

# Environmental Programs Office and Environment, Health, and Safety Office

## Overview

The Environmental Programs Office (EPO) is the headquarters office for the central Environment, Health, and Safety (EHS) Office of MIT. EPO is also the steward of MIT's Environment, Health, and Safety Management System (EHS-MS). MIT's policy is to exhibit EHS performance that exceeds regulatory compliance. EHS-MS works to ensure that MIT is an excellent environmental citizen and a leader in health and safety performance.

## Highlights

The EHS-MS and the EHS Office received awards from several government agencies and renowned organizations this year. A successful outside audit of the EHS system was completed in late April 2006. EHS training participation has increased from 4,000 individual sessions per year to 22,500 per year since implementation of the EHS system began in 2003. Hazardous waste cost per unit is lower, although newly constructed facilities and increased research activity increased total waste generation. And, the rate of total recordable injury and incidence cases for MIT continues to decrease, with both figures well below the national average for colleges and universities.

## Awards

The Institute's EHS program received numerous awards this year.

On May 22, 2006, the City Council of Cambridge passed a resolution recognizing MIT's leadership in environmental stewardship, particularly its model environmental programs in energy, sustainable design, storm water management, solar photovoltaics, and education. The resolution also thanked MIT for sharing its knowledge and experience with other institutions and for promoting sustainable practices.

MIT received a 2006 City of Cambridge GoGreen Business Award for outstanding recycling and waste minimization programs that helped MIT reach its target rate of recycling: 40 percent. EHS staff plays a key role in advancing recycling objectives and building awareness of such programs by partnering with the Department of Facilities, the Residential Life Programs Office, and the Working Group Recycling Committee.

Two EHS/EPO staff members were awarded 2006 MIT Excellence Awards in the Creating Connections category for their contributions on the Working Group Recycling Committee. And, one EHS staff member was honored with an Infinite Mile Award from another department.

EHS/EPO, in collaboration with the Department of Chemistry, was one of seven teams awarded funding through the People, Profits, and Planet (P3) program run by the US Environmental Protection Agency (EPA). MIT was one of 40 teams competing nationally for Phase 2 funding. The award enabled the design and delivery of the Green Chemical Alternatives Wizard, a web-based interactive tool that enables researchers to make more benign purchasing choices.

EHS/EPO was awarded an \$84,000 grant from the EPA to develop a clean diesel program on campus and in the City of Cambridge and to install advanced pollution control devices on the Institute's diesel vehicles.

MIT and EHS/EPO's work in reducing diesel emissions and leadership in the EPA's Greater Boston Breathes Better consortium was recognized with a certificate of excellence given jointly by the regional administrator of the EPA and the secretary of the Massachusetts Executive Office of Environmental Affairs.

MIT placed third in the country out of more than 90 colleges and universities in the paper recycling category at RecycleMania 2006.

### **Third Party Audit Report, Response, and EHS-MS Performance**

MIT hired Woodard and Curran Inc. to perform a comprehensive representative audit of its EHS Management System. The audit was performed in late April 2006 and fulfills the requirement in MIT's consent decree with the US EPA and Department of Justice to complete a systems audit of EHS-MS.

The following outlines the auditor's findings.

*Overall awareness.* Without exception, the audit team found that faculty, staff, members of the administration, and students with specific roles and responsibilities within the framework of the EHS-MS were aware of the implementation initiative and the general objectives of the system.

*System is becoming part of the MIT culture.* There is general understanding and acceptance of the purpose and benefits of the MIT EHS-MS, and there were no incidents identified in which it was being disclaimed, challenged, or ignored.

*Core elements of the EHS-MS have been implemented.* The foundation of MIT's EHS-MS is based on several core system elements. The system requirements associated with these elements have been emphasized and there is widespread evidence of implementation in accordance with the requirements.

*Strong management commitment.* The audit team interviewed many of MIT's senior managers from both the academic and administrative offices. There is strong agreement about the importance of having practical, consistent, and effective systems to manage the inherent EHS risks associated with MIT's activities and operations, and of creating a community that is safe for all and protective of the environment. All senior managers endorse MIT's EHS Policy and are committed to continual improvement of MIT's EHS affairs.

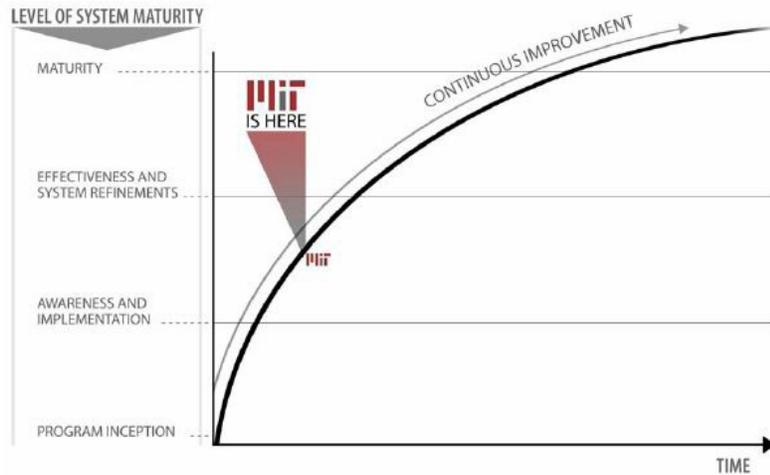
*Improved involvement and acceptance of MIT EHS Office.* Several MIT faculty and staff members commented that another benefit of the EHS-MS has been a more common understanding and better working relations between the EHS Office and the departments, labs, and centers (DLCs).

