

Chapter 13

National Defence

Hazardous Materials: Managing
Risks to Employees and the
Environment

Table of Contents

	Page
Main Points	13-5
Introduction	13-7
Canada has extensive legal requirements governing hazardous materials	13-7
National Defence uses many hazardous materials	13-8
Departmental policy on compliance with provincial and municipal laws is not clear	13-10
Focus of the audit	13-11
Observations and Recommendations	13-11
Risks to Employees and the Environment	13-11
Inadequate implementation of protective mechanisms increases risk	13-11
Compliance in some areas has not improved since 1993	13-12
The Department has not succeeded in fully implementing the Workplace Hazardous Materials Information System	13-15
There is a lack of training in hazardous materials	13-18
Inventory lists are inaccurate and incomplete	13-18
Storage practices are deficient	13-20
Respiratory protection programs are not fully implemented	13-20
Monitoring of Continuing Emissions	13-20
Outdoor air emissions are not adequately monitored	13-20
Sewage treatment program meets standards for biological contamination at low cost	13-21
Liquid effluent is not monitored for all contaminants that local standards limit	13-22
National Defence participates in national emission reporting programs	13-26
Compliance Management at National Headquarters	13-26
Managing for compliance reduces risks	13-26
National policy has some gaps	13-26
National plans, procedures and objectives met our expectations	13-27
National policies are not effectively communicated to the field	13-28
National hazardous materials audit programs are not complete or consistent	13-28
Performance measurement could improve compliance	13-29
Slow implementation of performance measures for sustainable development	13-31
Year 2000 certification of computer systems for hazardous materials is on target	13-31
Compliance Management at Bases	13-31
Base-level managing for compliance could be improved	13-31
Some promising developments were noted	13-33
Choosing Safer Products	13-35
Conclusion	13-36
About the Audit	13-37

Exhibits

13.1	Canadian Forces Base – Typical Activities and Types of Hazardous Materials Used	13–9
13.2	Hazardous Material Injuries – National Defence and Industries Performing Similar Tasks	13–12
13.3	Ten Most Common Hazardous Material Non-Compliance Findings 1993 to 1998	13–15
13.4	Summary of Compliance Findings at Three Canadian Forces Bases	13–16
13.5	Safety Ratings – Self-Assessment by Eight Bases	13–17
13.6	Monitoring of Sewage Treatment Plant Effluent	13–23
13.7	Monitoring of Effluent Discharged to Municipal Sewage Treatment Plants	13–24
13.8	Monitoring of Storm Sewer Effluent	13–25
13.9	Proposed Environmental Performance Indicators for Hazardous Materials in Sustainable Government Operations	13–30
13.10	Assessment of Hazardous Materials Management Systems at 10 Bases	13–32

Appendix

	ISO 14004 – Environmental Management Systems	13–40
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National Defence

Hazardous Materials: Managing Risks to Employees and the Environment

Main Points

13.1 Our audit at 10 Canadian Forces bases found widespread, frequent and recurring instances in which National Defence did not meet the legal and policy requirements that govern hazardous materials. Such instances may put employees and the environment at increased risk.

13.2 The Department has made efforts to improve its management of hazardous materials. While there are few clear measures of the impact of these efforts, we did find that injury rates for hazardous material injuries that require at least one day off work declined by more than half from 1993 to 1997.

13.3 The 10 bases that we audited do not periodically monitor their air or liquid effluent emissions for all hazardous material contaminants on which limits are set by federal laws or guidelines. As a federal agency, the Department is not legally bound by provincial or municipal laws and bases do not monitor emissions and effluents against all of those standards.

13.4 There is a lack of information on the overall state of compliance with legal and policy requirements. The existing management systems to ensure compliance at the base and unit levels do not promote continual improvement. Objectives are not set, plans do not exist, audit and inspection programs are not consistent and performance information is lacking. These are major factors in the instances of non-compliance by the Department with legal and policy requirements.

Background and other observations

13.5 National Defence uses more than 6,000 hazardous products, such as gasoline, ammunition and battery acid. The Department estimates that at least one quarter of its 80,700 full-time employees come into frequent contact with hazardous chemical products, and that every worker may have some contact with hazardous materials.

