Environmental Programs Office and Environment, Health, and Safety Office

The Environmental Programs/EHS Headquarters Office works with senior leadership to establish MIT's vision for environmental stewardship together with policies for securing the health and safety of the MIT and larger communities. In keeping with MIT's values, EHS performance at MIT is expected to exceed the standard of regulatory compliance and embody the Institute's commitment to excellence as an environmental citizen of the world. EHS Headquarters oversees MIT's Environment, Health, and Safety Office, its sustainability programs, and the EHS-related aspects of MIT's emergency preparedness, all of which provide critical support services for establishing and maintaining the high standard of day-to-day EHS performance at MIT.

Highlights

In January 2008, the US District Court released MIT from a consent decree to which it had agreed in 2001 following an inspection of MIT laboratories by the US Environmental Protection Agency. In agreeing to the termination of the consent decree, both EPA and the Justice Department indicated that MIT had fulfilled all the requirements of the decree and its submissions had met every deadline not only on time but with high quality results.

Participation in EHS training increased by 13 percent, to 26,500 individual sessions, in 2008. This represents an overall increase of nearly 600 percent since implementation of the EHS system began in FY2002. We continue to maintain training completion rates of 90 percent or greater for core EHS courses.

Hazardous chemical waste cost per unit decreased by 12.5 percent in FY2008 for a total reduction of almost 40 percent since inception of the management system in FY2002. Total volume of waste decreased by 5.5 percent in FY2008, for a total decrease of 9.5 percent in the past two years. These reductions come despite increases in research volume.

Implementation of a chemical inventory system facilitated 100 percent participation in an inventory mandated by the Department of Homeland Security's regulatory program for chemicals of interest and almost 30 percent participation in the completion of a full chemical inventory.

In April 2008, MITAlert, the data-collection front end of a campus-wide emergency notification system, was launched following an emergency communications discovery process, led by EHS Headquarters and the Security and Emergency Management Office, to identify, coordinate, and prioritize emergency communications and notification development.

FY2009 Goals

- Maintain or increase training completion for core EHS courses
- Implement an improved inspection program to provide a more consistent and efficient method to capture, support, and correct findings

- Work with the Training Alignment Team to develop EHS content in a new PI orientation course and to assist in the development of other non-EHS training across campus based on lessons learned with the EHS system
- Work with Facilities to develop a standard practice for ventilation and energy conservation that helps reduce energy use without adversely affecting the safety and health of occupants
- Evaluate and improve key safety programs with a focus on confined space entry, control of hazardous energy sources, and fall protection
- Assess the status of the following programs across campus with respect to regulatory compliance and best practices: controlled substance, universal waste, commercial vehicle use, and integrated pest management
- Involve the EHS management system organization with energy management and integrate the effort with that of the MIT Energy Initiative's Campus Energy Task Force
- Refine emergency management, including emergency operations center–based response protocols, communications, logistics, and operations plans as outlined in the National Incident Management System

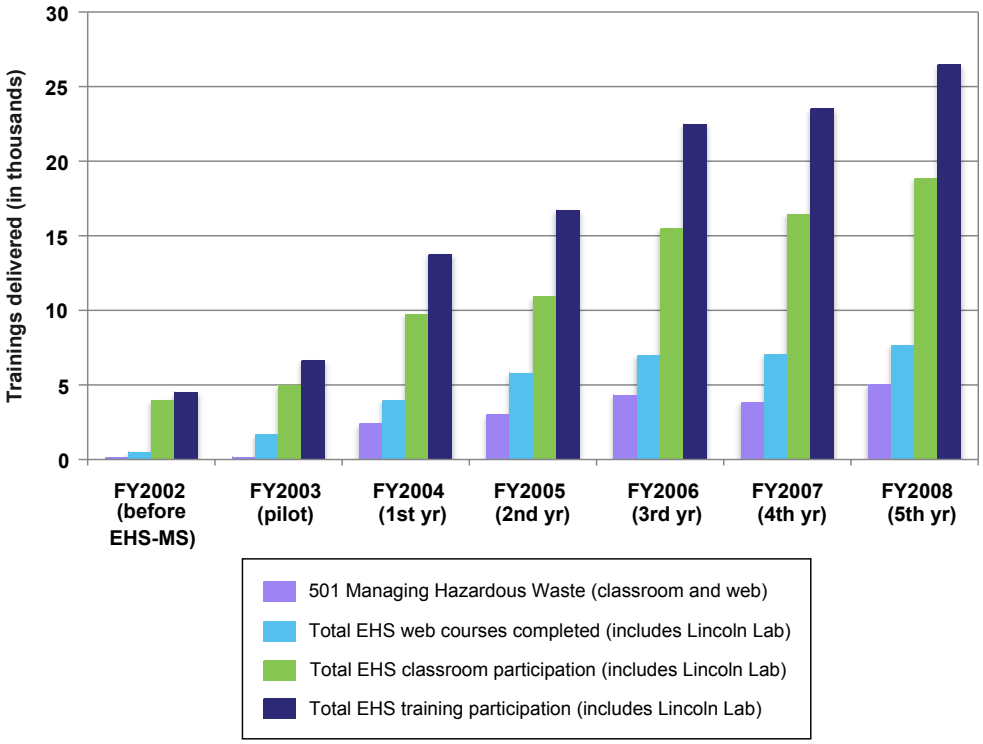
Training

Impact of EHS Management System on EHS Training

There has been a 14-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 FY2008. For the same time period, overall participation in EHS training has increased almost 6-fold, from 4,500 individual sessions to 26,500.