The audit did find evidence that MIT's EHS system is young and will need time and cycles of improvement to reach full effectiveness. Figure 1, taken from the audit report, illustrates the auditors' conclusions.

## Accomplishments

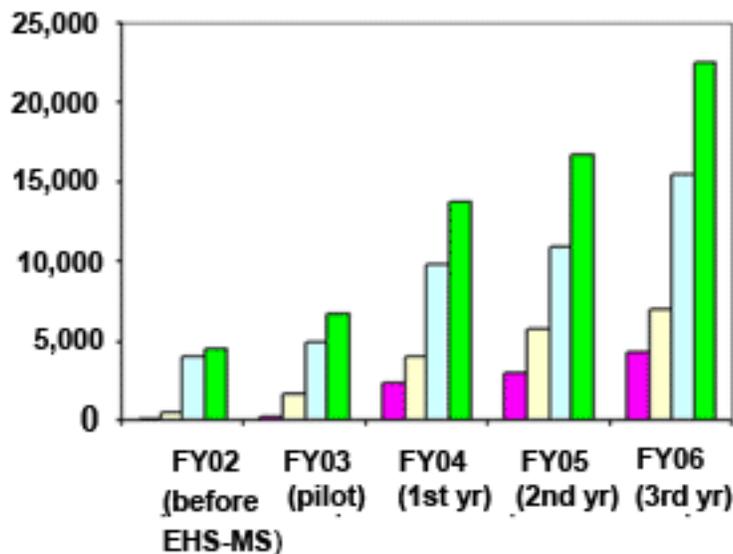
### Impact of EHS-MS on EHS Training

There has been a 12-fold increase in the number of individuals completing the Managing Hazardous Waste training sessions between FY2002 (the year before the EHS-MS training system was launched) and FY2006. For the same time period, overall EHS training participation has increased more than fivefold from 4,000 individual sessions to 22,500 (see following figure)