13.6 It is the Department's policy that its hazardous materials management activities must meet or exceed the letter and spirit of applicable federal acts, regulations, policies and guidelines and, where appropriate, be compatible with provincial acts and municipal and international standards. The Department has not defined the meaning of "where appropriate".

13.7 Our audit focussed on how the Department is implementing its policy and programs related to hazardous materials. We looked at policies, procedures and results at National Defence headquarters, and conducted field work at 10 bases. We also reviewed how the Department is implementing relevant sections of its sustainable development strategy.

13.8 Leadership is needed to set targets, to identify and monitor performance measures, and to follow up to ensure that programs are implemented. Commanders and managers have opportunities to demonstrate leadership when they revise the Department's sustainable development strategy and implement environmental management systems.

The Department responded positively to all our recommendations and proposes to take action that should address the problems our audit identified. In particular, the Department told us it is committed to rectifying situations of non-compliance with the requirements of the Workplace Hazardous Materials Information

System; reviewing its effluent monitoring procedures and plans for air emissions; identifying provincial and municipal regulations and policies applicable at each base and wing; and establishing core requirements for audit and inspections to ensure consistency.

The Department did not fully accept our conclusions about the level of non-compliance, contending that its audits have identified relatively few instances each year.

Introduction

13.9 Industrialized societies use many products that are regulated because they can harm people and the environment — for example, by exploding, catching fire, corroding, poisoning or irradiating. These hazardous materials include acids used in industry to etch metal, radioactive components in smoke detectors, most paints and paint thinners, fuels and oils, and bleaches and solvents for cleaning. Apart from their widespread use in the workplace, most Canadians would probably find a broad range of hazardous materials in their garage, in their garden shed, and under their kitchen sink.

Canada has extensive legal requirements governing hazardous materials

13.10 Industrial societies will continue to use many hazardous materials until environmentally friendly substitutes become available at acceptable cost. Organizations and societies must therefore manage and minimize the risks of continued use. In Canada, an extensive and growing body of laws has established minimum standards that govern the use of hazardous materials.

13.11 Federal laws govern labelling, safety instructions, training, protective devices, emergency response procedures, transportation documents, packaging, releases into the environment, storage, explosives and radioactive materials. Provincial laws parallel many of the federal laws but also govern outdoor air quality, transportation of hazardous materials within a province and disposal of hazardous wastes. Municipal by-laws regulate discharges of liquid effluent to sanitary and storm sewer systems. All of these laws establish a number of mechanisms to ensure the protection of workers and the environment.

13.12 The Workplace Hazardous Materials Information System (WHMIS)

is a national information system designed to protect Canadian workers. It is a systematic approach to identifying the hazards of a material, making safety data on the material available in the workplace and ensuring that workers receive appropriate training. The system groups materials into classifications based on their hazardous characteristics, and uses a set of symbols to identify the main classes. WHMIS consists of three components:

- A series of labels provided by either the supplier or employer indicate, at a minimum, the product name, safety information and a reference to a material safety data sheet.
- Material safety data sheets (MSDS) provide detailed information about products, such as ingredients; fire, explosion, reactivity and toxicological data; protection and emergency response measures; and contact names and telephone numbers. Suppliers are responsible for providing the sheets with their products, and employers are responsible for providing them to workers. The sheets must be updated every three years or whenever new information about the product becomes available.
- A training program for workers teaches them how to interpret information on labels and material safety data sheets, particularly those on the specific products they use in their workplace.

13.13 For WHMIS to be effective, workers must have access to accurate and complete inventory lists of the hazardous materials they use. The lists allow workers to ensure that they have the correct MSDS on hand and that they are trained for the specific products they use. The lists also tell emergency response personnel the types and magnitude of hazards they may encounter in responding to a spill, fire or injury, so that they can protect themselves and deploy appropriate equipment. Inventory lists also assist in monitoring usage of products to ensure that minimum

An extensive and growing body of laws has established minimum standards governing the use of hazardous materials.

quantities are acquired and products are not duplicated.

13.14 In addition to classification and symbols under WHMIS, the *Transportation of Dangerous Goods Act* establishes a second system of classification and symbols for transportation and storage. The classifications in the two systems are similar though not identical, and the symbols are entirely different. The symbols of both systems are often used together on a product.