- Since FY2002, 11,792 individuals have taken at least one EHS course. In FY2008, 2,039 took a course for the first time, and there were 9,444 individuals who were active in the EHS training system.
- There was a 34 percent increase in the number of EHS course participants from FY2005 to FY2006, following a 20 percent increase the previous year. This rate appears to be leveling off with a 4 percent increase from FY2006 to FY2007 and a 13 percent increase in FY2008. We believe we are now reaching almost all of those who need EHS training.
- For FY2008, 29 percent of EHS training was web delivered, a figure that has been consistent over the last three years.
- Web courses currently available are Managing Hazardous Waste, Oil Spill Prevention, Hazard Communication, Chemical Hygiene, Bloodborne Pathogens, Hydrofluoric Acid, and Nuclear Reactor Radiation Safety. Three web modules (Managing Hazardous Waste, Chemical Hygiene, and Hydrofluoric Acid) have been customized as a separate course for Lincoln Laboratory.

Figure 1. Number of EHS course trainings delivered,* FY2002–FY2008



* Trainings refers to one participant in one course; an individual may be a participant in more than one course.

Core Courses Training Completion Metrics

This is the second year we have tracked metrics for EHS core courses across the Institute. The July 1, 2007 data is presented in Table 1.

Table 1. Completion Rates for Core EHS Courses*

	No. Attending		Completion Rate	
Course	FY2007	FY2008	FY2007	FY2008
General Chem. Hygiene and Haz Com (100 and 120)[1]	4,568	5,627	96%	96%
Lab Specific Chem. Hygiene and Haz Com (110 and 121)[2]	3,314	3,917	85%	86%
Bloodborne Pathogens (200 and 210)[1]	1,526	1,489	92%	95%
General Biosafety (260)[2]	2,688	3,417	97%	99%
Radiation Safety (301)[2]	1,074	868	96%	96%
Laser Safety (371)[2]	962	996	96%	93%
Managing Hazardous Waste (501 and LL 506)[1]	3,918	5,036	87%	89%

[1] Live and web course

[2] Live only

* 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 FY2006 has helped to rectify this issue. This data indicates 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.

Inspections

The EHS-MS Audit/Inspection program is a key component of the management system that monitors and promotes the effectiveness of regulatory training and compliance, together with good practices to achieve environmental sustainability. This program consists of three tiers of inspection designed to assess performance and conditions, correct problems, and prioritize areas for improvement.

The Level I weekly inspection is conducted by the department, laboratory, or center (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 DLCs, and annually in non-research areas, by the DLC's EHS coordinator and the EHS Office. The Level III audit is a third-party audit conducted on a two-year cycle that can be focused on the overall system or on specific elements. A Level III audit will be completed by the end of the 2008 calendar year.

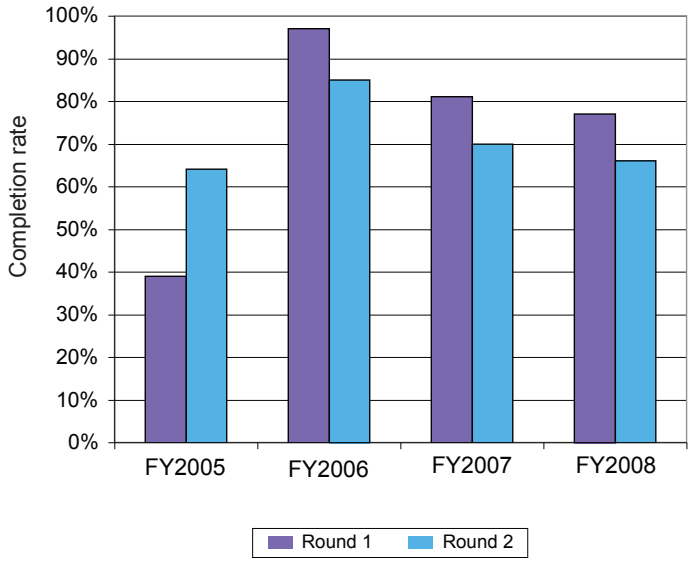
Ongoing Programs

Level II Inspections/Performance Metrics

Two rounds of Level II inspections were conducted in research areas, and one in operations areas, in FY2008. The completion rate in research DLCs for each round since system implementation, as measured by percent of research space subject to inspection, is shown in Figure 2. The results show that approximately 80 percent of registered space was inspected in FY2008. While a slight decrease in performance has been noted since FY2006, implementation of a system redesign scheduled for fall 2008, as noted below, is expected to simplify the process and improve performance.

For these inspections, a DLC-specific checklist is created based on registered hazards for the spaces. Findings are either corrected at the time of inspection or assigned to someone for correction. The total number of findings in CY2007 inspections in key question categories is consistent with those found for CY2006 and significantly reduced from

Figure 2. Completion rate for Level II inspections, FY2005–FY2008



CY2005 results. This consistency is evidence of the continued benefits of training and overall awareness of EHS issues across MIT.

Laboratory Inspection System Upgrade

In the spring of 2007, the Inspections Service Team proposed a redesign of the Level II Inspection component of the EHS-MS to help increase program compliance. The proposed improvements will eliminate the confusion that surrounds some of the finding terminology used in the initial version of the software. The proposed system design will also streamline the inspection process by reducing the number of keystrokes that the EHS coordinator needs to make in order to submit each lab or work area inspection report. The new inspection system is due to launch in the fall of 2008.

