

Environmental Health and Safety 10th Annual Report 2007

Environmental Health & Safety Office
www.dal.ca/safety

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TABLE OF CONTENTS

1. INTRODUCTION
 - 1.1 Environmental Health and Safety Office
2. HIGHLIGHTS OF 2007
 - 2.1 Life Safety
 - 2.2 Chemical Safety
 - 2.3 Radiation Safety
 - 2.3.1 CNSC Audit
 - 2.3.2 New Program Development
 - 2.3.3 2007 Annual Environmental Health and Safety Award
 - 2.3.4 Cell Phone Site Emissions
 - 2.4 Biosafety
 - 2.5 Inspections
 - 2.6 Health and Safety Committee Initiatives
 - 2.6.1 Written Program Document
 - 2.6.2 Revisions to the Accident Investigation and Inspections Programs
3. PROGRAM ADMINISTRATION
 - 3.1 Environmental Health and Safety Committee
 - 3.2 Committee Activities
 - 3.3 Local Safety Committees
 - 3.4 Communications
4. SAFETY AND ACCIDENT PREVENTION
 - 4.1 Accident Reporting
 - 4.2 2007 Accident Experience Overview
 - 4.3 2007 Accident Experience in Detail
5. FIRE SAFETY
 - 5.1 The Fire Safety Program
 - 5.2 The 2007 Fire Experience
 - 5.3 2007 Fire Safety Upgrades
6. MANAGEMENT OF HAZARDOUS MATERIALS
 - 6.1 Highly Regulated Materials
 - 6.1.1 Asbestos
 - 6.1.2 PCBs
 - 6.1.3 Propane
 - 6.1.4 Freons
 - 6.2 Hazardous Waste
 - 6.2.1 Green Custodial Chemicals
 - 6.2.2 Aqueous Waste Containing Radioactivity
 - 6.3 The 2007 Experience
 - 6.4 ChemEx

7. LEGAL MATTERS

- 7.1 Ongoing Regulatory Matters
 - 7.1.1 Areas of Provincial Jurisdiction
 - 7.1.2 Areas of Federal Jurisdiction
- 7.2 Regulatory Changes

8. TRAINING

- 8.1 Workplace Hazardous Materials Information System (WHMIS)
- 8.2 Student Security
- 8.3 Radiation Safety Training
- 8.4 CPR and Related Training
- 8.5 Custodial and Trades Training
- 8.6 Fire Warden Training
- 8.7 Biosafety Training

APPENDICES

- Milestones
- Radiation Safety Report

1 INTRODUCTION

1.1 Environmental Health and Safety Office

The Dalhousie Safety Office operates to:

- Offer advice to the University's Senior Management on ways in which the University can strengthen its efforts to provide a healthy and safe environment in support of the entire range of University activities.
- Support the activities of the Dalhousie Environmental Health and Safety Committee.
- Support the Deans, Directors and Chairs of Departments as they discharge their responsibilities for health and safety within their units.
- Liaise with regulatory agencies and other organizations to keep the University informed of developments that could impact Dalhousie's Environmental Health and Safety Program.
- Ensure that inspections, testing and training are carried-out as needed to ensure that the University is operating in accord with legislation.
- In accord with regulations, coordinate the disposal of hazardous waste created by teaching and research programs and by the University's operations.

The Environmental Health and Safety Office with a staff of four long-term members of the Department include Ms. Pauline Jones who deals with radiation and biosafety, Ms. Jan Taylor McIntyre, the Office Administrator, and Dr. William Louch, the Director. Mr. Stephen Ellis who joined the Office in 2006, has assumed responsibility for much of the University's fire and life safety programs.

The Office shares space with several other offices in one of the "University houses" at 1391 Seymour Street.

In carrying out its work, the Safety Office is assisted by a network of individuals in virtually every Department across all three campus who serve as first aiders, fire wardens, safety committee members, and laboratory safety coordinators.

2 HIGHLIGHTS OF 2007

2.1 Life Safety

2007 saw continued expansion in the University's Life Safety programs. As described more fully in the Training Section, during 2007 the Safety Office continued to offer CPR training - often combined with training in the use of automatic external defibrillators (AEDs). Using special funding provided by the Vice-President of Finance and Administration, the Safety Office was able to further expand the network of AEDs across the University. At the end of 2007, 15 AEDs had been placed in University Buildings - an excellent start on the Safety Office's goal of placing one unit in every major University Building.

For the first time during 2007, the Safety Office began to deliver first aid training programs. Unlike the more general programs offered by commercial first aid trainers, these programs are more highly focused on training members of the University to respond to the types of medical emergencies that might be reasonably expected to arise in the University context.

During the year, the Safety Office offered such focused first aid training programs to staff of Facilities Management and to teaching assistants responsible for supervising teaching laboratories in Chemistry, Biology, Medicine and Engineering.

2.2 Chemical Safety

2007 saw Dalhousie take the next important step in strengthening the University's chemical safety program when the contractor began work on the new Chemical Storage Facility. The \$5 million addition, located on the south side of the Chemistry Building, will provide state of the art facilities for storage of bulk chemicals in the Chemistry Department as well as providing the Safety Office with the facilities required to continue to develop the University's waste and surplus chemical handling programs. An exhaust tower located adjacent to the Chemistry building, has already been commissioned and will effectively collect and discharge fume hood exhaust - through specially designed high velocity exhaust fans - from both existing student instructional laboratories and the new facility. The tower also has capacity to accept additional air flow to accommodate future upgrades to the research areas of the Chemistry Building.

2.3 Radiation Safety

2.3.1 CNSC Audit

Dalhousie researchers use radioactivity under conditions set down in a consolidated license which the Canadian Nuclear Safety Commission issued to the University. For many years CNSC inspectors have visited the University several times each year to conduct routine inspections of representative laboratories. But recently, the Commission introduced a new, in-depth audit of programs such as Dalhousie's. Licensees were informed to expect one such audit during each 5 year licencing period. Unlike the routine inspections which tend to examine laboratory practices, the audit looks more broadly at the entire program examining policy and procedure documentation, record keeping and the institutional commitment to radiation safety.

In August 07, a CNSC audit team arrived at Dalhousie and over several days conducted interviews with a number of senior University administrators and laboratory staff and

students, inspected several laboratories and examined radiation safety documentation on almost a word-by-word basis. Although the audit team was able to find areas where they felt that the University could clarify documentation, the audit team did not identify any areas in which Dalhousie staff or students were handling radioactivity inappropriately. Members of the audit team commented favourably on the newly introduced inventory tracking system and the overall strength of Dalhousie's safety culture.

2.3.2 New Program Development

The Radiation Safety Committee continues to work with Dalhousie's Radiation Safety Officer to expand the University Radiation Safety Program. During the year, the Committee provided guidance on the development of an expanded refresher training for those who work with radioactive isotopes, and an on-line training program for University staff and students who use high powered lasers. Both of these programs are expected to be in full operation by early 2008.

Working with an analyst from Networks and Systems, the Radiation Safety Office created a web-based radioisotope inventory tracking system. This system has created a fully up-to-date inventory system which tracks the University's holdings of radioactive isotopes. The system links Purchasing, the researchers and the Radiation Safety Officer to ensure that individual possession limits and the University's possession limits are not exceeded. The system automatically takes into account the loss of activity as radioactive isotopes decay naturally and provides researcher's the capacity to update the inventory as the isotopes are used in experiments. The system allows the Radiation Safety Officer to determine which isotopes (and their quantities) are present in every approved storage location across the University's three campuses. At the same time, it facilitates the researchers' record-keeping. Finally, the system tracks the ultimate disposal of the isotopes and the containers in which they were supplied. The system – perhaps unique in the country – provides Dalhousie with a real-time, cradle-to-grave tracking of these highly regulated materials. The Safety Office hopes that in coming years the system will form the basis for systems which will track the University's holdings of other highly regulated materials.

2.3.3 2007 Annual Environmental Health and Safety Award

For over a decade, the Dalhousie Environmental Health and Safety Committee has formally recognized significant contributions to campus safety. With the 2007 Environmental Health and Safety Award, the Committee recognized a quarter of a century's effort by present and past members of the Dalhousie Radiation Safety Committee. Although many members of the University have participated on the Committee since it was created in 1982, the contribution of the late Dr. Forbes Langstroth was critical in establishing the Committee.

The Radiation Safety Committee's efforts have been instrumental in creating a program that is well respected by regulators and other Universities. It is a reflection of the excellent work of the Committee that there has never been a significant radiation incident at Dalhousie in the 25 years that the Committee has operated.

More information on the Radiation Safety Program is provided in the attached Annual Report which has been prepared in accord with a CNSC license requirement.