13.15 Proper storage is essential to protect workers and ensure that hazardous materials do not escape into the environment. Ideally, their storage should be apart from other materials, have limited access and meet recognized standards. Depending on the material, storage facilities may be designed to withstand fires or explosions or to contain spilled material. They may be heated and ventilated, and equipped with particular types of emergency systems such as vapour detectors, sprinklers and explosion-proof lighting. Limits on the size and storage capacity of facilities depend on the nature of the material. Because many hazardous materials react when they come into contact with each other and produce an explosion, fire or toxic gas, there are various tables and compatibility charts to guide workers in identifying incompatible products so they can be stored separately.

13.16 Some types of activities and facilities require licences or permits — for example, air emissions, storage of radioactive materials and ammunition, and facilities that generate hazardous waste. A licence or permit may provide standards against which to check quantities and activities, or may require tracking of activity over time.

13.17 For many hazardous materials, there are legal limits on the quantities to which workers can be exposed or that can

be released into the environment. A worker's exposure to hazardous materials can be measured by requiring periodic medical checks, conducting air quality or swipe tests of the workplace, or providing radiation workers with dosimeters. (Our audit of the Department's measuring of workers' exposure was limited to observing some respiratory protection practices at bases.)

13.18 Where their exposure levels could exceed allowable limits, and other means to eliminate the hazard are unavailable or ineffective, workers must be provided with personal protective equipment, properly fitted, and be trained in its use. We did not audit the availability or appropriateness of protective equipment at National Defence facilities.

13.19 Releases into the environment through air emissions, sewage or stormwater also can be measured periodically to establish that legal limits on concentrations of hazardous materials are not exceeded.

13.20 Emergency response equipment and trained emergency response personnel are to be available to limit injuries and prevent the further escape of material into the environment. We did not audit the availability of emergency response capabilities at National Defence.

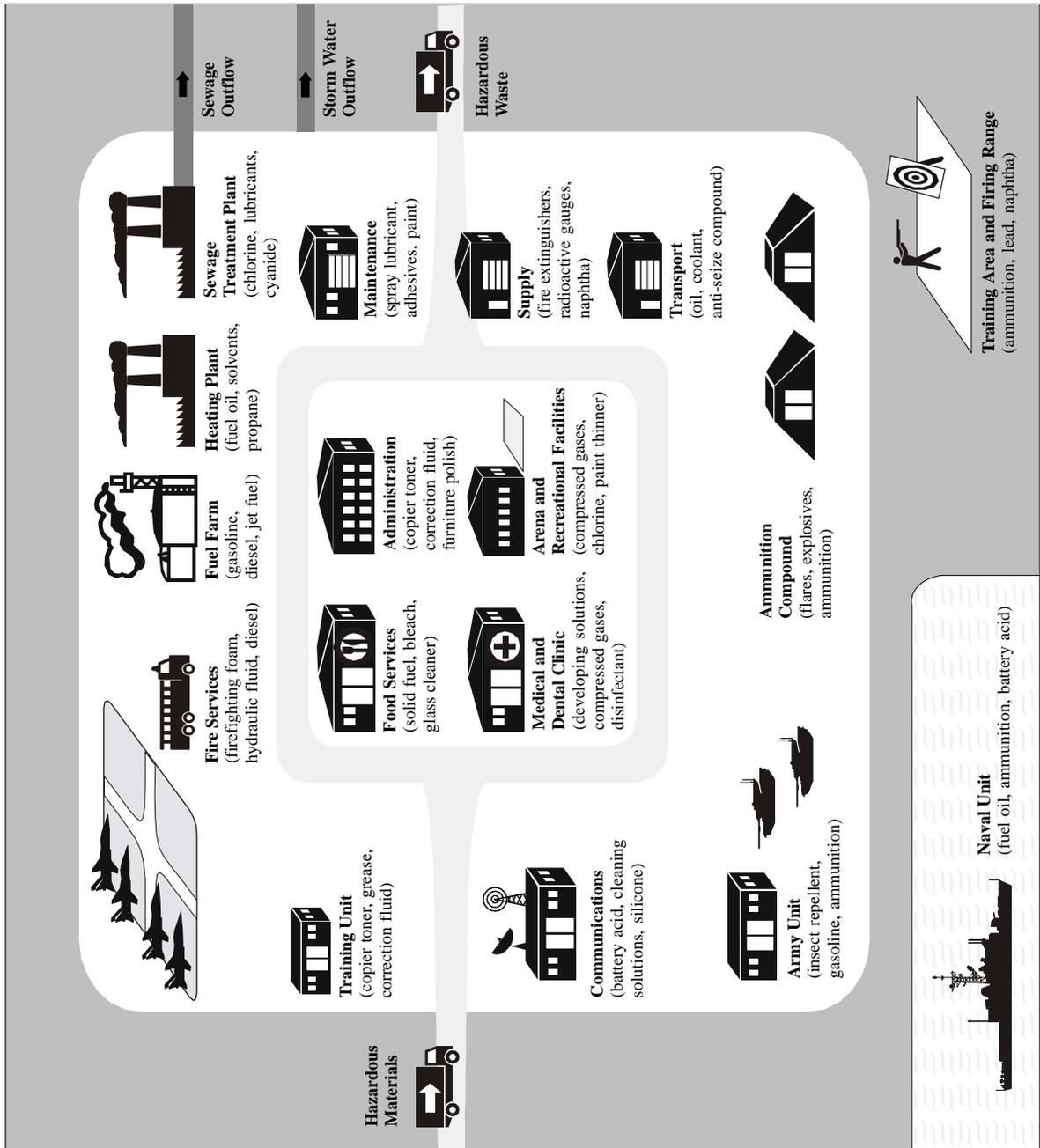
National Defence uses many hazardous materials

