took place this past year, encompassing the use and storage of hazardous waste, the use of ventilation hoods, and the use recombinant DNA technology or infectious agents.

c. Monitoring and prevention regarding a range of potential workplace hazards and exposures. This includes chemicals, asbestos, blood-borne pathogens, workplace injuries such as repetitive strain injuries, and safe practices during hot work. In FY '07, the EHS Office performed more than 3,800 lab analyses for chemical and biological materials and over 50,000 surface, air, and water samples for radioactive contamination.

d. Approximately 251 asbestos abatement projects were monitored and completed, a 33% increase from FY '06 due to an increase in renovation activities and implementation of new asbestos procedures.

Regulatory Interactions

OSHA	One complaint was filed with OSHA and is still under investigation.
Nuclear Regulatory Commission (NRC)	One unannounced inspection of the Special Nuclear Materials license, SNM-986, conducted on January 22-23, 2007. Based on the inspection findings, no violations were identified.
CDC, USDA	Each of these agencies separately inspected our select agent laboratories. All inspections were satisfactory and in some cases commendations were made.
Cambridge Fire Department	Training for the Cambridge Fire Department Hazardous Materials Response Team was conducted in preparation for "Operation Poseidon", an Office of Homeland Security drill simulating a radiological dispersal device explosion at the CambridgeSide Galleria, MIT EHS Office played a major role in the drill; fifteen EHS individuals participated on 9/17/06 (Sunday) from 5am to 1pm as radiological contaminated victims or as trained observers. EHS continues its effort in offering training to the Cambridge Fire Department and the Cambridge Police Department.
MWRA	Received notice of non-compliance for slightly elevated levels of mercury in waste water discharge. No monetary fine.
Cambridge Local Emergency Planning Committee (LEPC)	Several members of the EHS Office participated as members of the Cambridge LEPC. The Institute participated in two disaster drills with the City. EHS personnel assisted in the planning of one of the drills.
Massachusetts Department of Environmental Protection (DEP)	The EHS Office interacted with the Massachusetts DEP regarding many of MIT's 83 Massachusetts Contingency Plan sites (urban materials contaminated sites), many of which result from the location of our campus on urban fill. Massachusetts DEP assessed MIT $42,965 as the result of an accidental oil spill in November 2005. MDEP did not request any changes to MIT protocols and is in agreement that MIT addressed the cause of the accident immediately and adequately.

Massachusetts DPH Radiation Control Program	One unannounced inspection of the MIT Broad Scope license #60-0094 was conducted on October 4-6, 2006. There were no items of non-compliance found as a result of this inspection. One announced inspection of the MIT Broad Scope license #60-0094 was conducted on May 17-18, 2007 to verify the implementation of the "increased controls" security orders issued by the Nuclear Regulatory Commission in July 2006. There were no items of non-compliance found as a result of this inspection.

13. Communications and Awareness

Three newsletters were published and distributed last year with articles written by EHS and EPO staff members on a variety of topics. EHS staff also distributed EHS and EHS-MS information at the Vendor Fair, The Events Fair, the Health and Wellness Fair, and the Earth Day Fair. Awareness surveys were conducted at these events to assess awareness, as part of a Balanced Score Card initiative. Awareness is high amongst those working with potentially hazardous materials, indicated in light purple below, and significant for the campus as whole.

14. Campus Sustainability Initiatives

MIT's approach to EHS performance integrates important voluntary environmental stewardship initiatives – which are managed through the Campus Sustainability Program of the Environmental Programs Office - with compliance programs to reflect a holistic and high standard of stewardship. Numerous collaborative initiatives, involving many departments and programs at MIT, were undertaken over the past year to reduce MIT's environmental impacts and improve the safety and quality of life at MIT. These efforts benefit MIT, its neighbors and the region. Going well beyond regulatory requirements, these initiatives are intended to develop sustainable ways to safeguard the environment and the health and safety of the MIT and larger community.