Faculty Research Protocol Support and Compliance Committees

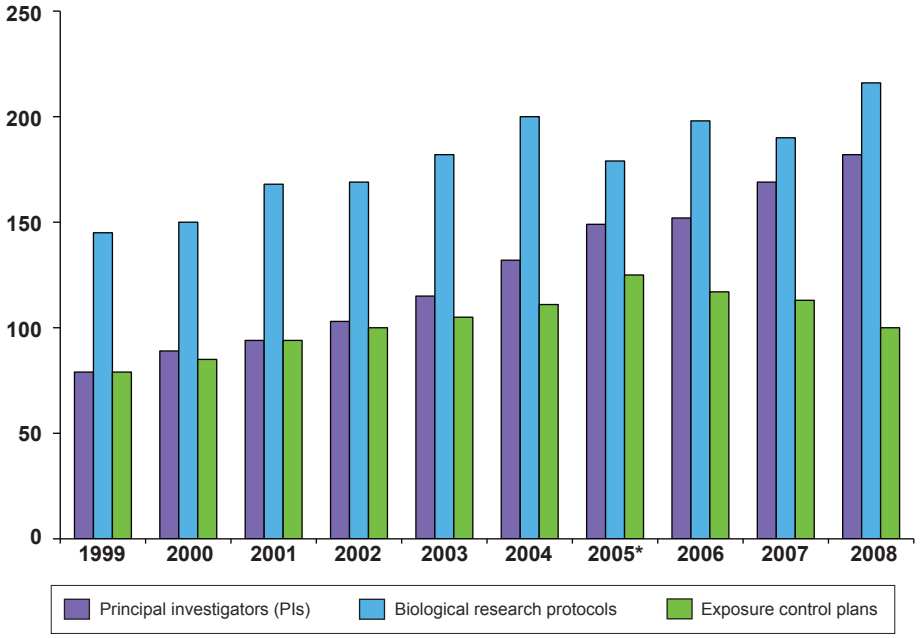
The EHS Office's support for protocol development and review is integral to the MIT faculty's ability to undertake safe and legally compliant research. There are six faculty research oversight committees with significant EHS implications: the Committee on Use of Humans as Experimental Subjects, the Institutional 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 management system. The EHS Office participates in all six faculty research oversight committees and provides administrative support for the Radiation Protection Committee (RPC) and the Committee on Assessment of Biohazards (CAB).

The EHS Biosafety Program and the Lincoln Laboratory 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 Draper Laboratory. The Institute's Radiation Protection Committee also functions as the Whitehead Institute's Radiation Committee. The Radiation Protection Program also supports Draper Laboratory's Radiation Protection Committee.

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. In the past eight years, the number of PIs enrolled in the Biological and rDNA Research Project Registration Program has increased by 100 percent, and the number of research protocols reviewed by the EHS Office and approved by the committees has increased by 44 percent. By comparison, the number of tenured and tenure-track faculty members at MIT has only increased by 6 percent in the Schools of Science and Engineering and the

Figure 3. Increase in biological research registrations and principal investigators in Science, Engineering, and the Vice President for Research from FY1999 to FY 2008



*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.

Vice President for Research areas. Figure 3 shows the growth in biological research as measured by the number of PIs and protocols registered in our system.

The projected growth in research space utilized for biological research at MIT has fulfilled expectations. However, the growth in research space is not just due to the new buildings outlined below; we have also seen the renovation of a number of non-research spaces into biolabs. With the addition of many new faculty members engaged in bioresearch last year, we expect this growth to continue; we already have three new faculty members with lab renovations underway who are in process of registering their research, and they have been included in the data for 2007–2008.

This growth of bioresearch at MIT coupled with the development of several new research technologies, including synthetic biology, nanoparticle delivery of biological materials, and development and use of hES cells, will challenge EHS BioSafety staff to develop the expertise needed to provide an appropriate level of collaboration and oversight for these projects while maintaining the expected level of performance in all the other areas.

Center for Disease Control Select Agent and Toxin Program

This program remains relatively stable in its size and complexity. We continue to see monthly requests for security renewals of one or two registered personnel. We continue to conduct annual retraining and manual reviews and tests of the security program. Two EHS personnel have been registered and approved as alternative responsible officials to assist the Select Agent Program with the paperwork and training burdens.

The bioresearch program is at a stable size at Lincoln Laboratory, and use of select agents remains constant. Overall bioresearch effort at Lincoln Lab is increasing in different areas, with funding coming from the Department of Homeland Security for things like detection of bioagents in shipping. DHS has asked Lincoln Lab to begin to address these gaps in security, leading to interesting biocontainment and control issues.

Radiation Programs

Radioactive Material Authorization and Machine Registration Program

This program remains the main link between the EHS-Radiation Protection Program (RPP) and the licensed material user community within the academy. The MIT license of broad scope was successfully renewed with the Massachusetts Department of Public Health during the past year. The new expiration date is September 2012. The license was amended by orders in May 2008 to reflect the latest changes in the "increased controls" requirements. All uses of radioactive material and radiation producing equipment are reviewed and approved by MIT's Committee on Radiation Protection on a continual basis. There are currently 133 authorizations of which 66 were renewed or amended during the past year. RPP staff conducted biennial audits of research projects during the authorization renewal process. RPP performed its annual program audit of all of its operational programs, and RPP staff performed one security audit of all licensed material storage locations.

Service programs within RPP are implemented to support the authorization and registration process. Programs include control/security of materials received at the Institute, the collection and management of low-level radioactive waste, worker and environmental radiation monitoring, laboratory surveys and sample analysis, radiation worker training/retraining, instrument calibration, packaging/transport of radioactive samples, and emergency response are in effect to serve the authorized projects. There are approximately 600 registered low and medium radiation labs, for which approximately 14,000 regulatory required radiation surveys were performed.

Analytical X-ray Program

EHS-Radiation Protection Program staff performed annual inspections on all analytical x-ray systems. There are currently 32 analytical x-ray units. RPP provides area radiation monitors for these installations and audits the medical and dental x-ray installations at MIT Medical, providing dosimeters/training to workers.