2.3.4 Cell Phone Site Emissions

In 1990, Dalhousie permitted Rogers to establish a cellular telephone site on the roof of the Life Sciences Centre. The decision sparked some concern among some occupants of the LSC and resulted in the University requiring Rogers to re-design the site to limit the exposure of building occupants to the radio-frequency radiation which is inherent in the operation of cell phones. Rogers provided a preliminary calculation of the predicted field strengths and later measured actual radio-frequency field levels when the site was commissioned. The measurements supported the results of the preliminary modeling and showed that the RF exposures created by the site were well below the limits recommended by Health Canada.

In late 2007, a senior member of the Biology Department, whose office was located on the LSC top floor, was diagnosed with a serious illness. This news, again, raised the concerns among some members of the Department that the site might present a health hazard. Responding to these concerns the Safety Office facilitated several meetings at which University administrators, and representatives of Industry Canada (the agency which licenses cell phone sites) and building occupants, were able to discuss these concerns. At the suggestion of the Senior Administration, the Safety Office contracted a Montreal-based engineering firm which specializes in RF measurements to once again measure the RF levels. Measurements were taken while the site was in full operation and when the site was turned off. The testing was conducted during June using the very latest in test equipment and generated data that was much more detailed than had ever been previously produced in evaluating the emissions for any Canadian cell phone site.

The report, which was provided to interested building occupants through the Biology Department, showed that the site is well within the limits set by Health Canada. In fact, in most areas of the top floor of the LSC, there is no significant difference in RF levels between when the site is operating and when it is shut down.

2.4 Biosafety

Working with Dr. W. Currie, the University's Biosafety Officer, the Environmental Health and Safety Office created an advisory committee which met several times during the year to begin to chart the development of a more formal biosafety program. Program elements have already begun to emerge. Included are:

- the preparation of an inventory of the University holdings of potentially infectious agents,
- institution of a formal risk assessment in advance of beginning work with biohazardous agents,
- formalizing of relationships between the University and the Canadian Public Health Agency and the Canadian Food Inspection Agency (the national units charged with regulating the use of biohazardous materials in Canadian research establishments), and
- offering for the second year a full day Biosafety Training session.

2.5 Inspections

As dealt with in more detail elsewhere, it was a busy inspection year for the Environmental Health and Safety Office. HRM fire officials conducted inspections of each of the University residences as well as areas of the Student Union Building where the serving of alcoholic

beverages brings the facility under municipal jurisdiction. Department of Labour inspectors responded to a relatively minor accident which occurred in the Arts Centre's Dunn Theatre. The accident occurred when a person-lift tipped while a Theatre staff member and a student were preparing the set for a student performance. The accident caused only minor injuries (the student was back on the set within hours of the accident to participate in that evening's performance). The Safety Office, working with the Environmental Health and Safety Committee, coordinated a formal review of the accident and the recommendations which emerged from the investigation were implemented by the Theatre Department.

Later in the year, Department of Labour inspectors also inspected areas of the Dunn Building where the Department of Physics and Atmospheric Sciences operates several wood and metal working shops. Late in the summer, a Labour Inspector returned to the Dunn Building to look into the department's chemical waste disposal practices. Although the inspection did not uncover problems with waste handling, the inspector did raise issues relating to other aspects of laboratory practices. In both instances, the inspector issued formal compliance orders. The Environmental Health and Safety Office coordinated the response to both sets of orders. The preparation of responses involved both representatives of the Physics Department and – as required by the Occupational Health and Safety Act – the Dalhousie Environmental Health and Safety Committee.

2.6 Health and Safety Committee Initiatives

2.6.1 Written Program Document

The NS Occupational Health and Safety Act requires that occupational health and safety committees annually review an organization's safety policy statement and safety program. In 2006, the University accepted the Committee's recommended update to the Environmental Health and Safety Policy. At that time, the Committee committed to carry-out a detailed review of the program. As the product of that review, the Committee formally approved an updated program document which has been since uploaded to the University's safety web site.

2.6.2 Revisions to the Accident Investigation and Inspections Programs

In response to orders issued by a NS Department of Labour inspector, the Committee undertook reviews of the University's accident reporting and investigation programs and the University's workplace inspection program. The Committee concluded that policy changes were not required in the accident reporting and response areas. But the Committee re-instituted its former practice of reviewing a summary of recent accident reports at each Committee meeting. Committee members – along with other interested University staff - participated in a formal accident investigation training program held early in 2008.

In reviewing the University workplace inspection program and the requirements established by both the Occupational Health and Safety and Fire Safety Acts, the Committee concluded that there was a need to strengthen the program. The Committee has recommended that the University implement a three-level inspection program encompassing:

- regularly scheduled inspections by Facilities management of mechanical systems and spaces,

- a revised system of at least annual inspections of laboratories, work shops and clinics conducted by local supervisors operating within the local departmental safety structures, and
- a new program of monthly building inspections to be conducted by fire warden teams.

In each of the three program components, the Committee recommended that reports be prepared that would prove the basis for future reviews of the effectiveness of the inspection programs.

Work is now well underway to implement these recommendations.

3 PROGRAM ADMINISTRATION

3.1 Environmental Health and Safety Committee

Throughout 2007, the Dalhousie Environmental Health and Safety Committee continued to operate as a forum for discussion of health and safety policy and procedural matters. The Committee also plays an important role in assisting in the development and updating of programs offered by the Safety Office.

Although the Committee responds to the requirements of Nova Scotia's Occupational Health and Safety Act, it was actually created in 1980, some years before Nova Scotia law required organizations to establish such committees.

Committee membership for the year is shown below:

Chair Person	2006 – 2007	Z. Hildebrant
	2007 - 2008	M. Yorke
		Heather Ann Walker - Deputy Chair

2007-2008 ENVIRONMENTAL HEALTH & SAFETY COMMITTEE MEMBERSHIP

Employee and Student Group Appointees

Forest Fyfe	DFA	Physics	Forest.Fyfe@dal.ca
Heather Ann Walker	DUAG	Anatomy & Neurobio.	Heather.Ann.Walker@dal.ca
Mark Stradiotto	DFA	Chemistry	Mark.Stradiotto@dal.ca
Michael Armstrong	IUOE	Trades-Fac.Mgmt. c/o	Michael.Armstrong@dal.ca
Mike Tipping	DSU	President	DSUPRES@dal.ca
Troy Winters	CUPE	Industrial Engineering	Twinters@dal.ca
Vacant	IUOE	Custodial-Fac. Mgmt.	
Vacant	IUOE	Security	
Zita Hildebrandt	NSGEU	Learning & Teaching	ZHildebr@dal.ca

University Appointees

Chris Keough	Athletics & Recreational Svcs.	Chris.Keough@dal.ca
Greg McNutt	Medicine	Greg.McNutt@dal.ca
Mark Knechtel	Dentistry	mr674907@dal.ca
Marlene Daye-Smith	Financial Services	Marlene.Daye@dal.ca
Mateo Yorke	Housing & Conference Svcs.	Mateo.Yorke@dal.ca
Paul Amyotte	Chemical Engineering	Paul.Amyotte@dal.ca
Paul Bourgeois	Facilities Management	Paul.Bourgeois@dal.ca
Roberta Emms	Dentistry	Roberta.Emms@dal.ca
Ruth Murray	Faculty of Engineering	Ruth.Murray@dal.ca

Ex-officio Members

Jan Taylor McIntyre	Recording Secretary	Jan.Taylor.McIntyre@dal.ca
Stephen Ellis	Health and Safety Officer	Stephen.Ellis@dal.ca
William J. Louch	Director	William.Louch@dal.ca

3.2 Committee Activities

During the year, the Committee took an active role in responding to the University dealings with the NS Department of Labour. The Committee participated in the investigation of an accident which occurred in the Theatre Department. The accident caused minor injuries to a Theatre staff member and very minor injuries to a Theatre student. The Committee assisted in the preparation of responses to Labour Department orders which followed from an inspection of the Dunn Building workshops and, later in the year, orders following an inspection of several Dunn Building laboratories.

As a follow up to the Committee's 2006 review of the University Environmental Health and Safety Policy, the Committee assisted in the preparation of the formal description of the University's Health and Safety Program. The document provides an updated response to the requirements set out in Section 28 of Nova Scotia's Occupational Health and Safety Act.

3.3 Local Safety Committees

In response to the University Policy which encourages Deans, Directors and Departmental Chairs to engage staff and faculty in safety matters, 17 local safety committees operate on a faculty, departmental, building or functional level.

To the extent possible, the Safety Office Director attends meetings of these committees.

3.4 Communications

During 2007, the Safety Office continued to expand its website: www.dal.ca/safety. The site has become both the Environmental Health and Safety Committee and Safety Office's most important means of communicating with the University and the broader community.

The site is heavily used both by members of the University and outsiders interested in health, safety and environmental protection. A tracking program, managed by University Computing and Information Services, reports that almost 80,000 users visited the Safety Office website during 2007. Visitors viewed about 175,000 pages.