14.1 Campus Sustainability Program

FY 2007 saw the continued growth of the Campus Sustainability Program with its development of new stewardship initiatives focused on energy and a deepening of our partnerships with faculty, students and staff alike. The Deputy Director position created in FY2006 continues to serve as focal point of new program development, coordination among other departments and academic units with campus sustainability roles, and liaison with senior leadership on issues of campus sustainability. This staff member was recognized with the institute's James N. Murphy award for his contributions to campus community life. The assignment half-time of an Assistant Officer in the EHS Office to support the Sustainability Program has allowed the program to meet some of the growing programmatic needs required by these new partnerships – especially with our students.

14.2 Support for Campus Operations, the Academy, and the Community: An Overview of Several Campus Sustainability Initiatives

EPO and EHS Office work to advance MIT's environmental goals relies on building and supporting collaborations across campus – and the community. These programs simultaneously work with MIT's operational units and DLC's to find ways of reducing environmental impacts in the way we

do business on campus – from the type of vehicles driven in the MIT fleet, to how we use and manage our energy – as well as working with faculty and students to support their interests and needs for researching the environmental impacts of our campus operations.

14.2.a Enhancing Campus Operations:

- FY 2007, the Environmental Programs Office continued to play a key role in developing the campus-focused campus energy initiative as a component of the new MIT Energy Initiative. In FY2007, the campus energy program has progressed from being a "proposed activity" to being a formal initiative of the MIT Energy Initiative. Staff from the Environmental Programs Office serve on the institute's Campus Energy Task Force to further develop the initiative into a comprehensive program for demonstrating leadership in campus sustainable energy practices. These efforts have been an important collaborative effort between MIT's administration, faculty and students.
- The Environmental Programs Office deepened it collaborations with the Department of Facilities on energy-related issues and focused on increasing support and programming for energy conservation. Through these collaborations, it is expected sizable energy cost savings will be realized as the planned conservation investments are implemented. Additional collaborations to introduce more environmentally friendly vehicles and the use of biofuels on campus have developed.
- MIT's Community Solar Power Initiative is managed by EPO in partnership with the Department of Facilities, and is now focused on making the installed systems available to students, faculty and the community for research and education. Through a grant developed and obtained by the Department of Facilities - augmented by an outside donor - installed solar power capacity on campus is expected to rise 200% in FY2008.
- EPO and EHS continued to promote collaborative partnerships to educate the community on recycling issues, build awareness of recycling opportunities and provide learning opportunities for our students. EPO and EHS Office continued to work closely in partnership with the Department of Facilities, the Working Group Recycling Committee (WGR) and others to support MIT's recycling and waste minimization programs to increase the Institute's recycling rates. In FY2007, MIT continued to achieve a recycling rate of over 40%. In addition, with EHS coordination, MIT again participated in the national Recyclemania Competition to strengthen recycling and awareness in the MIT dormitory community.

14.2.b Supporting Student Educational Opportunities:

- The Environmental Programs Office in partnership with the Education Program of the Laboratory for Energy and the Environment expanded its innovative Campus Sustainability UROP Program. The program is designed to facilitate the educational involvement of MIT undergraduates in practical research questions of interest and concern to campus sustainability initiatives at MIT. In FY2007, the program supported and supervised 7 Campus Sustainability UROPs.
- EPO partnered with the Sloan School's Sustainability Lab class to develop campus-focused research projects that addressed campus sustainability issues.
- EPO & EHS Office provided significantly increased technical and educational support to student research projects in FY2007 that focused on campus energy and environmental issues. From individual theses, class projects, student projects, and student organizations, EPO & EHS Office worked with students to provide data, operational information, and access to key operational personnel to enable them to conduct research that in return better informs us on aspects of our operations.