Non-Ionizing Radiation Programs

Laser Safety Program

By taking advantage of the Level 2 inspection program within the EHS management system, RPP's laser safety program works at improving implementation of the registration requirement for all Class 3b and Class 4 lasers. There are approximately 1,200 lasers in our current inventory. Registration includes a safety/risk analysis of the laser system by EHS staff, development of standard operating procedures by the laser users, and training of all laser workers. The laser safety program is allowing a stronger link to the academy similar to authorization program.

At Lincoln Lab, RPP staff continue to spend considerable time performing laser hazard analysis and review for projects requesting outdoor use of lasers propagated from Lincoln Lab buildings to the hut on its flight facility. Since these lasers traverse normally populated areas both on Lincoln property and on Hanscom Air Force Base property, specific SOPs and training are essential for their safe use. As a result, there has been a continued increase in laser hazard analysis and reviews for projects being done at the Lincoln Lab Flight Facility and for laser use in aircraft.

Radio Frequency Sources

There has been increased demand for review of radio frequency (RF) safety plans for sources at Lincoln Lab and Millstone Hill. Lincoln Lab has established an RF safety committee, and RPP is working with the committee to rewrite the RF safety program, including registration of all sources.

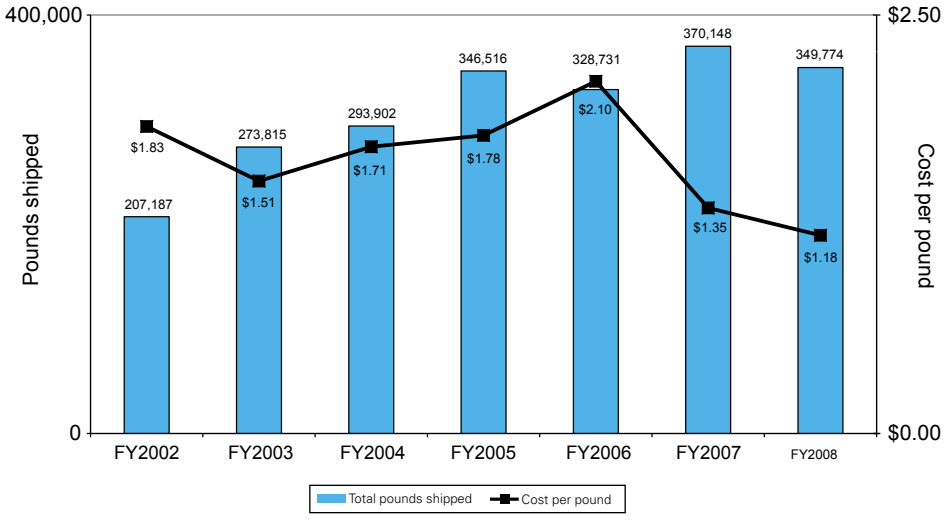
There was an event at Millstone that required RPP to investigate and subsequently map the RF exposure fields from an existing installation. In question was whether public exposure limits were being exceeded. Investigation results indicated that all RF exposure fields were within public limits outside the restricted area.

RPP provided extensive monitoring to support the HUSIR project. The program discovered unexpected high levels of x-ray radiation and led an effort to install additional shielding in the initial leg of the waveguides to protect workers from unnecessary radiation exposures. RPP also needed to train and monitor the workers on this project.

Hazardous Waste Metrics

Adjustment to our chemical hazardous waste service has allowed the program to more efficiently manage more waste and offer laboratory chemical cleanouts as a routine service. This change has allowed the program to accomplish two important goals: lower the price per unit and provide prompt waste collection service. One indicator of

Figure 4. Total pounds of waste shipped from MIT's main hazardous waste accumulation area, and cost per pound, FY2002–FY2008



this success has been the reduction of the hazardous-waste unit cost each fiscal year since FY2006. The overall service has also improved in FY2008 with the addition of a spill kit program. This program offers laboratory-specific spill kits based on the type of chemicals present in the labs. These kits are assembled by EHS and available to the labs at a discounted price.

FY2008 continued the trend of unprecedented waste generation due in part to growth in both research and infrastructure. To address 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 was to minimize the number of cylinders shipped out as hazardous waste. A new process has been developed to devalve and cut up empty cylinders. This eliminates unnecessary hazardous waste from being sent for disposal and the scrap left over from this process is sent for recycling.

Other program efficiencies leading to waste and cost reduction included:

- Lab-specific waste generation analysis
- A fully staffed hazardous waste team
- Improved communication and guidance

As a result of these efficiencies, MIT achieved a reduction in hazardous waste generation (as measured in pounds) of 5.5 percent from FY2007 to FY2008. As seen in Figure 4, there was also a cost reduction of $0.17 per pound of waste in FY2008, continuing the overall trend of reducing the per-pound cost since 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 importantly, reduced discomfort and improved function for members of the MIT community. The Ergonomics Committee, an ad hoc collaborative effort of the MIT Libraries, IS&T, Human Resources, Facilities, Lincoln Laboratory, the Whitehead Institute, and MIT Medical, is led by the EHS Office. In FY2005 the committee introduced a web-based training and assessment tool course, and in FY2008 50 individuals at MIT took the training, bringing the total, since launch, to1,326.

In FY2008, 32 people were initially classified as high risk, and after they made changes, five (16%) were reclassified to a lower risk. Those remaining in high risk were contacted by the EHS Office for a site visit. There were 145 on-site visits conducted in FY2008. A follow-up survey indicated that more than 90 percent 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 training materials, including PowerPoint presentations and videos,

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

Construction Safety Program

This is the sixth full year of the EHS Office's collaborative effort to provide EHS expertise to new construction and renovation projects. With funding from the Facilities Department, the program's objectives are to assure that EHS requirements are addressed during new construction and renovations, to protect the MIT community during construction and renovation activities on campus, and to strengthen MIT's relationship with the Cambridge authorities responsible for regulating these activities. This program calls for 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 FY2008, nine major projects and 71 renovations were reviewed, representing a 50 percent increase over FY2007.