4 SAFETY AND ACCIDENT PREVENTION

4.1 Accident Reporting

Dalhousie policy requires staff, faculty and students to report work or study-related accidents and injuries. Such reporting is an important component of the University's Safety Program in that these reports provide a means to:

- document the incident,
- ensure that the accident victim receives appropriate care, and
- initiate a review which aims to prevent similar accidents.

When accidents occur, those involved are required to report the accident to their supervisors. In turn, the supervisors direct those involved in the incident to complete the section on the Accident/Incident form which describes the sequence of events that led to the accident and the nature of the injuries. The supervisor then completes the section of the form describing the steps which the supervisor believes are necessary to prevent similar accidents. Copies of the report are provided to the:

- individual involved in the accident,
- local safety committee (acting on behalf of the Dean, Director or Chair),
- supervisor, and
- Director of Environmental Health and Safety.

During 2007, the Dalhousie Environmental Health and Safety Committee re-instituted a practice of reviewing the reports of University accidents as part of the work conducted at each of the Committee's monthly meetings. This practice provides the Committee with current information on the accident experience, creating the opportunity for the Committee to intervene to conduct investigations of serious or often repeated accidents. In support of this effort, the Committee organized an accident investigation training session which was held very early in 2008. At this session, members of the Committee, as well as other University staff, took part in a session which addressed both the philosophical and practical aspects of conducting effective accident investigations.

4.2 2007 Accident Experience Overview

For the first time as part of the 2006 Annual Report presentation to the Audit Committee, the Safety Office presented accident frequency data. Accident frequency data are compiled by dividing the counts of raw number of accidents, number of time loss accidents or time loss resulting from work place accidents by a measure of worker population at risk. A variety of worker exposure measures may be used but we chose to use 100s of person-years of full time work as our measure of the population at risk. The Audit Committee responded positively to the introduction of this measure into the annual analysis of the University's accidental injury experience in that frequency data provides a convenient overview of an organization's accident experience and it compensates for changing employment levels thereby making year-to-year comparisons more meaningful. Perhaps even more important, however, is the fact that with this data in hand, it is possible to make comparisons across organizations.

Table I presents the 2007 accidental injury and days lost frequencies. For comparison, the corresponding data for 2005 and 2006 are also included. Because the small number of

people employed in Security Services, and Trucking, Grounds and Mail, relatively small changes in accident numbers or numbers of days create substantial differences in the frequencies.

Table I

ACCIDENTAL INJURY FREQUENCY						
Group	Accidental Injuries/100 FTEs			Days Lost/100 FTEs		
	2007	2006	2005	2007	2006	2005
Security	44.5	44.0	24.0	27.3	Nil	88.0
Trades	45.2	46.2	40.6	107.0	106.8	156.4
Custodial	54.1	81.3	85.1	278.3	184.5	454.7
Trucking, Grounds, Mail	75.0	62.5	28.6	475.0	81.3	378.6
Faculty	0.5	0.3	0.2	15.2	0.5	Nil
Other Staff	3.5	2.8	3.2	2.5	2.1	2.3

The following section provides a more detailed analysis of the year's accident experience.

4.3 2007 Accident Experience in Detail

As **Figure I** shows, employees suffered 207 accidental injuries during 2007. This number of injury-producing accidents is somewhat less than the 237 accidental injuries reported during 2006. But, as is shown in **Figure I**, the 2007 experience is generally inline with the experience over the past five years.

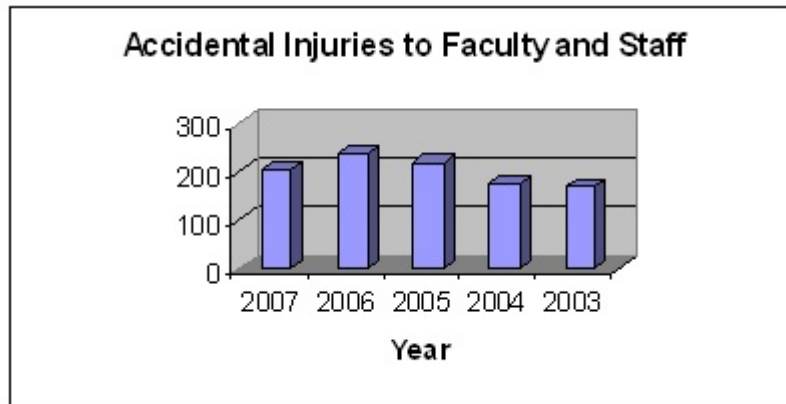


Figure I

Table II breaks down the distribution of staff and faculty reporting injuries.

Table II

2007 ACCIDENTAL INJURIES BY EMPLOYEE GROUP	
Employee Group	Number of Accidental Injuries
Faculty	5
Trades	52
Custodial	85
Mail, Grounds and Trucking	12
Security Services	10
Other Staff	43
Total Employees	207

As is always the case, the largest fraction of accidental injuries is reported by employees of Facilities Management. Included amongst these employees are the trades persons (plumbers, electricians, carpenters, etc.) custodians and grounds keepers and security officers. Other universities across the country report similar accidental injury patterns.

Although all accidents are of concern, clearly some are more serious than others. One measure of accident severity is time lost from work. The Dalhousie Safety Office counts as a lost time accident, one which prevents the injured person from returning to work on the next scheduled work day. During 2007, 46 accidents caused injuries serious enough to keep staff from reporting to work on their next scheduled work day. **Figure II** shows that the 2007 experience was well in-line with the 2003 - 2007 range.

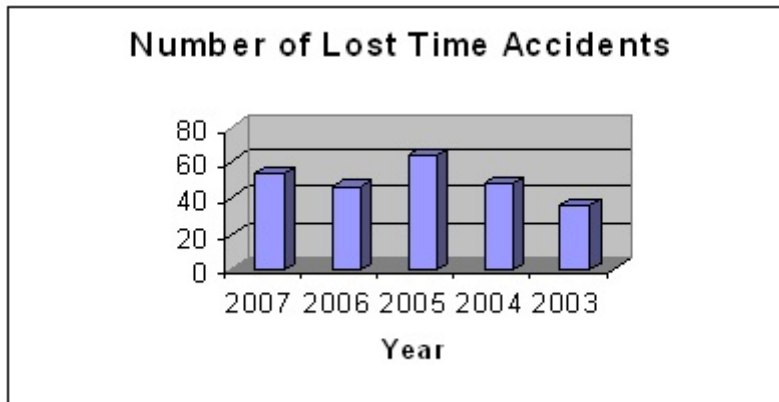


Figure II

A similar picture emerges when we look at accident severity as measured by the number of days lost. In total, the 54 time loss accidents recorded during 2007 resulted in 667 lost work days. Although higher than 2006's lost time toll, it was markedly better than the experience of 2005 when the accidental injuries cost the University almost 950 lost days.

Figure III shows, the 5 year trends.



Figure III

Workplace accidents can have lasting impact on both the victim and the employer. During 2007, Dalhousie trades, custodial and grounds staff recorded an additional 242 lost days as a result of accidents which occurred in past years. About a third of these days arose as a consequence of accidents which occurred in late 2006. But others were caused by recurring difficulties arising from older accidents - in one case dating back as far as 1999. Adding the loss from previous years' accidents, raises the total 2007 lost day count to 909. Again, this represents a poorer experience than the total of 851 lost day experiences of 2006, but an improvement over the 1001 days lost in 2005.

As Table III shows, by far, the majority of those involved in lost time accidents are trades, custodial workers and grounds keepers in Facilities Management.

Table III

Distribution of Lost Time Accidents Among Employee Groups

	NUMBER OF TIME LOSS ACCIDENTS	DAYS LOST
Trades	14	123
Custodians	24	427
Mail, Grounds and Trucking	5	76
Security	5	6
Other Staff	5	31
Faculty	1	4
Total	54	667

As is usually the case, a small number of accidental injuries accounted for the bulk of the loss time. The four serious accidents together accounted for a time loss of 363 days or just over half days lost as a result of workplace accidents.

Table V shows that the types of accidents which cause time loss during 2007 were similar to those which caused lost time in previous years. Over-exertion, falls (including both falls from a height and falls on the level) and striking something or being struck by something, were the causes of loss time accidents.

Table V

	Over-Exertion	Falls	Struck/Being Struck
Number of Accidents	27	10	7
Total Days Lost	413	31	108

The over-exertion injuries occur most often in connection with manually handling materials. In such an accident, an employee suffers a sprain or strain (often of the lower back) when lifting an unexpected heavy or awkwardly shaped object. So, for example, custodians often report over-exertion injuries when lifting a garbage bag of books or journals, or when lifting a heavy box of refuse overhead to throw it into a dumpster. And trades employees report over-exertion injuries when moving sheets of plywood or gyproc, or when moving very heavy tool boxes.