14.2.c Building Community Involvement:

- Supporting and participating in local and regional environmental initiatives is an important role of EPO and EHS Office. Together, EPO and EHS Office represent MIT in a number of off-campus community initiatives and programs to share information, learn best practices and to enable others to take action. Examples include participation in the Northeast Campus Sustainability Consortium, Greater Boston Breathes Better, Campus Consortium for Environmental Excellence, Cambridge Public School Volunteers, Boston Consortium, Clean Charles Coalition, Boston Earth Night, Campus Safety Health and Environmental Management Association, and many more. In FY2007, the Environmental Programs Office served on the Organizing Committee of an important new City of Cambridge initiative addressing energy conservation and climate protection, the Cambridge Energy Alliance.
- Earth Day – The largest Earth Day event at MIT took place in April 2007. Over 40 student, staff, educational and community organizations participated in the event. A week of environmentally focused activities led up to Earth Day to build awareness and engagement in stewardship initiatives. EPO and EHS were responsible for managing the joint student and staff Earth Day planning committee.

14.3 Pollution Prevention Program Efforts in FY07

General successes in 2007 include:

- Official launch of the Green Chemical Alternatives Wizard at the 2006 Campus Safety Health and Environmental Management Association (CSHEMA) Annual Meeting. Visitors to the Green Chemical Alternatives Wizard have come from over 50 different universities - including over 20 major research universities, approximately 12 private companies, and 9 governmental entities (the majority federal agencies). Since its launch, the Green Chemical Alternatives Wizard has logged over 1,100 visits representing over 475 separate domains. More than 15 websites representing research universities, government agencies, and nonprofit organizations have established a link to the Green Chemical Alternatives Wizard. The Green Chemical Alternatives Wizard received press coverage, including publication in MIT's Technology Review and in a major personal care products manufacturer newsletter.

- Hazardous chemical waste and waste packaging reduction. The 20-liter hazardous waste consolidation program continued to grow from the initial 5-building pilot effort initiated in FY2006. Reducing waste through further consolidation of liquid effluent wastes from certain lab procedures and lab equipment has proven to be successful. This program saves an estimated $7,000-$10,000 monthly (please refer to the Hazardous Waste Metrics section for data on reductions in the packaging associated with hazardous chemical waste removal). Consolidation of these waste streams improves compliance in labs, reduces clutter, reduces waste and, ultimately, saves money. The hazardous waste contract negotiated and signed in FY2007 now contains specific language and agreements for reducing waste at MIT. Under this contract the hazardous waste vendor has pledged to subsidize the installation of solvent recycling units in key locations on campus. There are also several other strategies to reduce waste generation at MIT and they are currently under development as part of the contract.

- Outreach to laboratories on solid waste recycling opportunities. In collaboration with the Department of Facilities Solid Waste Manager, the EHS Office visited biological laboratories to identify candidate materials for solid waste recycling, then delivered a presentation to Center for Cancer Research staff in May 2007. At present, these materials – predominately plastics – are

sterilized, and then are ultimately sent to landfills. The intent of the presentation was to raise awareness of recycling as a strategy to reduce waste while preserving laboratory safety standards.

- SYBR Safe® as an alternative to ethidium bromide for DNA gel staining. The EHS Office continues to promote and support laboratory conversion from ethidium bromide to SYBR Safe®. Using funds from its EPA People, Prosperity, and Planet (P3) grant, the EHS Office purchased 100 units of SYBR Safe®. Additionally, the EHS Office continues to field technical assistance requests from both on campus researchers as well as those in other research institutions.

- Promoting P2 awareness via Lab Specific Chemical Hygiene training. Laboratory Specific Chemical Hygiene training continues to serve as a vehicle for pollution prevention awareness training.

- Providing P2 tools for the MIT Community via the Working Group on Recycling's (WGR) "Working Green at MIT" site. The EHS Office served as a key content developer for the "Buy Green" portion of the redesigned WGR website (http://web.mit.edu/workinggreen/buy/index.html), launched during MIT's April 26 celebration of Earth Day. Buying green is pivotal to the concept of pollution prevention and toxics use reduction, and it is hoped this website will facilitate more sustainable purchasing practices.