13.21 National Defence defines hazardous materials as "any material that, if handled improperly, can endanger human health and well-being or the environment or equipment. Some examples... are poisons, corrosive agents, flammable substances, ammunition and explosives." This chapter, unless otherwise specified, uses the term "hazardous materials" to include ammunition and radioactive materials as well as hazardous chemicals and polychlorinated biphenyls.

13.22 The Department uses more than 6,000 hazardous products. Exhibit 13.1

Exhibit 13.1

Canadian Forces Base – Typical Activities and Types of Hazardous Materials Used



illustrates typical activities at a Canadian Forces base, and examples of the types of hazardous materials that are used.

13.23 According to estimates by the Department, at least one quarter of its 80,700 full-time employees come into frequent contact with hazardous chemical products in the workplace. In addition to those are 293 military and civilian ammunition technicians who have frequent contact with ammunition; and 1,132 employees who wear dosimeters because they work with the more radioactive materials in the Department's inventory. Many contractors also come into contact with hazardous materials on departmental property, and so may the

Every employee comes into some contact with hazardous materials during the course of the day (see paragraphs 13.23–13.24).



29,400 reservists in the course of their part-time duties.

13.24 The Department estimates that every worker, like many in light industrial facilities and offices, comes into some contact with hazardous materials during the course of the day. Soldiers may work with ammunition or cleaning solvents for weapons. Even office workers may use cleaning supplies or toner for photocopiers and printers.

Departmental policy on compliance with provincial and municipal laws is not clear

13.25 National Defence is exempt from all or part of many federal laws governing hazardous materials. In general, the exemptions exist to allow the Department to take actions during military operations that might not be appropriate during peacetime or by civilians. As a federal agency, the Department is not subject to most provincial and municipal laws.

13.26 It is the Department's policy that its hazardous materials management activities "must meet or exceed the letter and spirit of all applicable federal acts, regulations, policy and guidelines and, where appropriate, be compatible with provincial acts, regulations and guidelines and municipal and international standards." National Defence has not defined what it means by "where appropriate", and as a result it is not clear in what circumstances the Department's actions will be compatible with provincial, municipal or international laws and standards. For example, the Department conforms to provincial regulations on hazardous waste generation, and recently made a commitment to be compatible with the applicable standards in provincial and municipal laws governing sewage treatment plant and stormwater discharges. However, the Department has made no commitments to meet provincial laws governing air quality and permits for potentially contaminated air emissions,

nor to meet the mainly municipal laws governing sanitary sewer discharges to municipal systems.

Focus of the audit

13.27 This audit focussed on how National Defence is implementing its policy and related programs on hazardous materials. Specifically, it was intended to determine whether the Department:

- minimizes the risks to its employees' health and safety and to the environment;
- has systems in place that are effective in ensuring ongoing compliance with applicable laws, regulations and policies; and
- has established appropriate sustainable development targets for hazardous materials and can measure its performance in meeting them.