Incident Reporting and Investigations

The EHS Office continues to work with DLCs to encourage use of the incident reporting and investigation system, which centralizes and electronically links all information related to an incident, facilitates data handling, and provides online access to reports on injuries to Facilities management, EHS Office staff, and EHS coordinators at the DLCs. Major focuses in FY2008 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 (10 staff are certified) in incident investigation was developed and implemented. During the past year all significant incidents (24 in all) were investigated.

The incidence rate of total recordable injury and illness cases for calendar year 2007, 2.22, is shown in Table 2, along with data for the previous two years. While the rate has increased by 2 percent over the 2006 rate, it is still well below the 2006 incidence rate for private industry (4.4) and below the national average for colleges and universities (2.3). MIT's days away from work rate, 1.74, increased by 26 percent over the 2006 rate of 1.38

Table 2. Nonfatal Injury and Illness Case Incidence Rates

	Total Case Incidence Rate for Injuries and Illnesses (TCIR)		Days Away from Work Rate (DART)	
Year	MIT	National Average*	MIT	National Average*
2005	1.96	2.4	1.58	1.0
2006	2.18	2.3	1.38	0.9
2007	2.22	N/A	1.74	N/A
3 Year Rates	2.12		1.56	

* National averages for colleges and universities (Bureau of Labor Statistics)

and was higher than the 2006 national average of 0.9 for colleges and universities (the national average for 2007 was not available at the time of writing).

The goal for the coming year is to have both this rate and the illness and injury incidence rate measuring below the national average for universities.

Enhanced Delivery of EHS Services

Automated Request Tracking and Customer Support

The EHS Office continues to triage its response to internal and external customer requests through the use of a single email alias for all queries to EHS and EHS-MS. When customers submit a service requests using the environment@mit.edu email address, the queries are queued in MIT's Request Tracker (RT) customer support system and forwarded to the EHS Office's RT administrator and backup personnel. The EHS staff personally assists most customers within two days, with more complex requests occasionally requiring additional time to resolve. Using this streamlined process, 970 customer requests and questions were resolved in FY2008, a 28 percent increase over FY2007. Figure 5 shows a breakdown, by topic, of the FY2008 email service requests.

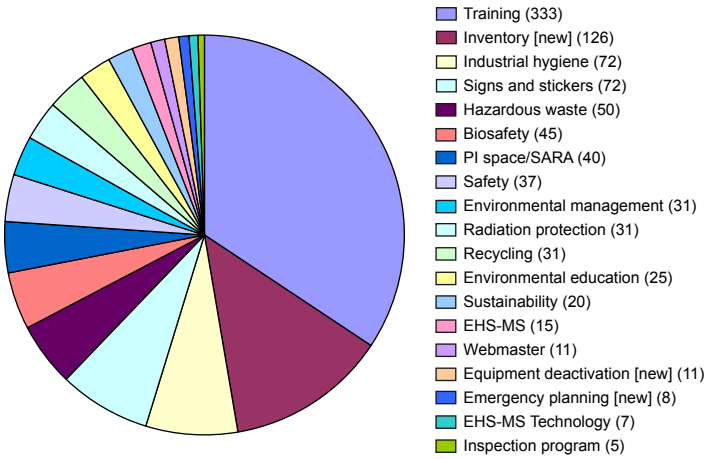
Customer Satisfaction Surveys

Upon completion of an RT service request, EHS solicits customer satisfaction feedback. We actively use this information to improve our service.

Chemical Inventory Pilot

The first key initiative involving EHS Technology Support was the roll-out of the Chemical Inventory Initiative using a chemical inventory system called ChemTracker, produced by a consortium organized at Stanford University. Beginning in the spring of 2007, the Technology Support team worked closely with the inventory team and staff at ChemTracker to define MIT's implementation requirements for a successful roll-out and then to put the implementation plan into action.

Figure 5. Email requests received by EHS Office, by topic, FY2008



Department of Homeland Security Chemical Facility Security Regulations

In the summer and fall of 2007, the US Department of Homeland Security (DHS) finalized a new screening requirement for chemicals of interest that applies to all organizations and corporations that work with chemicals, both for manufacturing and for research. The first phase of the reporting required that MIT report within a six-week period on the use of over 300 chemicals of interest in each of 500 laboratories and facilities. In response to this requirement, EHS Technology Support staff planned, tested, and implemented a web-based solution that maximized the EHS Office's ability to communicate with, as well as receive and track responses from, the 500 labs. By rapidly building an effective solution, MIT's EHS Office achieved a 100 percent response rate—an exceptional result for any program.

Support for Special Off-Campus Projects

The EHS Office provided significant support to off-campus activities over the past year, including those related to the Bates Linear Accelerator facility's decommissioning; environmental activities for portfolio properties managed by the Real Estate Office; and the Haystack Ultra-wideband Satellite Imaging Radar Upgrade Project.

Bates Linear Accelerator

During FY2005, the Bates Lab initiated a pre–decommissioning and disposal (D&D) program as part of a Department of Energy 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, realizing a substantial savings from FY2005 through FY2008.

L-3 Accelerator: as part of the revised mission for the Bates Linear Accelerator, MIT joined in partnership with L-3 Communications in a project sponsored by TSA to investigate the feasibility of using neutrons in a cargo screening application. The Bates Radiation Protection Program staff served on the project team responsible for overseeing the safe operation of the machine during its four months of operation in FY2008.