### Number of Participants in EHS Courses delivered (by fiscal year)

#### # of participants

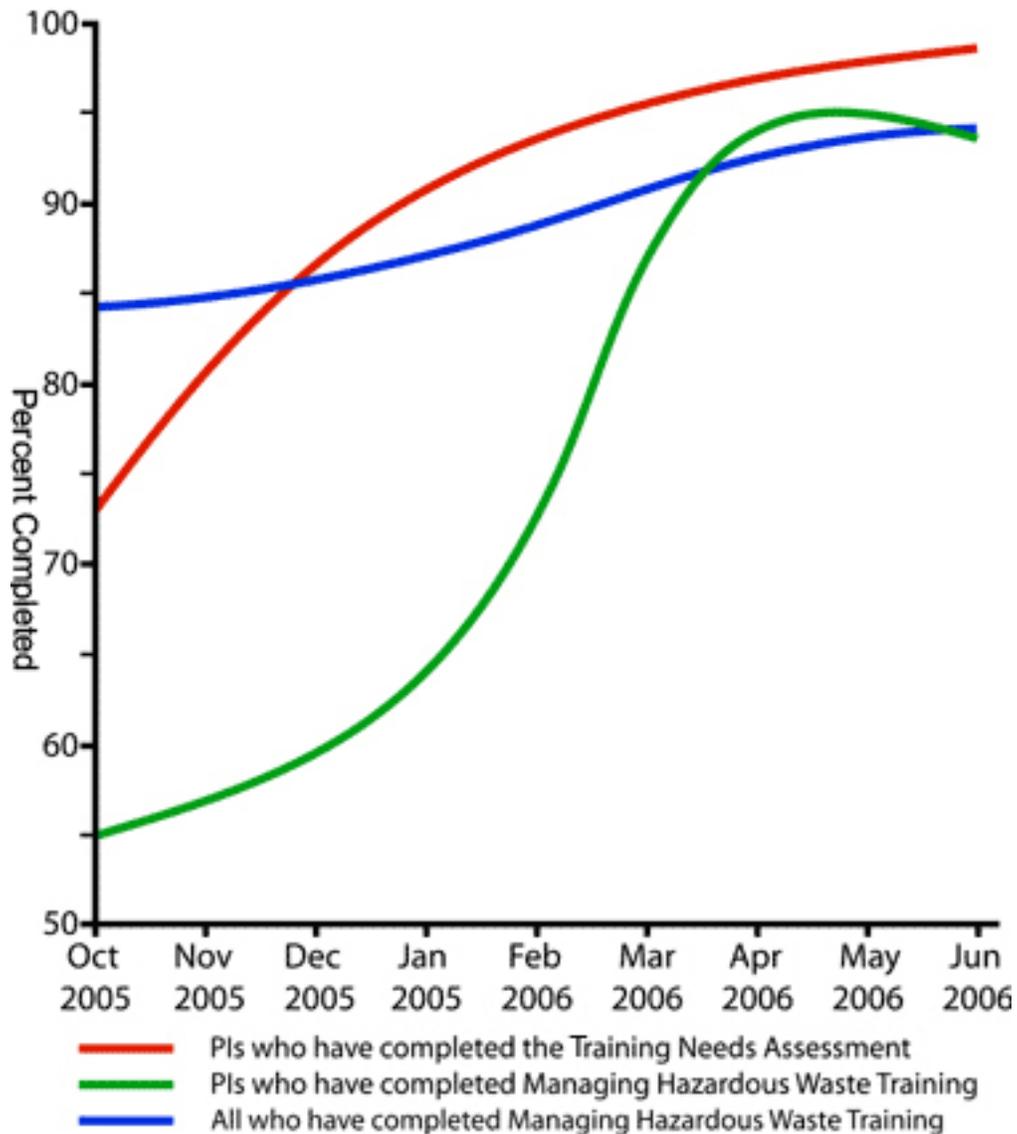


- 501 Managing Hazardous Waste (classroom and web)
- Total EHS web courses completed (including Lincoln Lab)
- Total EHS classroom participation (including Lincoln Lab)
- Total EHS training participation (including Lincoln Lab)

Note: An individual may be a participant in more than one course.

Note that it is unlikely the system will ever show 100 percent statistical compliance (see Figure 3) because (1) a system lag can cause training to appear necessary for people who have left the Institute or their positions but who have not yet been removed from the system, (2) training needs assessments may be filled out incorrectly, indicating a need for training when there is none, and 3) people may fill out the training needs assessment form well before they begin work, creating an artificial lag in training. A new data reconciliation procedure, instituted in FY2006, will help 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.

### EHS Training Completion Rates



### Inspections

The EHS inspection team of EHS experts and colleagues in the academy, in conjunction with several members of Information Services & Technology (IS&T), developed an online reporting system for inspections. This system, which is accessed via SAPweb,

went live on August 1, 2005, and gives those performing inspections more options and greater ease in reporting. EHS coordinators from around the Institute contributed to the development of this system, which allows for findings to be recorded in a handheld device (such as a Palm) then uploaded into SAPweb. EHS coordinators are able to customize reports as they see fit, while the EHS Office will have SAP as the backbone to manage inspection data.

### **Faculty Research Protocol Support and Compliance Committees**

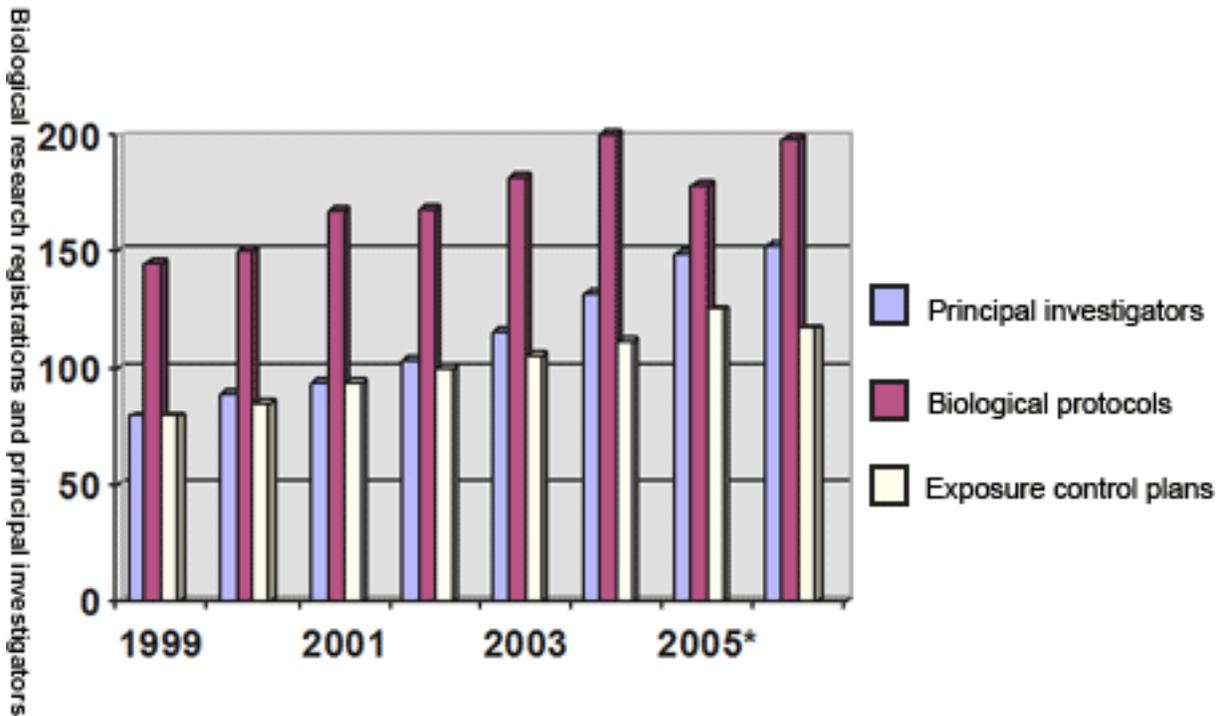
The EHS Office's protocol development and review support is integral to our faculty's undertaking safe and legally compliant research. There are six faculty research oversight committees with significant EHS implications: the Committee on Use of Humans as Experimental Subjects (COUHES), the Institutional Animal Care and Use Committee, the Radiation Protection Committee, the Committee on Toxic Chemicals, 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 members who chair 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 six 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 for environmental programs, director for 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.