13.28 Further information on our audit scope, criteria and approach can be found at the end of the chapter in the section **About the Audit**.

Observations and Recommendations

Risks to Employees and the Environment

Inadequate implementation of protective mechanisms increases risk

13.29 As we have noted, there are protective mechanisms that Canada requires in the workplace where hazardous materials are used (paragraphs 13.12 to 13.20). When these protective mechanisms are not in place, workers and the environment are placed at increased risk, of two kinds:

- accidents, leading to injuries and contamination; and
- ongoing exposures, leading to chronic illness and contamination.

13.30 In fact, National Defence's rate of injuries related to hazardous materials and requiring at least one day off work fell by more than half from 1993 to 1997. The injury rate among military personnel has been consistently low in comparison with workers performing similar tasks in industry. The rate among civilian employees has fallen by two thirds since 1993 and is now lower than levels in comparable industries (see Exhibit 13.2). However, both the military and civilian rates increased in 1998, although the rates remain below 1 per 1,000 employees. At the time of our audit, comparable information from industry was not available for 1998.

13.31 Information on contamination is more problematic. While the Department requires the reporting of hazardous material spills, until this year (1999) some discretion in reporting was allowed; moreover, the information was entered into databases that are not compatible. Spills considered "significant incidents" were reported to National Defence headquarters; 58 such spills were reported in 1998, ranging from half a litre to 17,500 litres. The Department recently issued a spill reporting directive and developed a spill reporting computer program, which may address the concerns about inconsistent reporting requirements and incompatible databases.

13.32 Environmental baseline studies and subsequent assessments conducted at all Canadian Forces bases since the mid-1980s have identified significant contamination caused by hazardous material use and accidents. National Defence has developed a database to track its contaminated sites, many of which it believes were contaminated by leaking underground storage tanks or by technology and management practices used in the past. Remediation and monitoring costs are borne by National Defence headquarters for sites contaminated before 1993, and by bases for their sites contaminated since then.

From 1993 to 1997, the rate of hazardous material injuries that require at least one day off work declined in National Defence by more than half.

Efforts have been made to improve storage facilities, the availability of emergency response equipment, and spill response training.

The contaminated sites database lists 530 sites on the 10 bases we audited, and headquarters expects to spend \$17.3 million on them over the next five years. While it is likely that most of the sites were contaminated before 1993, the database does not identify when the contamination occurred. We did not audit the management and remediation of sites where soil and groundwater contamination have been identified.

13.33 As well as clean-up costs, financial liabilities from claims, fines or prosecutions can result from failure to implement legally required protective mechanisms. To date, the Department has pleaded guilty twice for violations of the *Fisheries Act*, and has been ordered to pay \$42,021.

Compliance in some areas has not improved since 1993

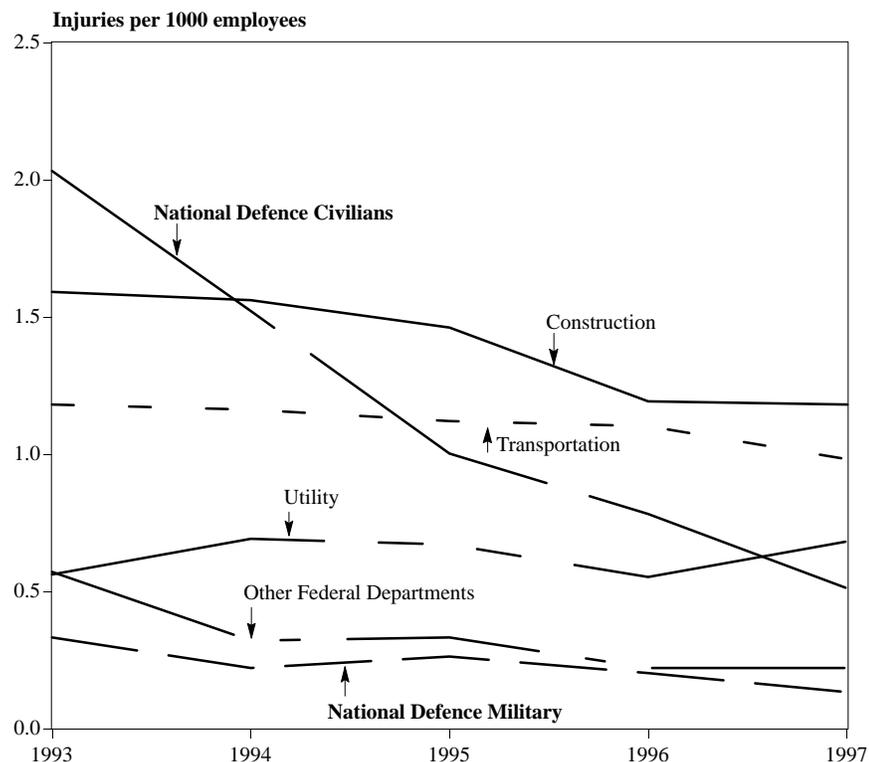
13.34 In recent years, National Defence has made a significant effort to improve