Properties with Environmental Concerns

MIT and the MIT Investment Management Company own and have responsibility for 118 identified contaminated sites under the Massachusetts Contingency Plan. These sites are primarily associated with redevelopment efforts in Cambridge, although a few are associated with oil or fuel spills. As a result of filling and historical industry, most construction projects involving soil removal in Cambridge are MCP sites. Most of these sites have been effectively closed, leaving 12 sites, primarily associated with construction, that were considered active in this fiscal year. EHS provided policy and practice guidance and reviewed consultants' work products involved in the cleanup and remediation of these sites. This helps to ensure quality work products and efficacious remediation of these sites.

Superfund

MIT and Lincoln Labs are listed as potentially responsible parties for two major cleanup activities overseen by government that had significant activity during the year. One site is managed under the federal Superfund law and the other is under state jurisdiction. Both sites involve major cleanup efforts where the costs will be shared among the responsible parties. The EHS office has been working closely with the General Counsel's office and external counsel in an effort to find evidence and data to reduce exposure and liability associated with these locations. A third site we had previously settled as a de-minimus party under a consent agreement was reopened this year when the agreement was nullified on appeal. A revised settlement for this location is expected this year.

Westgate

PCBs have been detected in exterior building materials (i.e., caulking and adjacent concrete/brick) and some soil samples at the Westgate Complex. While an evaluation performed by MIT and outside experts showed that leaving these materials in place without disturbing them does not present an imminent health risk, the PCBs could be transported to other locations or media (e.g., groundwater or surface water). In addition, some of the PCB levels measured are above US Environmental Protection Agency (EPA) environmental thresholds for abatement/remediation. MIT is arranging to contain or remove these materials to achieve the EPA's stringent high occupancy or residential cleanup levels. A full-scale pilot test of EPA-approved PCB remediation activities was done in late fall of 2007, which proved distracting to the building's residents. A revised remediation plan was developed that includes working with hand tools only, no brick removal, and encapsulation of contaminated building surfaces. EPA has approved the revised work activities.

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. With MIT's research volume increasing by almost 30 percent since FY2004, the EHS Office has experienced a 10 percent or greater increase in activity. Many EHS activities fall into the following three major groupings:

Surveys

Approximately 21,000 surveys to monitor the safe use of equipment and materials were implemented in FY2008 concerning equipment and safety practices related to the use of biological and radioactive materials, chemicals, recombinant DNA technology, and infectious agents.

Inspections

Inspections are 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 of recombinant DNA technology or infectious agents.

Monitoring and Prevention

This includes chemicals, asbestos, blood-borne pathogens, workplace injuries such as repetitive strain injuries, and safe practices during hot work. In FY2008, 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. Approximately 223 asbestos abatement projects were monitored and completed. This is similar to FY2007 and a 15 percent increase over FY2006.

Regulatory Interactions

MIT is subject to both scheduled and unannounced regulatory inspections by 15 federal, state, or city agencies. FY2008 was a particularly active year in this regard. The following summarizes the results of these visits:

- MADEP—The Massachusetts DEP conducted a multi-media inspection in August. MIT received a notice of noncompliance regarding minor label issues. A finding related to the exhaust stack height at Simmons Hall is still being evaluated for corrective measures.
- MADEP—After many years, the Institute received a "Title V" air operating permit from the Massachusetts DEP in June 2008. This permit is required by the Clean Air Act Amendments of 1990.
- MWRA—The Massachusetts Water Resources Authority conducted a thorough compliance inspection of the campus over five days in June and December. Although a few observations were noted during the tour, only two minor findings were noted.
- MWRA—The Institute received a notice of noncompliance and order from the MWRA in May 2007 related to mercury discharges from MIT after detecting very low concentrations of mercury in the discharge on numerous occasions. After significant remediation effort and testing coordinated by the EHS office, the Institute successfully met the requirements of the order and was able to close this action in September.
- DHS—The US Department of Homeland Security published chemical facility security rules on November 20, 2007, to prevent potential misuse of certain chemicals. The EHS office led a significant effort to inventory the use of these chemicals on campus and ultimately submitted 'Top Screen" reports to DHS for those locations that exceeded thresholds. The Institute has been instructed by DHS to perform vulnerability assessments for certain locations on campus as a result of this screening.
- OSHA—Three visits to MIT by the Occupational Safety and Health Administration (OSHA) in the last year resulted in citations and fines and highlighted some of the many complex health and safety concerns associated with work at MIT. These OSHA visits reinforced the importance of the health and safety components of the Environment, Health and Safety management system (EHS-MS). During the visits OSHA investigated the following: injury and illness reporting procedures, a fall from an elevation and fall protection, control of hazardous energy (lockout/tagout) programs and procedures, and confined

space entry programs and procedures. Two additional complaints were received by OSHA and were resolved by MIT EHS without an inspection.

- MADPH—the Massachusetts Department of Public Health radiation control program inspected our program once and there were no items of noncompliance.
- NRC—The Nuclear Regulatory Commission conducted two routinely scheduled inspections of the nuclear reactor and conducted one special investigation of an exposure incident. Two level 4 (lowest) citations were issued and have since been resolved.
- DOT/FAA—The US Department of Transportation, Federal Aviation Administration conducted an assessment of Lincoln Laboratory to assess compliance with Hazardous Materials Transportation Regulations. The inspection is still open with no results presented to date.
- Cambridge DPH—The Cambridge Public Health Department visited the Johnson Athletic Center Skating Rink's regulation. Three violations were noted with nonmonetary penalties. All were corrected.
- VTDMV—The Vermont Department of Motor Vehicles issued four citations to MIT for an Athletic Department vehicle's hauling of a trailer classified as a commercial vehicle. All citations have been corrected.

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. Surveys were conducted at these events to assess awareness, and awareness is high among those working with potentially hazardous materials and significant for the campus as a whole.