Overall, the EHS Office has direct contact with almost 50 percent 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. For example, US Department of Health and Human Services (DHHS) funding at MIT grew by 226 percent during 1999–2005. In the past six years, the number of principal investigators (PIs) enrolled in the Biological and rDNA Research Project Registration Program has increased by 71 percent, and the number of research protocols reviewed by the EHS Office and approved by the oversight committees has increased by 32 percent. By comparison, the number of tenured and tenure-track faculty at MIT has increased by only 6 percent within the Schools of Science and Engineering and the purview of the vice president for research and associate provost.

The addition of the Brain and Cognitive Sciences Complex and the Broad Institute resulted in a 34 percent increase in the amount of laboratory space associated with biological research. Figure 3 shows the growth in biological research as measured by the number of PIs and protocols registered in our system.

**Increase in Biological Research Registrations and Principal Investigators in the Schools of Science and Engineering and Reporting to the Vice President for Research, FY1999 to FY2006**



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

The growth of bioresearch at MIT dramatically increases the workload of the EHS Office. 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 other areas.

The Institute Biosafety Officer led an effort to reduce the burden on researchers using established human cell lines. COUHES 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 the Office for Human Research Protections nor by the National Institutes of Health (NIH). This agreement removes the conflict with NIH grant process created by the former COUHES requirement. MIT's 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 will no longer require COUHES registration and approval, which reduces their administrative burden.

The Radiation Protection Program of the EHS Office reviewed/renewed 65 applications or amendments for authorizations to use radiation-producing material under MIT's

license. The total number of authorizations currently in effect is 134, used in 648 laboratories by almost 1,500 researchers. Each authorization covers one to several protocols and is required to be reviewed biennially. There are currently 389 protocols on file for use of radioactive material.

### **Positive EHS Initiatives and Collaborations**

MIT's approach to EHS performance integrates positive initiatives with compliance to reflect a holistic and high standard of stewardship. In the past year, 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.

### **Campus Sustainability Program**

The Environmental Programs Office this year substantially strengthened its commitment and ability to advance the Institute's environmental goals and expand its leadership position in the emerging area of campus sustainability. In FY2006, a deputy director position in the Environmental Programs Office was created to guide EPO's voluntary positive initiatives to reduce the environmental impact of campus operations in a comprehensive manner, while seeking process efficiency gains wherever possible.

### **Support for Campus Operations, the Academy, and the Community**

The work of the EPO and the EHS Office to advance MIT's environmental goals relies on building and supporting collaborations across campus and in the community. These programs work with MIT's operational units and DLCs to find ways to reduce the environmental impact of doing business on campus, from the type of vehicles driven in the MIT fleet to how we use and manage our energy. We also work with faculty members and students to support their research into the environmental impacts of our campus operations.

### **Enhancing Campus Operations**

The Environmental Programs Office played a key role in developing a campus-focused sustainable energy initiative that was included in the MIT Energy Research Council's May 2006 report to the president. Titled "Walking the Talk," the chapter outlines a comprehensive road map for demonstrating leadership in campus energy management and was an important collaborative effort between MIT's administration and faculty.

MIT's Campus Solar Power System Program, managed by EPO in partnership with the Department of Facilities, is now focused on making the installed systems available to students, faculty, and the community for research and education. President Susan Hockfield presided over the inauguration of the latest solar photovoltaic system in November.

The Environmental Programs Office and the City of Cambridge, through its MIT-Cambridge Clean Diesel Collaborative, partnered to win a competitive grant from the EPA. The grant is to be used to install advanced diesel emission controls on vehicles, in an effort to improve local air quality.

A collaboration led by the EHS Office with the Department of Facilities, Bates Laboratory, and the Laboratory for Energy and the Environment is currently assessing the feasibility of installing wind turbine power generation technology at the MIT Bates Laboratory in Middleton, MA. The study is analyzing the potential wind resource, electrical demands, and financial implications of this renewable energy project.

### ***Supporting Student Educational Opportunities***

The Environmental Programs Office has developed and is implementing with the Education Program of the Laboratory for Energy and the Environment an innovative Undergraduate Research Opportunities Program in campus sustainability. The program is designed to facilitate the involvement of MIT undergraduates in practical research questions of interest to campus sustainability initiatives at MIT.

The EPO and the EHS Office significantly increased their technical support to students conducting research on campus energy and environmental issues in FY2006—for everything from individual theses to class projects to work undertaken by student organizations. EPO and EHS worked with students to provide data, operational information, and access to key personnel in order to facilitate such research, which in turn better informs us about our operations.