  Greening of the 2007 Campus Safety Health and Environmental Management Association Annual Meeting. Through its role in the tri-campus Host Committee for the 2007 CSHEMA annual meeting in Boston, the EHS Office spearheaded efforts to green the CSHEMA conference, which had over 400 attendees. Green conference features included: a) a meeting facility with a strong sustainability program; b) reusable water bottles and recycled content pens; c) locally sourced speaker gift bags; d) host committee shirts made with bamboo, a renewable and sustainable material, and e) shuttle services to and from the conference site that ran on alternative fuel. MIT also produced an ordering guide, which included links to green meeting information and buying local.

15. Extended Outage/ Pandemic Planning, Emergency Management and Business Continuity

MIT continues to develop response and recovery protocols for an extended outage such as an influenza pandemic or other disaster. MIT's approach is three fold: First to organize around general emergencies using the National Incident Management System (NIMS) model as required of entities receiving federal funding. Second, planning with local departments, laboratories, centers, and offices to ask them to prepare themselves for any extended outage from pandemic influenza to power outages to a severe Winter or Summer storm. And third is to respond professionally and effectively to emergencies and to support MIT departments in recovering their business should a loss occur.

15.1 Emergency Organization

To organize for emergencies MIT EHS and MIT Police have developed an Emergency Operations Center (EOC) to muster the service of all MIT departments to resolve major emergencies. In September, 2006 MIT participated in a regional and Federal, State and Local agency emergency drill called 'Operation Posiden'. MIT EHS provided actual radiological sources to be placed on mock victims for this 'radiological dirty bomb' scenario. MIT EHS regularly trains the Cambridge Fire Department on radiological detection. MIT's EOC was also activated for the drill and participated in the exercise. A communications drill to examine MIT's ability to communicate quickly with our community is planned for the Summer of 2007. MIT Police and EHS are planning how to address the intersecting issues of security, policing, emergency management, and EHS programs in a more

systematic way. In the past year the EVP approved the new position of an emergency planner jointly reporting to MIT Police and EHS Headquarters.

A companion organization for MIT executives is planned as a leadership forum for decisions about messages to the MIT community, parents, press, and for decisions about recovery efforts, major commitment of resources, etc.

15.2 Emergency/ Disaster Planning

To prepare for large emergencies and disasters EOC has been communicating with many parts of MIT to raise awareness and interest, to begin some trials of preparation and drills, and gain adoption of emergency planning as a necessity at the Institute. Notably, the Division of Student Life and the Dean of Undergraduate Education have begun to analyze the impacts of a major emergency or outage and plan mitigation of these impacts. Additionally, we have engaged the Faculty Policy Committee, the Committee on Undergraduate Program, the Controllers Accounting Office, Human Resources, the Registrar's Office, Student Financial Services, Dean for Undergraduate Education, Dean for Graduate Education, Dean for Student Life, Assistant Deans (across all Institute Schools), Committee on the Assessment of Biohazards, Administrative Officers within the School of Engineering, AACII, General Counsel, Insurance Office, Facilities, and others at MIT and beyond to begin planning mitigation of an extended outage using pandemic influenza as an exercise. To support this work going forward, the Provost has approved a temporary assignment for a retired Senior Associate Dean to continue this planning.

The Massachusetts Department of Public Health and the Cambridge Hospitals are collaborating with MIT in planning responses to a public health emergency such as pandemic influenza. MIT is sharing information about our facilities and resources which could be shared with the intention of extending MIT Medical's ability to care for our MIT community as well as extend the care available to all of the MIT area of Cambridge.

Additionally, departments such as Facilities and Dining and Housing which rely on incoming supplies or service or groups that provide essential service to other parts of MIT are examining supply and service chains to determine how they can be made more redundant, more robust, more substantial, or more resilient in the time of an upset. Supply and service chains are of great concern especially in light of the decentralized procurement systems in place at MIT and our urban location.