some aspects of hazardous materials management. Since 1993, headquarters has made available approximately \$9 million through the Corporate and Incremental Environmental Programs to improve storage facilities, purchase emergency response equipment, and provide spill and emergency response training. Bases have also acquired equipment with their own budgets. Efforts have been made to identify and disseminate good practices. A database of best practices, most of which address hazardous materials, has been created for the Land Maintenance System. National Defence headquarters is developing a plan to implement the practices, where operationally feasible and cost-effective.

13.35 Given these efforts, we attempted to assemble an overall picture of compliance with hazardous materials laws and policies at the 10 bases we audited. We examined the reports of all external and departmental audits and inspections conducted from 1993 to 1998 in order to

Exhibit 13.2

Hazardous Material Injuries – National Defence and Industries Performing Similar Tasks



Source: Association of Workers' Compensation Boards of Canada; Statistics Canada; National Defence Directorate of General Safety

identify instances of non-compliance. We also conducted audits of compliance at three bases: Cold Lake, Gagetown and Halifax. Finally, we examined all the reports on Safety Program Development and Evaluation Technique (SPDET) assessments conducted from 1993 to 1998. These are self-evaluations conducted by units and bases; they provide a rating out of 100 points for each of 16 components of an organization's safety program. The technique includes a section specifically on hazardous materials safety, but several other sections also contain relevant elements.

13.36 We found that many different types of departmental inspections have been conducted at the 10 bases, generally reflecting the different responsibility areas of the base safety and environment officers. Inspection frequency has varied widely, though it has generally increased in the last two years. Inspections of National Defence facilities by other federal departments responsible for enforcing hazardous materials laws are also uneven in frequency and coverage. We found that inspection methods were rarely similar across a base, or at the same unit for two or more years.

13.37 Because of the variety of inspection methods and the gaps in coverage, the inspection data cannot be aggregated to provide performance information on trends or the overall state of compliance, at individual bases over time or across bases. The data indicate, however, that from 1993 to 1998 there were more than:

- 800 instances at the 10 bases when applicable federal legal requirements governing hazardous materials were not met;
- 450 violations of the federal Fire Code; and
- 200 instances of failures to meet departmental or federal policy requirements.

13.38 The audits and inspections also identified approximately 120 additional instances where best management practices were not followed.

13.39 Complying with legal and policy requirements ensures that the minimum standards or risk levels established by regulatory authorities or the Department are met. The degree to which a failure to comply with legal and policy requirements increases the risk inherent in the use of hazardous materials is very dependent on the circumstances. A relatively minor oversight, especially if combined with others, can lead to a serious accident. Examples can be found in the Department's widely distributed safety publications. While individual instances listed in the Department's audit and inspection reports may have been corrected, we found that certain problems seem to recur over time and across bases (see Exhibit 13.3).

13.40 We observed the common compliance failures listed in Exhibit 13.3, as well as several others, during our audits of Canadian Forces bases at Halifax, Gagetown and Cold Lake. There was a noticeable difference among the three bases in the general levels of management and compliance. We consider Halifax to be in the best state of compliance, with Gagetown next; Cold Lake faces significant compliance and risk issues. A general summary of what we found at the three bases is provided in Exhibit 13.4.