### ***Building Community Involvement***

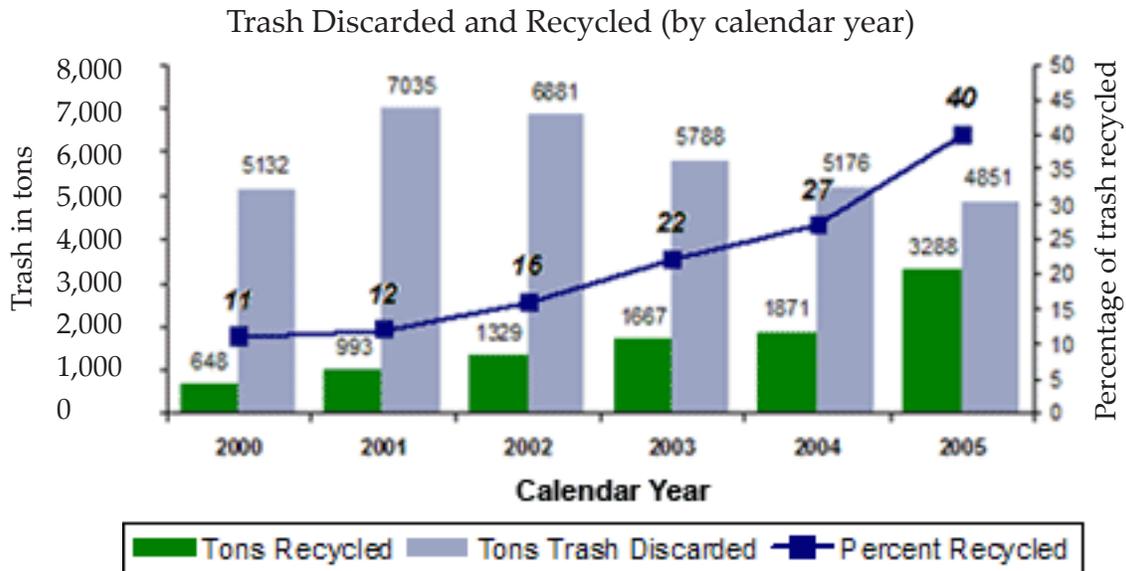
Supporting and participating in local and regional environmental initiatives is an important role of the EPO and the EHS Office. Together, EPO and EHS represent MIT in a number of off-campus community initiatives and programs to share information, learn best practices, and enable others to take action. Examples include participation in the Northeast Campus Sustainability Consortium, Greater Boston Breathes Better, Campus Consortium for Environmental Excellence, Cambridge Local Emergency Planning Committee, Cambridge Public School Volunteers, Boston Consortium, Clean Charles Coalition, Boston Earth Night, and the Campus Safety Health and Environmental Management Association.

### ***Recycling and Waste Reduction***

The EPO and the EHS Office continued to work closely in partnership with the Department of Facilities, the Working Group Recycling Committee, and others to improve waste management, reduce costs, and increase the Institute's recycling rates.

MIT has achieved and sustained its 40 percent recycling rate goal for the entire 2005 calendar year, and is on track to surpass 40 percent in 2006. This 40 percent recycling goal was adopted by MIT to support the 40 percent recycling goal called for in the Cambridge Climate Protection Plan. In addition, MIT has continued to reduce its discarded trash tonnage annually from a high in 2001. Since 2001, MIT has reduced its discarded trash tonnage by 2,184 tons, or 30 percent.

MIT has committed to a comprehensive Institute-wide effort to reduce waste and increase the percentage of materials recycled. This is a result of collaborative efforts from multiple departments, student and staff environmental groups, and faculty support. The successes and improvements of the program can be largely credited to collaboration, a tremendous accomplishment on such a large and diverse campus.



MIT recycled more than 3,000 tons of material in 2005. Using figures taken from the EPA and the Northeast Recycling Council, it's possible to extrapolate MIT's environmental impact in 2005. Recycling at MIT reduced greenhouse gas emissions by more than 860 tons; reduced other air pollutants by 37 tons; reduced waterborne wastes by 4 tons; and saved more than 29 million BTUs of energy, the equivalent of 5,139 barrels of oil, 240,000 gallons of gasoline, or taking 436 passenger cars off our roads.

### Pollution Prevention Program Efforts

General successes in 2006 include:

*Launch of the 20 Liter Can Program*, which reduces hazardous chemical waste packaging. The 20L Can project is a cost reduction program that reduces the per gallon charge for flammable liquids disposal, (MIT's highest volume hazardous waste) from \$3.97 to \$2.80 per gallon. The program is currently working toward the goal of saving MIT \$14,000 off the hazardous waste budget.

*Use of new chemical sharps containers*, which reduce hazardous chemical waste packaging. Improved containers and better guidance for the chemically contaminated sharps waste stream has yielded a monthly savings of \$720 by reducing the number of containers shipped per week by about two.

*Acceptance of SYBR Safe* as an alternative to ethidium bromide for DNA gel staining. As part of a demonstration project funded by the EPA P3 grant "Encouraging Toxics Use Reduction in Academic Laboratories," two undergraduate teaching labs received startup supplies of SYBR Safe, a product that is safe enough to dispose of via sink drains and meets the sewer standards of the Massachusetts Water Resources Authority. Both labs are now using SYBR Safe. A case study from this effort is available. Additionally, two large lab groups in two different DLCs received SYBR Safe samples to try.

*Piloting Pollution Prevention (P2) awareness* via lab-specific chemical hygiene training. Nine groups in Chemical Engineering received P2 awareness training; as a