During 2007, falls which occurred on wet or icy floors, stairs or sidewalks, were relatively frequent. Our long term experience suggests that, on average, falls which occur on slippery surfaces, lead to absences which are twice as long as absences caused by slips and trips on dry surfaces. During 2007, in half of the lost time falls, employees reported that snow or ice was a factor in the accident. Together, these accidents resulted in 20 days lost time out of the total 31 days claimed by falling accidents. The majority of these days were lost during the last two months of the year, reflective perhaps of the unusually early onset of the winter of 2007 - 2008.

In this regard, 2007 was somewhat different than 2006 when ice, snow and water were infrequently reported to be the cause of falls.

Accidents and injuries involve not only staff. Faculty, students, contractors and visitors, are also occasionally injured. Further, the Safety Office receives reports of other campus events, some of which relate to injuries.

Figure IV shows that the Safety Office received a total of 282 such reports during 2007, generally in-line with the experience of recent years.

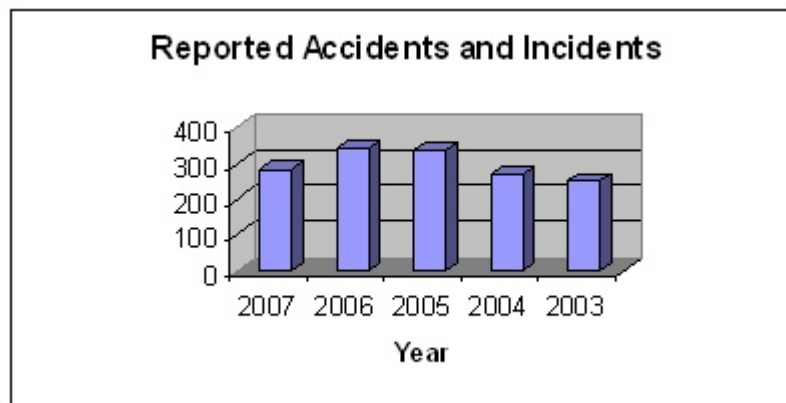


Figure IV

Included among these reports were:

-	Accidents causing injuries to staff and faculty	208
-	Other work or study accidents (1)	28
-	Sport accidents involving:	
	students	19
	visitors	10
-	Medical emergencies	7
-	Incidents (2)	10

(1) *Other work or study accidents include:*

- *cuts and punctures suffered by students in laboratory or clinic programs, and*
- *other miscellaneous injuries suffered by students in the course of attending classes or working on campus.*

(2) *Incidents included fires and chemical spills and indoor air quality episodes.*

5 FIRE SAFETY

5.1 The Fire Safety Program

During 2007, Dalhousie continued to operate the aggressive fire safety program which has been developed over the years. The University makes ongoing efforts to install and maintain detection, suppression and alarm systems, and to upgrade equipment and facilities to keep pace with changes in the National Building and Fire Codes of Canada. During the year, the Safety Office continued to work with fire warden teams across the University. These fire warden teams are a cornerstone of our program and serve each of the University's major buildings.

To ensure that both wardens and building occupants are familiar with the building's emergency evacuation plan, evacuation drills are conducted annually. In most cases, the drill is conducted during the first few weeks of the Fall term. The evacuation systems are now so well established that we are able to evacuate most Dalhousie buildings in less than 5 minutes.

Working with Facilities Management and building fire wardens, the Safety Office has almost completed upgrading the emergency evacuation information that the Fire Code requires to be posted in major buildings. By the end of 2007, updated signs had been placed in all but a handful of Dalhousie buildings. We expect to complete the project in the first quarter of 2008.

To meet the requirements of Nova Scotia's new Fire Safety Act, the Safety Office has begun to prepare formal fire safety plans for each building. The Inspection Division of the Halifax Regional Fire and Emergency Services is presently vetting sample plans. Once we have agreement from the fire officials on the form and contents of the plans, we will continue to prepare plans for the remainder of the University's buildings.

During the past year, Housing, Conference and Ancillary Services has taken the initiative to have all residences inspected by the Fire Marshall. As a result of the recommendations put forward through the inspection process, the Department has spent over \$100,000 in upgrades related to fire safety. These upgrades include: door closures, updated emergency lighting, electrical panel upgrades, door installations, and design costs designated for future fire safety projects.

It is anticipated that the inspection process for all residences will be completed by June 2008. Furthermore, in collaboration with Facilities Management, a long-term plan will be presented to the Fire Marshall to address any outstanding recommendations brought forward from the inspection process.

At this point, Housing, Conference and Ancillary Services has over \$225,000 of projects scheduled for the 2008/09 budget year for fire safety.

5.2 The 2007 Fire Experience

2007 was, again, an exceptional fire safety year, continuing an almost decade-long succession of fire safe years. During the year, only three fires were recorded which as the table shows, makes the 2007 experience as the best in at least a decade. In almost every year in the last decade, the University experienced at least one outdoor fire. These fires often occurred in mulched flower beds or garbage receptacles. Careless discarding of cigarettes was the most likely cause of the majority of these fires. During 2007, no exterior fires were reported - perhaps a result of the University efforts to limit smoking on campus.

However, one of the fires which did occur was both quite serious and costly.

Late in the afternoon of March 14th, an electrical fire broke out in a Killam Library transformer. A Facilities Management staff member was present in the mechanical space at the time. Recognizing that the fire was beyond his capacity to respond to, he activated the fire alarm. Under the direction of the fire warden team, building occupants evacuated uneventfully. The fire was easily extinguished but, as the power to the Library was disconnected, the Library was closed until the following morning. The fire created a relatively small amount of smoke but destroyed a critically important electrical transformer. During the evening, Facilities Management worked to bypass damaged circuits, located a portable diesel-fueled generator on the boulevard outside the Library, and provided electrical supply using heavy duty cables which ran from the generator through the utilities tunnel into the Building. These interim provisions made it possible for the Library to open as usual the following morning.

In the days following the fire, an electrical consultant determined that the transformer failure had been a result of an electrical over-load and a replacement, higher capacity transformer was ordered. As delivery schedules for large transformers are quite long, the Library operated using the portable generator for several weeks. In what was likely an attempt to steal the cable, late one evening someone tampered with the fitting which connected the heavy duty cable to the generator. The area of the connection was badly scorched - suggesting that the culprit was badly surprised. If the individual was injured, there - not surprisingly - was no report. The tampering did, however, unbalance the electrical supply, damaging several of the motors which power the Building's large ventilation fans.

The costs associated with this fire were well in excess of \$100,000.

In a second fire, a Food Services employee suffered minor burns while re-lighting a pilot light in a propane-fueled range in the Howe Hall kitchen. After receiving first aid, the employee returned to work later in the shift. The fire did not cause any damage.

The third fire broke out in a Biology laboratory when a technician accidentally ignited a small quantity of alcohol. The technician was using a burner flame and alcohol to sterilize an instrument used in cell culture manipulations. The fire caused no injuries or damage. It did, however, reinforce the need for care when students and employees use flammable liquids in University laboratories.

Table I presents the data on the number of fires which have occurred at Dalhousie over the past decade.

Table I

Year	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
# of Fires	3	4	6	5	11	5	7	9	10	7

The **Figure I** presents a running three year average which clearly shows the dramatic improvement in the University's fire experience over the period.

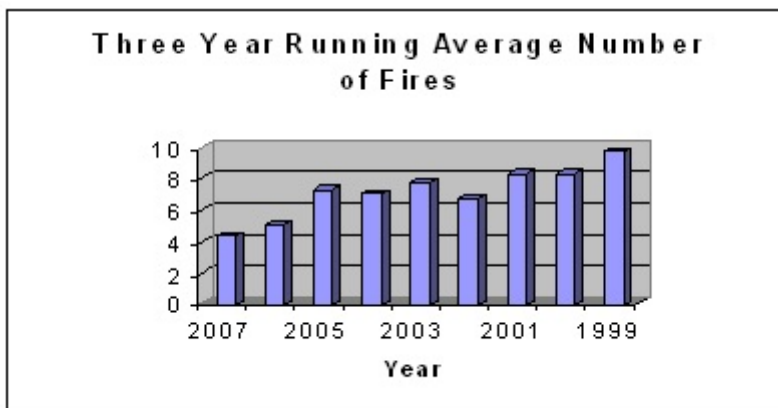


Figure I

5.3 2007 Fire Safety Upgrades

At present, Facilities Management and the Faculty of Medicine are involved in replacing an old fire suppression system in the Faculty's chemical storage facility. Although it has never been activated, the system was designed to release carbon dioxide gas to suppress a fire by displacing oxygen from the storage room. Such systems present an on-going concern for personal safety since, when the CO2 gas is released into a space, the resulting atmosphere contains insufficient oxygen to sustain life. Facilities Management is replacing the old system with a modern sprinkler system specially designed for this application. The project, with a budget of \$100,000, is scheduled to be completed in the first quarter of '08.