13.41 The frequency of Safety Program Development and Evaluation Technique assessments is also uneven. None had been conducted at two of the bases in our sample, and the number conducted each year at the remaining eight facilities varied widely. There is no obvious trend in the results (see Exhibit 13.5), but the average ratings achieved in the SPDETs appear quite high; the Department considers that any rating of 75 percent or higher is acceptable. We question whether a rating of 75 percent for handling

Inspection data showed more than 1,400 instances when legal and policy requirements governing hazardous materials were not met.

hazardous materials can be considered acceptable: 90 percent of the points in SPDET assessments are for meeting legal requirements designed to protect the health and safety of workers. Moreover, as self-assessments, the SPDETs may contain a bias toward positive results. We note in particular the contrast between the situation we observed at Cold Lake during our audit and the high average rating of 94 percent achieved in SPDETs conducted there in 1998.

13.42 A department-wide internal audit of hazardous materials management was conducted in 1991–93. The audit included site visits at four Canadian Forces Supply Depots and their support bases, two of which were also in our audit sample. The internal audit observations were similar to our own in a number of compliance areas, particularly inventory information and the use of WHMIS. We concluded that in the last six years, compliance in these areas has shown little or no improvement.

A relatively minor oversight can lead to a serious accident (see paragraph 13.39).

A Bad Mix

A Canadian Forces serviceman approached the floor-washing task with gusto. To obtain the best results possible, he decided to concoct a stronger cleaning solution, so he mixed the contents of two very similar and poorly marked opaque plastic containers — vinegar and bleach — in the bucket.

WRONG! Our zealous serviceman was overcome by the gasses given off and required hospitalization as a result. Luckily, it doesn't appear that he will suffer a permanent disability or any long term harmful health effects. It could have been fatal. When combined, vinegar and bleach produce a potentially lethal gas.

Make sure that cleaning fluids are kept in well-marked and labelled containers, read the labels carefully, and don't mix incompatible material.



DND Safety Digest – Edition 1 1998

Check Fuel Levels Safely, Don't "Check Out"!

A soldier, let's call him Charlie, was on guard duty at a bivouac site when the heater ran out of fuel during the evening. He and several other soldiers went to get some fuel. It was dark and there were many jerry cans, both full and empty, in the petrol, oil and lubricants (POL) point. One of his companions, who we will call Ralph, picked up a full can next to one marked diesel and proceeded to fill the heater.

He wasn't able to see if the heater tank was full so he put the can down to check. At the same time, Charlie decided to use his lighter (there was no flashlight) to check the fuel level. He reasoned that diesel fuel fumes do not readily ignite when subjected to open flame. With a "flick of his Bic," he transformed himself into a human torch. He had ignited the fumes, which were coming from the tank. It turns out that Ralph had inadvertently filled the heater tank with gasoline instead of diesel. Charlie's upper body was engulfed in flames, which caused second degree burns to his face and neck. While his recovery was a long and painful process, Charlie's injuries will not result in a permanent disability.



Adhering to the following safety rules would have prevented this near tragedy:

- Store POL products properly and ensure they are clearly marked and segregated.
- Ensure that flashlights (and filters if tactically required) are available if night operations are planned.
- Never use any type of open flame around fuel containers or when refueling vehicles or equipment.

DND Safety Digest – Edition 2 1998

The Department has not succeeded in fully implementing the Workplace Hazardous Materials Information System

13.43 Compliance with all three elements of WHMIS is weak. In a sample of 229 hazardous products, the 1993 internal audit found that 38 percent were not labelled. Departmental audits and inspections since 1993 have noted inadequacies in WHMIS labelling every year at Cold Lake, and frequently at five other bases. At all three bases we examined in more detail, we saw unlabelled drums at several locations and hazardous liquids dispensed from drums into smaller containers that often were unlabelled.

13.44 Even weaker is the implementation of the second WHMIS component, the availability of up-to-date

material safety data sheets for all hazardous materials used. Departmental inspections that included WHMIS found deficient MSDS at every base in every year for which data were available, except the base at Wainwright in 1998. There were 76 instances of deficient MSDS reported at the nine other bases in 1998. Our three in-depth base audits found hazardous products base-wide whose data sheets were unavailable or out-of-date.