The communication highlight for the year involving all EHS staff was an open house held in October and attended by more than 350 people from many organizations on campus. Attendees were provided with a tour of the EHS facilities and laboratory, and received promotional products, information, and food. The open house provided an opportunity for the campus community to become more familiar with the EHS Office and the scope of the work done by EHS, as well as an opportunity to talk with EHS staff during interactive presentations on key EHS topics.

Emerging Issues

Nanotechnology

EHS has continued its close collaboration with MIT faculty and staff who are conducting research in the area of nanoparticles. EHS also represents MIT on the Scientific Advisory Committee formed by the City of Cambridge to investigate the need for a local ordinance on nanotechnology. In the committee's report to the City Council, the final recommendation was to monitor health effects information and assess current use in Cambridge rather than to issue a regulation.

Confined Spaces, Control of Hazardous Energy, and Fall Protection

Two of the inspections by the Occupational and Safety Health Administration focused on these issues. Our major safety focus this coming year will be to assess these conditions across MIT in both facilities and research areas.

Emergency Management and Notification

Enhanced emergency preparedness and notification are emerging issues in the college and university sector across the nation. MIT EHS Headquarters is leading an effort among several groups to increase preparedness and response capability at the campus and beyond. Beyond local campus police forces and emergency responders, the need to coordinate all participants in campus operations into a cohesive emergency management organization has been demonstrated at several campuses across the country since 2001. MIT EHS Headquarters has recognized this need and is working to lead these enhancements at our campus.

Vulnerability Assessment

MIT recently completed a FEMA-funded assessment of disaster potential using an all-hazards approach. The assessment was conducted by a Hua Li, a graduate student in the Engineering Systems Division under the direction of Professor George Apostolakis. The assessment involved the elicitation of expert views from more than 60 stakeholders and use of a value tree and process to rate the severity (disutility) and likelihood of 270 scenarios that could affect our campus and operations. The results of this study have informed EHS, Facilities, and other groups as we prioritize mitigation of disaster potentials here.

Emergency Notification

In April 2008 MIT introduced MITAlert, the data collection system designed to provide emergency responders with contact information for community members in the event of a critical crisis on campus. A campaign to raise awareness and participation was implemented in April with another campaign planned for late summer of 2008. To date, MIT emergency responders have collected about 25,000 contact points including email addresses and cell phone numbers. In late 2008 MIT EHS and IS&T plan to commence a project to comprehensively improve notification and data collection systems.

Emergency Management

MIT EHS headquarters is leading an effort to train members and improve our Emergency Operations Center, designed to muster the operational resources of MIT in a time of emergency. In August 2007 we combined a tabletop drill with a test of our notification capabilities. Results of this test began the development of the MITAlert system mentioned above. More drills and exercises are planned. MIT uses the National Incident Response System as a model for our emergency management.

Emergency Communications

A discovery effort was completed by MIT EHS headquarters to determine who the key communicators are during a major emergency. From this process, emergency leaders

have obtained specific predirectives to immediately notify the community directly in a time of a severe emergency. Pre-drafted notification scripts have been developed for specific critical emergency scenarios to save time and assist responders. Also, emergency leaders have met with MIT's executive leadership to review communication roles and responsibilities of responders and executives during a time of emergency.

Campus Sustainability Program

MIT's approach to EHS performance integrates important voluntary environmental stewardship initiatives, managed through the Campus Sustainability Program of the EHS Headquarters 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 communities.

Overview

The Campus Sustainability Program was established to collaboratively develop, strengthen, and realize MIT's institutional commitments to integrate principles of sustainability and environmental stewardship into all aspects of MIT's facilities, activities, and operations, in a manner that enhances the Institute's core education and research mission. The Campus Sustainability Program advances its mission by providing leadership in visioning, planning, facilitating, coordinating, and executing programs and projects that bring best practices into our campus operations while providing rich educational opportunities to the MIT community. The deputy director of environmental sustainability continues to serve as the 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 energy and environmental stewardship.

FY2008 saw the continued progress of the Campus Sustainability Program with a deepening of existing stewardship initiatives focused on energy and an expansion of our partnerships with faculty, students and staff alike.

Highlights

In 2008, MIT was recognized as a national Campus Sustainability Leader by the Sustainable Endowments Institute in its annual College Sustainability Report Card, which ranked the largest 200 colleges and universities. In addition, MIT was profiled in the 2009 Kaplan College Guide as a Top 25 environmentally responsible school, reflecting the growing importance of green institutional practices in students' college selection process.

The Campus Sustainability Program has continued to contribute to and shape the work of the MIT Energy Initiative's Campus Energy Task Force, resulting in several new energy conservation programs put into place by MIT's key energy-intensive DLCs,

including Facilities, IS&T, Housing, Athletics, Dining, and Chemistry. Both new and existing buildings have benefited from robust implementation of sustainable design features that will substantially reduce lifetime energy costs while developing innovative design processes. Unique research collaborations between MIT's students and faculty and administrative units have resulted in many educational opportunities allowing students to gain hands-on experience in solving campus sustainability challenges, while at the same time enriching EHS operations with extensive analysis and innovation.

Enhancing Campus Operations

In FY2008, the campus energy program of the MIT Energy Initiative began to bear fruit in realizing energy savings, implementing innovative sustainable energy practices, providing rich educational opportunities, and gaining recognition from the wider community. Staff from EHS Headquarters Office serving on the Institute's Campus Energy Task Force continued their work to develop a comprehensive program for sustainable energy practices on campus.