During the past year, Housing, Conference and Ancillary Services has taken the initiative to have all residences inspected by the Fire Marshall. As a result of the recommendations put forward through the inspection process, the Department has spent over \$100,000 in upgrades related to fire safety. These upgrades include: door closures, updated emergency lighting, electrical panel upgrades, door installations, and design costs designated for future fire safety projects.

It is anticipated that the inspection process for all residences will be completed by June 2008. Furthermore, in collaboration with Facilities Management, a long-term plan will be presented to the Fire Marshall to address any outstanding recommendations brought forward from the inspection process.

At this point, Housing, Conference and Ancillary Services has over \$225,000 of projects scheduled for the 2008/09 budget year for fire safety.

6 MANAGEMENT OF HAZARDOUS MATERIALS

6.1 Highly Regulated Materials

Dalhousie has had many years of experience dealing with materials such as asbestos, freons and PCB's. During 2007, we continued the programs which are designed to ensure that we manage these materials safely and in full compliance with Federal and Provincial regulations. Given the extent of the University's use of these highly regulated materials, their management will challenge the Faculties and Facilities Management for many years to come.

6.1.1 Asbestos

Between roughly 1925 and 1975, asbestos was widely used by the construction industry. As Dalhousie has a number of buildings constructed during this period, asbestos is present in many of the University's older buildings. During the past 15 years, a good deal of asbestos has been removed as older building systems have been replaced, as renovations have been carried out or where the condition of the material presented a significant exposure risk. But a good deal of asbestos remains as thermal insulation on piping systems, as structural fire or sound-proofing and as a strengthening agent in flooring and plaster.

To ensure that neither staff of Facilities Management or building occupants are exposed to potentially harmful asbestos exposure, the University adopted a comprehensive Asbestos Management Plan in 1998. The Plan, which can be found on the University's Safety web site, details the procedures which are to be used in dealing with asbestos-containing materials and the training programs which are required before staff undertake work with asbestos. Facilities Management maintains an Asbestos Inventory that lists locations where asbestos is known to be present as well as the type of asbestos fibre involved. The Inventory is updated as new asbestos containing materials are discovered.

The Plan was updated in 2005 and refresher training programs were held in 2006.

2007 was a typical year in terms of the University's dealing with asbestos. Projects were undertaken on all three campuses in which precautions were taken to prevent potentially harmful exposures to asbestos fibre. Among the more major projects were removal of fibre from mechanical spaces in the Burbidge Building and the CRC, renovation projects involving asbestos removal in washrooms in the Sexton Campus C and J Buildings, and renovations involving asbestos fibre in plaster or flooring in two suites in the Henry Hicks Academic and Administration Building and Sexton's F Building.

Expenditures related solely to the asbestos component of these projects was about \$30,000.

6.1.2 PCBs

As permitted by federal regulations, Dalhousie continues to operate several large transformers filled with PCB-containing transformer oils. The PCB transformer located in the Central Services Building, failed during 2006 and was replaced with an interim unit while a suitable replacement was being manufactured. The replacement was installed without incident during the early part of 2007. With the completion of that project, the last PCB containing unit in the CSB has been removed. PCB containing electrical equipment remains in service in the Killam Library, the Life Sciences Centre and the Weldon Law Building.

As the federal government is in the process of moving forward the date at which all PCB equipment must be removed from service, Facilities Management anticipates that the remaining PCB units will be replaced (or the PCB removed) by 2010.

6.1.3 Propane

During 2007, Dalhousie continued to work on propane systems in co-operation with inspectors from the Fuel Safety section of the Department of Environment and Labour. The focus of the work was to address compliance issues created by recent code changes, including some introduced by the new Fuel Safety Regulations.

During 2007, a major project was undertaken in Tupper. At a cost of almost \$50,000, the project, which entailed a 5 month shut down of the building's propane distribution system. The project updated large portions of the system to meet current Code requirements. During the shut down, laboratories used small, portable burners fueled by disposal cylinders to maintain research activities. In places where it has not been practical to update the propane distribution system, laboratories continue to use these portable devices. We expected that, as future renovations are undertaken, at least some of these laboratories will be updated and then re-connected to the propane system.

In coming years, there will be a need to update propane systems in a few locations in the Chemistry Building and throughout significant portions of the Life Sciences Centre.

6.1.4 Freons

Dalhousie makes extensive use of cooling systems ranging from the gigantic chillers down to individual, domestic scale refrigerators found in dozens of departmental kitchenettes and literally hundreds of laboratories on each of the University's three campuses. Many of the units employ ozone depleting freons (or more properly ozone depleting substances) in the cooling unit's compressor.

Dealing with old refrigerators and air conditioners is a responsibility shared between Facilities Management and the campus unit which wishes to discard the unit. But when larger units are involved, the tasks of disposing the highly regulated compressor gas, falls to Facilities Management. During 2007, a major cooling equipment replacement was carried out in Oceanography and three such projects were carried out in Tupper. One of the Tupper projects alone required the capture and transfer of almost 30 kg. of refrigerant gas. And the Safety Office arranged for the disposal of an additional 60 kg. of refrigerant purchased many years ago to recharge a research chiller which has since been decommissioned.

6.2 Hazardous Waste

Since 1988, the Safety Office has coordinated the University's chemical waste disposal effort. With the assistance of a crew from Trucking, the Safety Office collects waste solvents and related wastes each month. The fluid wastes are generally bulked into 45 gallon drums with other compatible wastes and shipped for disposal to a fully-licensed waste site by a licensed hazardous waste disposal firm. In recent years, the range of wastes collected in this program has been expanded to include some radioactive waste as well some biohazardous wastes. These wastes are also bulked and sent for destruction by incineration (again at licensed sites) or are handled in the system which accommodates the biohazardous materials generated by the Province's hospital network.

Again, during the summer of 2007, we accepted the full range of waste chemicals including those which we are unable to deal with during the academic year. Many of the wastes created by University laboratories require some degree of pretreatment and cannot simply be bulked into drums for shipment and disposal. Lacking year-round access to facilities which support such pretreatment work, we are unable to accept such wastes except during the summer months when we have access to a vacant undergraduate Chemistry laboratory. As in the past, we were assisted in this phase of the disposal effort by two students.

During the Spring, construction began on an addition to the Chemistry Building to build a new facility which will more appropriately accommodate the storage of the substantial volumes of chemicals required by the Chemistry Department. It will also create a facility designed to support the Safety Office's waste and surplus chemical handling program. We are looking forward to moving into the new facility in April 2008. By early summer, we expect to be fully operational and to be able to accept and deal with the full range of wastes as they are created. The new facility represents a significant step forward in our ability to safely manage the hazardous materials created by the University research and teaching programs. It will also make an important contribution to laboratory safety across each of the University campuses.

6.2.1 Green Custodial Chemicals

In 2006, Facilities Management decided that the time has come to try to reduce the number and type of cleaning products used by Dalhousie and, if possible, to select a small number of more environmentally friendly products. During the last few months of 2006, the Safety Office worked with Facilities Management staff to develop a set of 'green' custodial chemical criteria. Early in 2007, Purchasing used these criteria in a tender call. The Safety Office assisted in the review of responses to the tender and assisted Environmental Services in short listing possible suppliers. During the summer, the tender was awarded and by the fall of 2007 the new line of cleaning products was in service.

This product selection should reduce the impact of custodial work on buildings, building occupants and the waste water system. In addition, these chemicals are generally less dangerous than at least some of those that they have replaced. Finally, the reduced range of products will make easier compliance with safety regulations.

6.2.2 Aqueous Waste Containing Radioactivity

For many years, some Dalhousie laboratories have discharged to the municipal sewer system, relatively small volumes of waste containing traces of radioactive isotopes such as tritium (a radioactive form of hydrogen), carbon 14. These discharges are permitted under the terms of the license issued to the University by the Canadian Nuclear Safety Commission. Perhaps more importantly, given the enormous dilution which occurs within the buildings' waste handling systems and later within the municipal system, these discharges did not constitute a health or environmental hazard. However, with the construction of the Region's new waste water treatment system, our Radiation Safety Office felt that the practice would perhaps be seen unfavourably by municipal officials. As a result, a decision was made to discontinue the practice. Early in 2007, a new practice was instituted under which laboratories using radioactive isotopes began collecting these fluids in a program that is analogous to the system we use in collecting waste solvents. A new interim storage facility was created in the Sir Charles Tupper Building. After a cooling period, these wastes are pooled with other water-based hazardous wastes and sent off campus for destruction. Dalhousie is one of only a hand full of Canadian universities that has moved away from sewer discharge for this type of waste.