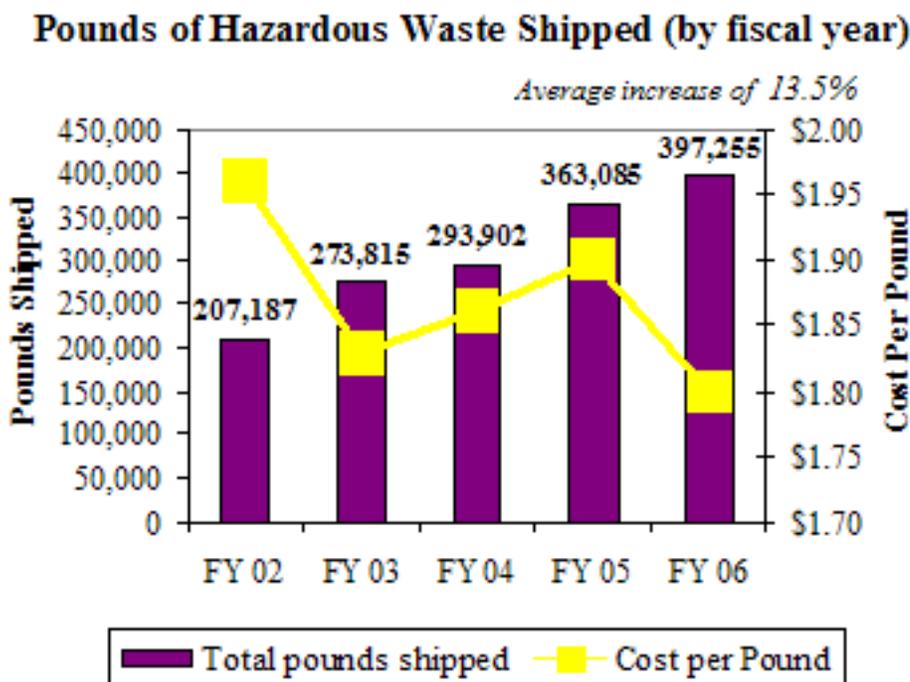
result of this training, one lab implemented a substitution of a hazardous cleaning solution, and two other labs have requested similar information.

*Development of tools to assist the MIT community in adopting P2 practices.* The Green Chemicals Wizard, [http://web.mit.edu/environment/academic/green\\_chemicals.html](http://web.mit.edu/environment/academic/green_chemicals.html), launched in June 2006, is a deliverable under the EPA P3 grant referenced above. The wizard provides an interactive approach to the static flowcharts of alternatives previously accessible, and allows the user four starting points: (1) chemical to replace, (2) process to replace, (3) search by a known alternative chemical (4) search by a known alternative process. Peer-reviewed journal references and other references are provided; this information can either be printed or emailed to the user. The wizard also contains buttons that link to the vendors (the VWR company or SciQuest) and SAP (only accessible to MIT users with certificates). Finally, the program includes a function that allows EHS to track where people are entering and exiting the system.

### Hazardous Waste Metrics

Overall, hazardous waste generation (measured in pounds) at MIT increased by 10 percent between FY2005 and FY2006 and by 35 percent for a two-year period beginning in FY2004. The greatest impact on waste generation is lab cleanouts encouraged by the implementation of the EHS-MS. The effect of these cleanouts can be measured both in total pounds generated and services provided. Newly constructed facilities and increased research activity have also affected total generation.

The EHS Office has continued to seek efficiencies and cost savings as a way to manage hazardous waste disposal costs within budget in an environment of expanding research and overall regulatory compliance. Figure 6 shows the actual waste shipped from FY2002 to FY2006.



## **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 important, reduced pain and suffering by members of the MIT community. The Ergonomics Committee, an ad hoc collaborative effort involving the Libraries, IS&T, Human Resources, the Department of 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 FY2005. In FY2006, 432 computer users at MIT took the training, bringing the total since launch in February 2004 to 1,296.

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 training. This program was implemented in the three DLCs with the highest injury rates: the Department of Facilities, the Division of Student Life, and the Division of Comparative Medicine.

## **Construction Safety Program**

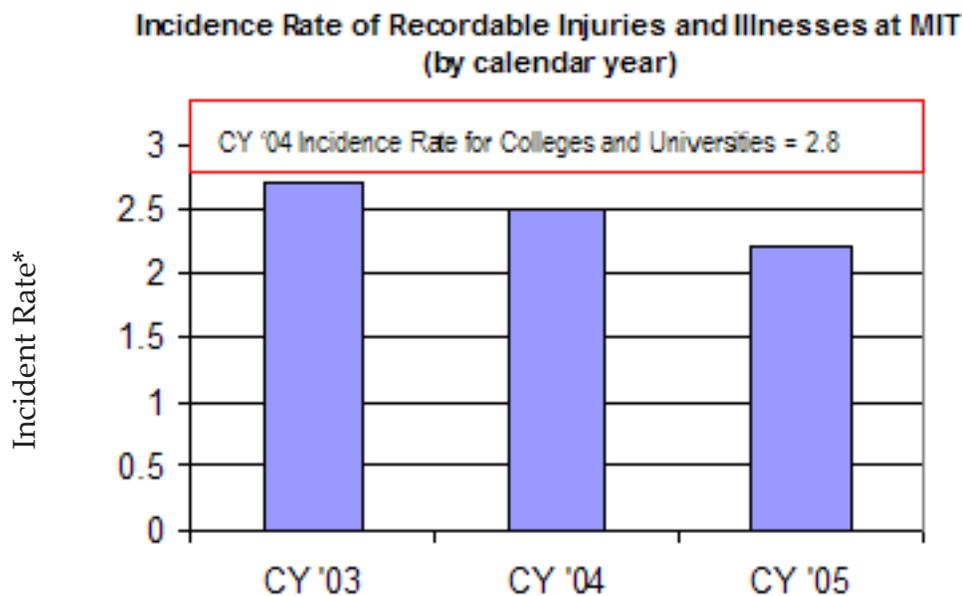
This is the fourth full year of the EHS Office's effort, with funding from the Department of Facilities (DOF), to provide EHS expertise for new construction and renovation projects. The objectives of the program are to ensure that EHS requirements are addressed for new construction and renovations, to 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 DOF 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 FY2006, five major projects and 49 renovations were reviewed. In FY2004, we initiated a "Lessons Learned" review for major projects to help minimize adverse effects on future projects. This led us in FY2005 to develop a matrix for EHS-related issues and tasks during laboratory moves and decontamination. That matrix supports a standard operating procedure called "moving a laboratory: preparation and decontamination." The procedure will allow for more economical and efficient moves.