In collaborations with the Department of Facilities, several new energy conservation pilot programs were developed and implementation begun, achieving substantial energy savings. Efforts to introduce more environmentally friendly vehicles and the use of biofuels on campus also resulted in the adoption of biodiesel in MIT's Grounds Service's fleet and the installation of advanced diesel pollution control devices on several of MIT's shuttles. Through the Community Solar Power Initiative managed by EHS Headquarters in partnership with the Department of Facilities, installed solar power capacity on campus increased by 200 percent to 60kW in FY2008.

Recognizing that reducing the energy footprint of an organization requires behavior modification among individuals as well as engineered solutions, the Campus Sustainability Program partnered with several departments and student organizations to reduce energy use on campus by improving chemical fume hood practices, turning off unused lights, promoting use of revolving doors, enabling computer power management features, reducing the volume of paper used in Athena clusters, and supporting the Dorm Electricity Competition.

Supporting Student Educational Opportunities

In FY2008, the Campus Sustainability Program awarded 20 grants totaling $20,000 in the new Student Campus Energy Project Fund that awards grants to support innovative student projects that advance campus energy and environmental stewardship goals.

In partnership with MITEI's Energy Education Office, EHS Headquarters expanded the innovative Campus Sustainability Program for UROPs and interns, supporting and supervising nine UROPs and four interns, and worked to develop campus sustainability projects for subject 5.92 Energy, Environment and Society. In addition, EHS Headquarters and the EHS Office continued to provide data, operational information, and access to key personnel in support of student research projects focusing on campus energy and environmental issues.

Building Community Involvement

EHS Headquarters and the EHS Office represent MIT in a number of off-campus community initiatives and programs, including the Cambridge Energy Alliance, Northeast Campus Sustainability Consortium, Greater Boston Breathes Better, Campus Consortium for Environmental Excellence, Cambridge Public School Volunteers, Boston Consortium, Clean Charles Coalition, and the Campus Safety Health and Environmental Management Association.

On campus, EHS Headquarters was an instrumental partner in developing new outreach efforts to engage and inform the wider MIT community. In FY2008, these activities included a pre-orientation course focused on campus sustainability activities for incoming freshmen, MITEI's Energy Futures Week during MIT's Independent Activities Period, and participation in numerous energy-focused events and conferences.

EHS Headquarters was also instrumental in helping to organize the annual Earth Day festival in April 2008 and StuffFest in May 2008. Through a partnership of EHS Headquarters and the MIT Women's League, the Division of Student Life, and the student organization SAVE, StuffFest collected over 12,000 pounds of clothes and household goods donated to local charities by students moving out from their dorm rooms.

FY2009 Goals

- Continue to shape and build MITEI's campus energy initiatives into a robust program aimed at reducing MIT's energy footprint while serving as a model for other institutions
- Engage the EHS organization to raise awareness and interest and enable adoption of energy-efficient behaviors across laboratories and other areas of MIT
- Work to build and institutionalize support for student engagement in campus sustainability activities through campus-focused UROPs, class projects, theses, research assistantships, internships, and volunteer opportunities

Pollution Prevention Program

In FY2008, MIT embarked on new collaborative endeavors in pollution prevention outreach, while continuing to advance existing efforts through the EHS Office's hazardous waste program. Early in the fiscal year, MIT seized an opportunity generated through its role as part of the Host Committee for the College Safety, Health and Environmental Managers Association annual meeting to green the conference. The conference typically draws over 300 EHS-director and associate director-level attendees representing academic institutions from across the country and world. MIT worked with host committee members from the other sponsoring universities (Harvard and Boston University) to ensure green conference elements were incorporated, developed speaker thank you gifts that were locally sourced, created informational materials on how the conference was made more sustainable, and distributed information to all conference attendees as a technology-transfer gesture. After the conference, an MIT delegate from the Host Committee publicized the efforts in the *EHS News & Views* newsletter to raise

awareness of our joint efforts and to inform other DLCs of practical steps they can take to host greener meetings.

Within the MIT community, a mid-year visit to Lincoln Laboratory to demonstrate the Green Chemical Alternatives Wizard and discuss content revisions to the Pollution Prevention pages on the EHS website led to discussions on opportunities to reduce toxicity in select research divisions at Lincoln Laboratory. An advisory committee has been formed to explore opportunities for toxicity reduction in select research divisions at Lincoln Laboratory in the coming fiscal year; the Pollution Prevention Program manager is a member of that committee. Pollution Prevention Program outreach efforts continued with the EHS Office and EHS Headquarters' Sustainability Program involvement in the Broad Institute's Green Day Event held on June 20, 2008. Both the Sustainability Program deputy director and the Pollution Prevention Program manager participated in the event and worked with Broad Institute staff on planning the event, which included a demonstration of the Green Chemical Alternatives Wizard and samples of approved substitutes for ethidium bromide. Finally, in keeping with the Pollution Prevention Program plan and the EHS-MS commitment to create beneficial synergies with Institute groups, the EHS Office continues to revise and update the Buy Green portion of the Working Group on Recycling's Working Green @ MIT website.

Laboratory-level implementation of hazardous waste toxicity and volume reduction techniques continues to be implemented through the EHS Office hazardous waste program. Continuing efforts include expanding options for ethidium bromide substitution and promoting waste consolidation. Solvent recycling is being pursued, and will be a focus area in FY2009.

Greenhouse Gas Emission Regulations

State and federal agencies are moving closer to regulating greenhouse gas emissions. The EHS Headquarters Office has been following these developments closely, as regulations may have significant impact on energy producing and energy-intensive organizations like MIT. While MIT has been adopting proactive measures to monitor and reduce greenhouse gas emissions—measures that will position MIT well in the future—new regulations may require additional reporting and mitigation measures across campus. The EHS Headquarters Office is well positioned to provide guidance on new policy and program development to senior leadership as these new regulations emerge.

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More information about the environment at MIT can be found at http://web.mit.edu/environment/.