6.3 The 2007 Waste Handling Experience

During 2007, the disposal program handled almost 13,500 individual wastes, ranging in size from a few milligrams to a few kilograms. In total, the program handled just under 15,000 kilograms of waste and surplus chemicals. The demand for disposal services continue to rise – at least in terms of the number of wastes handled. During 2007, we dealt with almost twice the number of individual wastes handled during the previous year. However, for the first time in a decade, there was a decline in the total quantity of waste we dealt with. The 15,000 kg. handled during 2007 represented a decline of about 5% over quantities handled during 2006. The increase in the number of items is likely being driven by rapidly growing research activity in some of the Faculties including Medicine and Dentistry.

Of the 15,000 kg. total, almost just under half consisted of laboratory solvents and the associated dissolved solids. A breakdown of the type of wastes handled during 2007 is shown below.

Waste Disposal

Toxic inorganic compounds	275 kg.
Scintillation waste	400 kg.
Toxic organic chemicals	102 kg.
Contaminated acids	150 kg.
Laboratory and clinic solvents and oil	7000 kg.
Non-hazardous chemical wastes	345 kg.
Sharps and other potentially infectious waste *	3660 kg.
Dangerously reactive compounds	75 kg.
Contaminated solid and sediments	210 kg.
Other wastes	200 kg.

* This quantity represents only a fraction of the quantity of sharps and potentially infectious waste created by Dalhousie research and teaching laboratories and clinics in Medicine, Dentistry and Science. The disposal of this waste is coordinated by Facilities Management's Environmental Services. Dalhousie's sharps and potentially infectious waste disposal program is fully integrated into the province-wide system with several hospitals and similar facilities.

In addition to this disposal activity, we continue to look for opportunities to reuse or recycle some of these surplus and waste materials. The Table below shows the 2007 totals for materials diverted from disposal.

Metals including mercury, lead and chromium	40 kg.
Batteries	1958 kg.
Paint	65 kg.
Glass	1400 kg.
ChemEx	100 kg.

Chemical disposal costs can be significant. Since 1992, when much of the chemical waste handling was taken over by the Safety Office, annual disposal costs have run between \$10,000 - \$20,000. As **Table I** shows, disposal costs have increased, reflecting increases in the unit disposal fees and the increased volumes.

**Table I
Disposal Costs**

Year	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
Annual Chemical Disposal Cost	\$27,400	\$21,000	\$21,300	\$20,800	\$14,800	\$14,600	\$16,200	\$14,250	\$16,000	\$13,500

6.4 ChemEx

During 2007, the Safety Office continued to operate ChemEx, the University's surplus chemical exchange program. 2007 was one of the busiest years in the history of the exchange. During the year, ChemEx placed 670 items with a catalogue value of just over \$31,500.

As **Table II** shows, 2007 activity brings the value of chemicals placed since 1992 to almost \$420,000. The value of the exchanged chemicals under-estimates the avoided costs as it does not include shipping or brokerage costs associated with new purchases, nor does it consider the disposal costs which otherwise would have been incurred. Over the year, ChemEx has saved Dalhousie (and neighbouring institutional) researchers and teachers on the order of \$1,000,000 in avoided costs.

Table II

Year	2007	1992-2006
Number of chemicals exchanged	482	7600
Value of chemicals exc hanged	\$22,300	\$385,725

7 LEGAL MATTERS

7.1 Ongoing Regulatory Matters

7.1.1 Areas of Provincial Jurisdiction

During 2007, officials from the Nova Scotia Department Environment and Labour visited the campus on three occasions.

The first visit was in response to an accident which took place on March 27th in the Arts Centre's Dunn Theatre. A Department of Theatre instructor and a Theatre student were putting the finishing touches on the set for a student performance that opened that evening. The student and the instructor were using a hydraulic 'person lift'. The lift is a wheeled, vertically adjustable platform which allows a person to work at heights from 15 to about 30 feet to reach the upper portion of the set. Working from behind the set where supports and braces created cramped working area, the two people were attempting to reposition the lift. As they tried to move the lift over a brace, it tipped. The instructor suffered a sprain as he tried to prevent the lift from falling and the student was struck, causing what turned out to be fairly minor bruises. Concerned that the injuries were more serious, bystanders called 911 which brought a response by both HRM Fire and Police, as well as the ambulance. As is their practice where police respond to an accident at a work site, the police officers in turned called the Department of Labour. The inspector arrived shortly after the departure of the ambulance and ordered that the University conduct a formal investigation into the accident.

The Safety Office, working with members of the Theatre Department and the University Environmental Health and Safety Committee, conducted the investigation. The investigation team's recommendations included:

- an inspection and re-certification of the lift by an outside service technician,
- preparation by the Theatre Department of a safe work procedure for the safe use of the lift, including a policy that it should only be used under the supervision of a technician who is appropriately trained in its use,
- a recommendation that the Departmental administrators review the Occupational Health and Safety Act and remind staff and students about the Act's provisions regarding the rights to know, participate and refuse,
- the preparation of a readily accessible library of safety information for all Departmental equipment, and
- a recommendation that, in future, set design take into account the need to do as much set construction on the floor to minimize the need to work at heights.

The Theatre Department acted on each of the recommendations.

Later in the spring, a Labour Department inspector visited the Sir James Dunn Building and carried out an inspection of a number of wood working and metal working shops which the Department of Physics and Atmospheric Sciences operates on the Building's ground floor. In response to an extensive series of orders issued by the inspector, the Department carried out an in-depth review of its shop policies and procedures. Among the resulting changes were:

- certification of a metal lathe hoist,
- servicing of welding equipment,
- disposal of outdated chemicals and updating of the MSDS information,
- improvements in safety signage,
- strengthening of the personal protective equipment and machine guarding policies and procedures,
- improved task illumination, and
- improvements in the over-all shop illumination.

The exercise not only improved safety in the Physics shops but it also prompted other departments to similarly upgrade their shop safety programs. In addition, the follow-up communications with the Department of Labour lead to the formalization of an understanding about how the University responds to a number of provisions in the Occupational Health and Safety Act. In a number of places, the Act requires that employers 'post' critical safety information to ensure that it is readily available to employees. The University has long argued the use of the Safety web site (www.dal.ca/safety) is an effective means of meeting many of these obligations and further, it is a means which fits well into the University structure and culture. Over the years, Labour officials have often made reference to the absence in University buildings of 'safety bulletin boards' which they see in many NS workplaces. In the follow-up to the orders issued regarding the Physics shops, the Labour Department formally agreed that our use of the web site meets these 'posting' requirements. There, of course, remains the on-going need to publicize the site so that the University community is well aware of the role it plays in the University's health and safety program.

A third inspection took place in late summer when an inspector responded to an anonymous telephone call suggesting that occupants of the Dunn Building were inappropriately disposing of dangerous chemicals. The inspector visited a number of laboratories and found no indications of improper disposal. The inspector did, however, issue a series of orders dealing with chemical storage practices, accident investigation and laboratory inspections.

The Dalhousie Environmental Health and Safety Committee concluded that the inspection and investigation matters should be approached from a University rather than departmental perspective.

The Committee concluded that changes were not required to the accident reporting or investigation policies. The Committee did, however, re-instate a former practice of reviewing recent accident experience at each meeting.

In the matter of inspections, the Committee concluded that the University should perhaps strengthen its inspection program. The Committee recommended that the University implement a three tier system. The first level would include the routine inspections of mechanical spaces and building systems carried out by staff of Facilities Management (or contractors). The Committee felt that these Facilities Management inspections should be supported by a new, monthly fire and general safety inspection program under which University fire warden teams would inspect 'public' areas of University Buildings. Finally, the Committee suggested that local supervisors should conduct at least annual inspection laboratories, work shops, clinics and similar high hazard or high specialization areas. In each of these last two tiers, the Committee suggested direct roles for local safety committees, departmental chairs, the Dalhousie Safety Office and the Environmental Health and Safety Committee. Such a system the Committee felt would ensure the effectiveness of the programs and create the documentation needed to demonstrate compliance with the regulations.

On the Environmental side, the University dealt twice with soil contamination. In the first instance, a first test of soil was carried out when a student group requested permission to establish a co-operative garden behind a 'University house' on South Street. Results indicated that metal and organic chemical concentrations exceeded those deemed safe for food cultivation by health and environmental agencies. Plans have been developed to create a raised- bed garden using fresh clean soil for the up-coming growing season.

Later contamination was discovered in the soil excavated for the new Chemical Storage Facility. Although the level of contamination was low enough that the regulation permits such materials to be used as back-fill and landscaping around the site, the University opted to have the soil removed for treatment and disposal.

There is no doubt that in both instances the contamination arose from long abandoned practices. In the South Street case, the contamination most likely represents the result of

using fill which included ash residues generated by the now closed generating station which was located at the foot of Terminal Road. In the case of the Chemistry building site, contamination likely arose from on-site disposal of ash from the building's original coal fired heating system.