## **Injury and Illness Reduction Initiative**

The EHS Office has worked with the Department of Facilities and the Division of Student Life (DSL) since early 2004 to institute a department-wide incident investigation program and a Return to Work/Temporary Modified Duty program. The EHS Office began by sending monthly injury summaries to DOF Management and to the DSL EHS coordinator so that they would be aware of the type of injuries occurring and take action to prevent further injuries. A web-based incident reporting and investigation system completed in FY2006 facilitates data handling because it centralizes and links all information related to an incident. It also provides online access to reports on injuries to

DOF management, EHS Office staff, and EHS coordinators within the DLCs. Introducing this new system to supervisors and to the EHS Office and EHS coordinators was a major focus in FY2006.

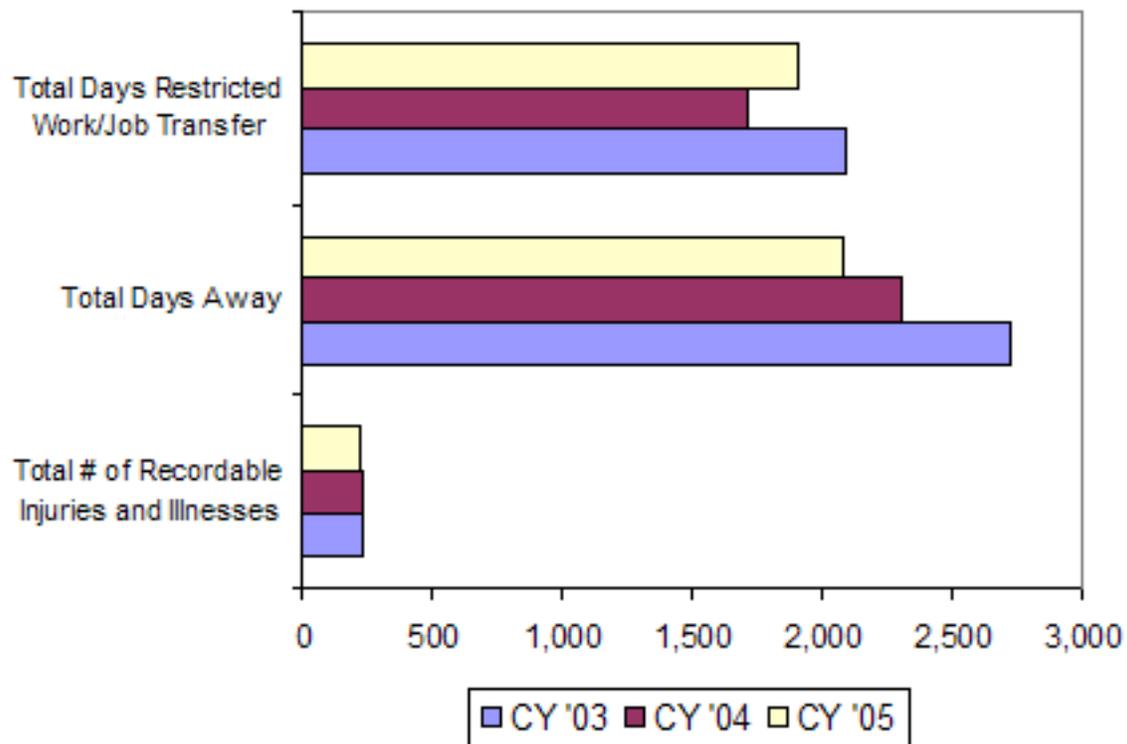
The incidence rate of total recordable injury and illness cases for calendar year 2005 is 2.2, a number that continues a downward trend for MIT (see Figure 7) and is below the calendar year 2004 (latest available data) incidence rate for private industry (4.8), and also below the incidence rate for colleges and universities (2.8), according to the US Department of Labor's Bureau of Labor Statistics. Figure 8 shows the MIT trends for the last three calendar years in numbers of days of restricted work/job transfer, number of days away, and total number of injuries. While the number of injuries has remained relatively constant, the days away from work has decreased by 24 percent from 2003 to 2005.