MIT's Engineering Systems Division participated with MIT EHS to examine disaster potentials facing the Institute. This work was carried out by Hua Li, a graduate student under the guidance of Professor George Apostolakis. The results of this work show disaster types that have higher likelihood and severe consequences as well as other disaster types that have very low probability but extreme impact. This work is helping to prioritize the preparation and planning of MIT emergency officials. The work was also commissioned by a grant from FEMA and the Massachusetts counterpart MEMA.

Future work will seek to increase the emphasis on local departments planning their own mitigation to protect their work and research. Engagement of the research mission has been slower than the academic program and we will seek to increase the engagement with researchers in the coming year. More formalization and participation in emergency centers and drills will be needed, as well as participation by MIT executives in an upcoming drill to improve emergency management at MIT.

15.3 Business Continuity

On December 8, 2006 a major fire at One Broadway caused the first mass-victim emergency in memory at our campus. An NStar electrical worker died in the accident and more than 50 people

were treated and/or transported to area hospitals with smoke inhalation. MIT had about 80 personnel as tenants in the building.

MIT EHS provided support to the affected departments in helping to access service groups of MIT for restarting their business. Many lessons were learned including the need and for addressing anxiety among workers as well as restoring business equipment.

MIT is forming a business continuity team to systematically address these issues and well as plan for future business outages. We are also collaborating with UC Berkeley which has developed a business continuity tool to assist in restarting business at a university. The tool is freely available.

16. Emerging Issues

16.1 Nanotechnology

EHS has been establishing a close collaboration with MIT faculty and staff who are conducting research in the area of nanoparticles. EHS has been closely monitoring the studies on potential health effects and waste issues of nanoparticles and public perception of potential new hazards presented by nanoparticles and communicating this to research staff. EHS has been at the forefront in characterizing potential exposures to nanoparticles and conducted air sampling in 5 MIT laboratories in collaboration with the UMASS Lowell Department of Work Environment. The UMASS group purchased an $80,000 research monitor, which can measure particles between 5 to 500 nm. The five laboratories in which sampling was conducted were in the following departments: Institute for Soldier Nanotechnology, Mechanical Engineering, Department of Material Science and Engineering, Electrical Engineering and Computer Science, and Laboratory for Electromagnetic and Electronic Systems. The operations sampled included carbon nanotube growth reactors (both atmospheric and vacuum), work with nanometer size amorphous silica powder, and electrospinning with polyacrylonitrile fibers and fullerenes. Air sampling confirmed that the work practices and engineering controls in place for these research areas are effectively reducing nanoparticle exposures. EHS will continue to seek out those beginning research in this area through the EHS-MS organizational structure, print and web communications, and IAP presentations.

The City of Cambridge has formed a Scientific Advisory Committee to investigate the need for a local ordinance on nanotechnology. EHS represents on it on this committee.

16.2 Toxic Substance Control Act (TSCA)

TSCA requirements related to research with new materials were presented in EHS Rep orientation training and in Lab Specific Chem Hygiene training to expand the effort to educate research personnel about their requirements under EPA's TSCA.

16.3 Reduction of Injuries and Illnesses

Substantial savings to the Institute can be realized if the number and severity of injuries and illnesses can be reduced. We plan to work collaboratively with the Department of Facilities to identify programs to reduce their injury and illness rate.

16.4 PCB's in building materials

In the past year MIT has learned that a number of buildings built after 1930 and prior to 1978 may have polychlorinated biphenyl compounds (PCBs) in some of the original construction materials such as masonry caulking. Some PCB materials have been discovered in an MIT housing unit and an effort is underway under the oversight of the US EPA and the Massachusetts Department of Environmental Protection to remove and replace these materials. MIT EHS is also developing

protocols for other candidate buildings to be sure they are checked when renovations or other disturbances would both make prudent sense and have regulatory requirements to evaluate and remove these materials.