There were no inspections conducted by Environmental officials and no environmental orders were issued to Dalhousie during the year.

7.1.2 Areas of Federal Jurisdiction

As is dealt with in more detail elsewhere, officials of the Canadian Nuclear Safety Commission conducted both routine inspections and a formal program audit of Dalhousie's use of radioisotopes.

Dalhousie continued to handle the disposal of hazardous waste in accord with federal Transport of Dangerous Goods Regulations.

Discussions with representatives of the Canadian Food Inspection Agency and the Canadian Public Health Agency suggest that the University is likely to face increased scrutiny and perhaps more regulations on the University's use of potentially biohazardous materials. During the year, the University concluded agreements that each of these agencies will only process applications for import or export permits from Dalhousie faculty that are endorsed by the Safety Office.

On behalf of the University, the Safety Office filed the reports required annually under the Chemical Weapons Convention Regulations by Foreign Affairs Canada.

7.2 Regulatory Changes

2007 did not see significant changes in the Federal statutes under which the University Health and Safety Program operates.

In the late 1990s, Dalhousie introduced a workplace violence prevention program. That program aligns closely with the requirements of a new workplace violence regulation issued by the NS Department of Labour. However, the Regulation calls for renewed violence assessments at least every 5 years, so it will be necessary to refresh the University program. The Vice-President Finance and Administration has created a working group with participation from Human Resources, Security and Safety. That group is presently reviewing the University program and preparing a proposed hazard assessment methodology. The Committee expects to issue its report within a few weeks and expects that the assessment work will follow shortly thereafter.

8 TRAINING

Although a number of units and departments across campus provide safety training, the Safety Office is one of the focal points for safety training. During 2007, the Safety Office delivered, or participated in, sessions which provided instruction and information to well over 1200 staff and students.

8.1 Workplace Hazardous Materials Information System (WHMIS)

WHMIS is a set of interlocking Provincial and Federal regulations, created to give employers and employees information upon which they can develop procedures to work safely with chemicals. WHMIS regulation requires employees to be trained in WHMIS, and in how the employee is to apply this information to daily work with chemicals. The Safety Office provides much of the WHMIS training for those whose exposure to chemicals arises in laboratories or clinics. Although the WHMIS regulation technically only applies to employees, many of those participating in these training sessions are students. During 2007, the Safety Office conducted 12 training sessions for staff and students in Biology, Chemistry, Dental Hygiene, Dentistry, Facilities Management, Housing and Conference Services, Medicine, Science Co-op and Engineering. In total, over 325 people participated in these programs.

8.2 Student Security

As has been the practice over the past decade, the Safety Office provided two, half-day safety orientation sessions for members of Tiger Patrol and the Student Building Security Service. One session was offered in January as part of the orientation for students recruited during the course of the year. The second session was held in September as part of the orientation provided to 100 students recruited to work during the 07-08 academic year.

8.3 Radiation Safety Training

The Radiation Safety Office also conducts training for all staff and students working with radioactivity. The training meets the terms set in the consolidated license issued to the University by the Canadian Nuclear Safety Commission. The Radiation Safety Office also offers an on-line training module which provides refresher training for those who have attended previous training workshops and a session which provides laboratory staff with the information required to safely receive parcels containing radioactive materials which are shipped under the conditions established by the Transportation of Dangerous Goods Act. More information of these training programs is presented in the Radiation Safety Annual Report which is appended to this report.

8.4 CPR and Related Training

During 2007, the Safety Office was very active in first aid, CPR and AED training. During the year, the Safety Office offered 36 training sessions which provided hands-on training to almost 300 members of the University community.

Among these sessions were five first aid sessions which were offered for the first time. The sessions were delivered to Facilities Management staff focusing on the traumatic type of injury that one might encounter in trades work. Several sessions were offered to teaching assistants and laboratory instructors. These sessions focused in much greater depth on responding to the types of chemical accidental injuries which might be anticipated in the University's teaching laboratories. In time, the Safety Office hopes that all University teaching assistants and undergraduate laboratory supervisors will all have taken part in this type of training.

8.5 Custodial and Trades Training

During 2007, the Safety Office provided 4 training sessions involving about 200 trades and custodial staff. Among the topics covered were:

- an orientation to the hazards present in University labs and clinics,
- back injury prevention, and
- asbestos orientation (level 1 training)

8.6 Fire Warden Training

For the second year in a row, the Safety Office conducted a one-day fire warden training session. About 50 members of fire warden teams from buildings across all three campuses attended.

8.7 Biosafety Training

For the second year in succession, the Safety Office (in co-operation with the University Biosafety Officer and the Faculty of Medicine) offered a full day biosafety training program. The session was presented by biosafety specialists from Canada's level 4 bio-containment facility in Winnipeg and from the offices in Ottawa of the federal regulatory Departments.

The session focused on the practical aspects of working safely with potentially infectious agents as well as reviewing the regulatory aspects of Canada's biohazardous material importation system. About 70 researchers and students attended the session.

APPENDICES

MILESTONES IN HEALTH AND SAFETY AT DALHOUSIE

- 1976** Appointment of Dr. GFO Langstroth, a faculty member in the Department of Physics, as Radiation Safety Officer and Chair of the Radiation Safety Committee.
- 1977** Appointment of A. Chisholm as Director of Safety (in addition to duties as an engineer within Physical Plant and Planning).
- 1980** Establishment of the Dalhousie Environmental Health and Safety Committee composed of both University and Employee Group representatives charged with providing policy advice and presenting an opportunity for the resolution of health and safety concerns.
- 1982** Establishment of a Radiation Safety Program in cooperation with the Nova Scotia Cancer Centre. Appointment of P. Jones as Assistant Radiation Safety Officer. Atomic Energy Control Board of Canada issues Dalhousie University its first consolidated radioisotope licence.
- 1983** Appointment of Dr. J. Johnson as Director of Safety. Dr. Johnson, a physician with years of service at Dalhousie brought to the Program a professional stature and an important skill set.
- 1984** Appointment of Ms. J. Taylor McIntyre, Administrative Secretary.
- 1985** Enactment of the Nova Scotia Occupational Health and Safety Act. This Act mandated the creation of committees and introduced important new workplace rights and responsibilities.
- 1990** Appointment of Dr. Wm. Louch, Director of Environmental Health and Safety.
- 1995** Adoption of the Scent Reduction Program. In an effort to support sensitive members of the University community, the program encourages people to avoid using scented personal care products. The Program also encourages Facilities Management to avoid unnecessary chemical exposure which may arise from maintenance and operations of Dalhousie buildings.
- 1996** Enactment of an amended Occupational Health and Safety Act.
- 1997** Amalgamation of Dalhousie University and Technical University of Nova Scotia. The Dalhousie Safety Office assumed responsibilities for environmental health and safety at the Sexton Campus.
- 2000** Amalgamation of Environmental Health and Safety and Radiation Safety Offices. Appointment of Ms. P. Jones as Radiation Safety Officer.
- 2001** Dalhousie becomes the first University to be issued a consolidated licence by the new Canadian Nuclear Safety Commission.
- 2003** Dalhousie becomes the first Canadian University to adopt a smoke-free campus policy.
- 2004** An amendment to the Criminal Code of Canada created a new legal obligation in matters of safety for those who direct or who have the authority to direct work.
- 2005** Appointment of Mr. S. Ellis, Health and Safety Officer.

Dalhousie University, Radiation Safety Annual Report

This annual report summarizes the progress of the Radiation Safety Program for the period January 1, 2007 to December 31, 2007.

1. SUMMARY

During 2007 the Radiation Safety Program has continued successfully with the supervision of the policies and procedures developed thus far. The matter of improvement of these policies and procedures is a continuing agenda item for each meeting of the Radiation Safety Committee. The university was inspected twice by the Canadian Nuclear Safety Commission. A Type 1 audit was conducted in August of 2007. The audit report was received in late October. The report noted two Directives, one Action item and four Recommendations. A response to the audit report was submitted to CNSC in December. A CNSC Security audit was conducted on September 11, 2007. Additional upgrades to the inner door in the Gammacell suite were required. Upgrades are in progress.