\* The incidence rate shows the injuries and illnesses recorded per 100 workers and is calculated by multiplying the number of injuries times 2,000 hours per worker per year times 100 workers divided by the total hours worked

\*\* Source: US Department of Labor's Bureau of Labor Statistics

### OSHA Recordable Injuries and Illnesses (by calendar year)



### Emergency and Security Preparedness Program

To foster collaboration among affected units during emergencies, a drill was held in April 2006 that exercised MIT's Emergency Operations Center and tested an MIT Medical disaster plan. Seventeen MIT departments participated in the drill, which was observed by city and state emergency management officials. The purpose of the drill was to demonstrate MIT's ability to distribute emergency medications to our entire community within 48 hours. MIT achieved the desired patient rate throughout the drill. MIT's emergency preparedness community, led by EPO, MIT Police, MIT Medical, and DOF has expanded during this time of planning for a possible pandemic of influenza. Efforts are centered on programs of social distancing and alternate ways of MIT continuing its mission during pandemic conditions. Since resources and supply chains could be affected simultaneously nationwide, MIT is determining ways to improve robustness at supply chains and services. From the perspective of business continuity, pandemic influenza presents new issues. Many MIT departments are now determining which operations must continue (e.g. power plant or police services), which operations can be deferred for a number of weeks, and which operations can be deferred for two to six months. A master plan for pandemic preparedness is in development.

### 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 (DHHS) and US Department of Agriculture (USDA) regulations. First promulgated in December 2002,

they require 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 to have the potential to cause significant harm to the public, animal, and/or plant health or products. These determinations are reflected (alone or in combination) in the regulations of the DHHS Centers for Disease Prevention and Control (CDC), and of the USDA Animal and Plant Health Inspector Service. 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 campuswide and Lincoln-wide per-PI toxin volume exemptions. 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, a procedure that ensures 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 inspection this past year. Inspections were conducted by the CDC and USDA. There were no significant findings.

### **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 FY2005, the Bates Lab initiated a pre-decontamination and decommissioning (D&D) program as part of the DOE user facility phase-out. This program involved identifying and removing equipment that 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 savings in D&D costs in FY2005 and \$100,000 in FY2006.

### **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 10 percent since FY2004, the EHS Office experienced at least a 10 percent or greater increase in activity. (See our website for more details regarding EHS activities.) Many EHS activities fall into the following three major groupings:

*Surveys (typically involving measurements) to monitor the safe use of equipment and materials.* Approximately 21,000 such surveys were implemented in FY2006, concerning equipment and safety practices related to the use of biological and radioactive materials, chemicals, recombinant DNA technology, and infectious agents.

*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. They encompassed the use and storage of hazardous waste, the use of ventilation hoods, and the use of recombinant DNA technology or infectious agents.

*Monitoring and prevention of 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 FY2006, the EHS Office performed more than 3,800 lab analyses for chemical and biological materials and more than 50,000 surface, air, and water samples for radioactive contamination.

Approximately 189 asbestos abatement projects were monitored and completed, a 25 percent decrease from FY2005 that was due to a reduction in renovation activities and the implementation of new asbestos procedures.

More than 7,000 faculty, staff, and students received training concerning the use of biological or radiological materials, chemicals, hazardous waste, emergency response, and cutting and welding safety, a number that indicates an increase of more than 10 percent. Web-based training increased by 21 percent.

### **Regulatory Interactions**

Occupational Safety and Health Administration (OSHA)

Three complaints were filed with OSHA. Two were resolved with no citations issued. One resulted in four citations and a small fine of \$2,500. All issues were immediately corrected.

Nuclear Regulatory Commission (NRC)

One routine inspection of the MIT nuclear reactor was conducted by the NRC. No notices of violations were issued.

Centers for Disease Control and Prevention, US Department of Agriculture

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 for radiation safety, chemical and biological hazards, and air sampling techniques. Members of the EHS Office worked with the Fire Department on emergency planning procedures.

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.

## **Emerging Issues**

### ***Nanotechnology***

EHS has been collaborating closely with MIT faculty and staff who are conducting research in the area of nanoparticles. EHS monitors the studies on potential health effects and waste issues related to nanoparticles and monitors the public perception of potential new hazards presented by nanoparticles, communicating this information to research staff. EHS has been at the forefront in characterizing potential exposures to nanoparticles and conducted air sampling in five MIT laboratories in collaboration with the University of Massachusetts (UMass) at Lowell's Department of Work Environment. The UMass group purchased an \$80,000 research monitor, which can measure particles between 5 nm and 500 nm. The five laboratories in which sampling was conducted were in the following DLCs: the Institute for Soldier Nanotechnology, the Department of Mechanical Engineering, the Department of Materials Science and Engineering, the Department of Electrical Engineering and Computer Science, and the 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 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 presentations during the Independent Activities Period.

### ***Toxic Substance Control Act***

Toxic Substance Control Act (TSCA) requirements related to research with new materials were presented in EHS representative orientation training and in lab-specific chemical hygiene training. This expanded the effort to educate research personnel about their requirements under EPA's TSCA.

A web page is planned for FY2007 to clarify requirements and assist researchers with compliance.

### ***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 collaborate with the Department of Facilities to identify ways to reduce their injury and illness rate.

### ***Security of Hazardous Materials and Equipment***

A significant effort is being made to increase security with respect to hazardous materials and equipment. Now that there are more regulations in this area, as well as more prudent laboratory practices, EHS and security experts are able to look more closely at laboratory and facility operations with an eye toward deterring intentional actions. Recently, investments in access control and security measures have been made at many locations across MIT with the support of the executive vice president and the director of security. EHS has taken the initiative to assess security risks in order to help security professionals protect MIT.

**William VanSchalkwyk, Director for Environment, Health, and Safety Programs**

**Lou DiBerardinis, Director, Environment, Health, and Safety Office**

*More information about the Environmental Programs Office and the Environment, Health, and Safety Office may be found at <http://web.mit.edu/environment/ehs/>.*