New initiatives this year include:

- a) A worker re-training session in the form of a Power Point presentation was completed and posted to the Environmental Health & Safety web site in June 2007. The topic of this years re-training module was "**Conducting Contamination Surveys**". All workers trained prior to 2005 were required to complete the module and accompanying quiz.
- b) As a result of Health Canada's recommendations that the allowable indoor concentrations of radon be reduced from the current level of 800 becquerels/m³ to 200 becquerels/m³ the office acquired a number of alpha track test kits to conduct long term testing in selected locations across campus. These kits were placed in late December and will stay in place until the end of March 2008. Kits were placed on the lowest occupied level in the various buildings selected. Once testing is complete the kits will be shipped to Landauer Inc. for analysis.
- c) The computerized tracking system was turned over to the office in late summer. After a considerable amount of data input, training of individuals in the various research groups was undertaken. Currently one hundred twelve (115) individuals use the program. The program can only be accessed through Dalhousie computers and is password protected.
- d) The collection of water soluble liquid radioactive waste started in January 2007. The waste is collected at the laboratory level in containers supplied by the Radiation Safety Office. Filled containers are then transferred to the waste storage facility in the Tupper Building for decay and subsequent transfer for incineration.
- e) At the request of HRM Fire Department we conducted facility tours of areas where nuclear substances are used for four separate HazMat crews.
- f) A series of questions to accompany each module of the Laser Safety training program were developed by Kevin Hewitt and Kimberley Hall. Both the modules and the tests will be housed on the Physics Department web site. Training will be mandatory for all laser users.
- g) Equipment to perform quality assurance on diagnostic x-ray equipment in the Dental School was calibrated and we expect to embark on a QA program in the first quarter of 2008.

2. RADIATION SAFETY COMMITTEE

Members for 2008

Dr. A. Chatt, Director, SLOWPOKE-2 facility, Trace Analysis Research Centre,
Dr. S. Cameron, Chemistry
Dr. M. Dobson, (Chair), Biochemistry & Molecular Biology
Dr. R. Dunlap, Physics & Atmospheric Science
Dr. K. Hall, Physics & Atmospheric Science
Dr. K. Hewitt, Physics & Atmospheric Science
Dr. D. Hoskin, Microbiology & Immunology, Pathology
Ms. P. Jones, (Secretary), Radiation Safety Officer
Dr. W. Louch, Director, Environmental Health & Safety
Mr. G. McNutt, Building Services Manager, Tupper
Ms. K. Murphy, Pharmacology
Dr. N. Ridgway, Atlantic Research Centre
Dr. M. Zentilli, Earth Sciences

Dates of Committee Meetings

June 5, 2007
September 11, 2007 (cancelled awaiting CNSC Type 1 audit report)
December 18, 2007

3. RADIATION USE (*ionizing and non-ionizing*)

- a) Nuclear substances find application in the following experimental techniques, where the majority of use is conducted in the Faculty of Medicine.
- i) activation analysis
 - ii) gas chromatography
 - iii) geochronological research
 - iv) imaging studies
 - v) metal assays
 - vi) Mossbauer spectroscopy
 - vii) positron annihilation studies
 - viii) radiation biology
 - ix) radioimmunoassay
 - x) teaching, laboratory technique
 - xi) tracer studies
- b) Number of active Nuclear Substance permits in 2007 48
Number of new permits issued in 2007 5

	Number of "Storage Only" permits	3
	Number of "Inactive " permits	16
	Number of permits utilizing open source material	44
	Number of staff/students who use/handle nuclear substances	306
c)	Number of analytical x-ray permits issued in 2006	1
	Number of staff/students authorized to use x-ray equipment	47
d)	Number of Class 3B and Class 4 lasers identified	21
	Number of laser users identified	47

e) **Nuclear Substance Purchases - 2007**

¹⁴ C	48.4 MBq*
³ H	1.23 GBq
³² P	2.18 GBq
³³ P	120.25 MBq
³⁵ S	5.03 GBq
⁵¹ Cr	1.85 GBq
¹²⁵ I	95 MBq
Others	777 MBq

TOTAL 11.3 GBq

** The *becquerel (Bq)* is the derived unit of radioactivity, defined as the activity of a quantity of radioactive material in which one nucleus decays per second. This is an extremely small amount of radioactivity, research labs generally work with activities in the *megabecquerel (MBq)* - 10⁶ and *gigabecquerel (G bq)* - 10⁹ range.

- f) Currently no research groups are conducting research using nuclear substances in off campus locations.
- g) During this reporting period there were no significant changes to nuclear substance facilities.
- h) There has been no significant change in nuclear substance use at Dalhousie University during this reporting year, though use over the years has shown a steady decline largely because reliable non-radioactive techniques are more readily available.

4. **CONTAMINATION AND RADIATION SURVEYS**

Nuclear substance users are required to comply with the requirements set out in the *Radiation Safety Manual*, section **E.6**, condition 10 of Dalhousie University's *Nuclear Substance and Radiation Devices Licence 07154-2-12.2*, Dalhousie University's *Nuclear Substance User Permit - Schedule of Conditions* (item 14), Dalhousie University's *Basic/Intermediate Level Laboratory- Nuclear Substance Safety* posters and Dalhousie University's *Record Keeping Requirements* policy. Radiation Safety personnel visit each research group a minimum annually or as required.

Each research group is required to perform self-audits twice yearly, in May and November.

5. **INCIDENTS**

During this reporting year there were no incidents where personal exposures exceeding Dalhousie University action limits occurred. Action limits are set at one third of regulatory limits. No incidents which required reporting to the Canadian Nuclear Safety Commission occurred during the reporting year.

There was one reported instance of a potential overexposure to ultraviolet radiation from a light in a bio-containment hood. The office purchased a light meter capable of measuring in the UVC range of the spectrum. Readings showed that exposures at the work station where the individual in question worked were not detectable. As a result of this inquiry, the office undertook measurements in all laboratories having bio-containment hoods containing UV lights. It is now recommended that these lights not be used as their germicidal properties are questionable at best and there does continue to be concern for worker exposure to the lights. The Radiation Safety Committee will confer with the Biosafety Advisory Group and make a recommendation that such lights be removed from all containment hoods.

6. **DOSIMETRY - 2007**

a) In the following table dosimetry results are reported on the basis of the past year to date, as shown in returns from the Radiation Protection Bureau.

Department	# of badges	Whole Body Exposure (mSv)	Skin Exposure (mSv)
Animal Care	14	0.00	0.00
Biochemistry	62	0.26	0.26
Biochemistry (extremity)	20	-----	0.00
Dentistry	16	0.22	0.22
Chemistry	1	0.00	0.00
Earth Sciences	13	0.00	0.00
Microbiology	35	0.00	0.00
Microbiology (extremity)	7	-----	0.00
Pediatrics	23	0.00	0.00
Pharmacology	51	0.00	0.00
Pharmacology (extremity)	17	-----	0.00
Physics	8	0.35	0.35
Physiology	10	0.00	0.00
Physiology (extremity)	11	-----	0.00
SLOWPOKE	6	0.26	0.26

Exposures listed are the maximum for any individual in each departmental group.

There are no designated Nuclear Energy Workers (NEW's) at Dalhousie University.

- b) A program is in place for routine bioassay screening as required by CNSC regulatory guide **R-58 "Bioassay for Iodine-125 and Iodine-131 in Medical, Teaching and Research"**. No workers were required to participate in the screening program during this reporting period.
- c) No tritiations are performed at Dalhousie University, thus a tritium bioassay program has not been necessary.

7. WASTE MANAGEMENT

Solids to municipal garbage

No solid waste is sent to the municipal garbage system. All shipping containers are collected in designated metal containers, transferred to one of two radioisotope storage facilities on campus for monitoring, trefoil defacement and prepared for recycling or disposal.

Liquids to sewer

Effective January 1, 2007 all water soluble waste with activities > those shown in Table I of the **"Management of Radioactive Waste"** policy is collected in containers supplied by the Radiation Safety Office then transferred to the liquid waste storage facility in the Tupper Building. Waste is held for decay and then shipped for incineration.

Solvent based liquid waste is collected monthly by the Environmental Health & Safety Office. The waste is shipped for incineration.

Incineration

Solid waste containing nuclear substances with a half life of less than ninety days is packaged by laboratory personnel and transferred to one of two decay rooms located in the Tupper Building and the Life Sciences Centre. The material is held for ten half lives, then monitored and transferred as biomedical waste for incineration. Tritium waste is also packaged for incineration.

Transfer to other agencies

During this reporting year no radioactive waste was shipped to another agency for disposal.

8. RADIATION SAFETY TRAINING

There were four formalized one day **Radiation Safety Training** sessions held in 2007. A total of 61 workers participated in these sessions.

A total of 61 workers received **Receipt of Radioactive Shipments** training.

Workers who trained prior to 2005 were required to participate in an on-line training module. The topic of this years training was **"Conducting Contamination Surveys"**. A total of 73 workers were re-trained.

One **Hazard Awareness** session was held for Facilities Management personnel. Ten participants took part.

A **Laboratory Hazards Seminar** was held for departmental technicians. A total of 46 individuals attended this session

Total number of individuals trained - 190

10. **INSTALLATIONS**

There were no new installations during this reporting period.

11. **OUTLOOK**

Five **Radiation Safety Training** sessions have been scheduled for 2007. A retraining module reviewing the principles and procedures of contamination monitoring is being developed for the workers trained prior to 2006.

Respectfully submitted,

Pauline Jones