13.45 We distributed a questionnaire to collect data on a sample of hazardous chemical products recorded on inventory lists at the 10 bases in our audit. Sample selection focussed on locally procured items, though some of the responses indicated that the selected item had been obtained through the national system. Further details about the sample selection process and response rates can be found in the section **About the Audit**. Of the

Lack of container labelling is a problem.

Exhibit 13.3

Ten Most Common Hazardous Material Non-Compliance Findings 1993 to 1998

Finding	Risk or Hazard
1. Inadequate or inappropriate storage locations	Risk of spill or fire, which could endanger personnel and the environment
2. Deficient material safety data sheets (MSDS)	Information on handling procedures, first aid and hazard information unavailable to personnel using the material
3. Inadequate and inappropriate signs on storage facilities	No warning to employees and emergency personnel of presence of hazardous materials
4. Inadequate emergency response procedures	Risk to personnel or the environment due to proper procedures not being followed
5. Training or training records missing	Danger to personnel who do not know the proper safety procedures
6. Inappropriate management procedures	Risk of injury to personnel handling the material improperly
7. No inspection process	Risk to personnel or the environment due to undetected problems in hazardous material storage
8. No secondary containment	Possibility of spills entering the environment or exposing personnel to additional risk
9. Inventory lists lacking	Risk that necessary training requirements are not determined and danger to firefighting personnel who will not be aware of the presence of hazardous materials
10. Workplace Hazardous Materials Information System (WHMIS) labels missing	Danger to personnel who are unaware that they are using hazardous materials

607 responses in our sample, only 28 percent had an up-to-date MSDS. We noted three types of deficiency:

- 30 percent were missing MSDS;
- 16 percent had MSDS that were over three years old and therefore out-of-date; and
- 26 percent used internally produced hazardous materials guide sheets. Since February 1994, Labour Canada (now part of Human Resources Development Canada) has not considered the guide sheets to be legally acceptable substitutes for MSDS.

13.46 These results are very similar to the findings of the 1993 internal audit that examined the MSDS for a sample of 329 items. That audit found that 39 percent of the items were missing the MSDS and 12 percent had MSDS that were out-of-date.

13.47 The devolution of responsibility for the purchase and management of

hazardous materials in the Department has made it a laborious process to keep MSDS up-to-date. This is because different products may be in each of the widely scattered inventories of hazardous materials at departmental facilities, and the age of the MSDS for each product must be tracked and a new one obtained periodically. Information technology increasingly offers a solution to this problem, provided the available information meets Canadian legal requirements. Many MSDS are now available directly on the Internet. More can be found on commercially available CD-ROMs, and making these accessible through internal computer networks can expand their distribution.

13.48 The Department has been developing its own hazardous materials information system to include electronic versions of MSDS. The Hazardous Materials Information Query, or Hi-Q, has been under development since 1996 but responsible authorities at several bases

Exhibit 13.4

Summary of Compliance Findings at Three Canadian Forces Bases

CFB Halifax, 29–30 September 1998

Hazardous materials are generally stored, handled and used in compliance with regulatory and National Defence requirements in buildings and on ships; hazardous materials and wastes located on the jetties are not always handled in accordance with these requirements. Staff interviewed during the audit were generally knowledgeable and aware of the handling requirements for hazardous materials and wastes.

CTC Gagetown, 17–18 November 1998

Hazardous materials management is very decentralized. Each unit is largely responsible for hazardous materials procurement, storage, handling, and disposal. A number of employees responsible for hazardous materials management within their units have not received Workplace Hazardous Materials Information System (WHMIS) training or spill response training. While some units appear to have good practices in place, improper handling practices, such as unlabelled containers and ungrounded drums used for dispensing flammable solvents, were observed at a number of locations throughout the base. This inconsistency indicates a lack of co-ordination and control over hazardous materials management. A number of locations where significant quantities of hazardous materials are stored are not secured to prevent spills or leaks of dangerous goods from entering the natural environment.

4 Wing Cold Lake, 14–15 October 1998

There is a high frequency of significant legal compliance issues associated with hazardous materials management. Some of these could entail a high level of risk. There is evidence of incremental contamination as a result of poor handling practices at the Hazardous Waste Facility, and many locations where significant quantities of hazardous materials are stored are not secured to prevent spills or leaks from entering the natural environment. While some squadrons appear to have good practices in place, the inconsistency in the application of these practices indicates a lack of co-ordination and control over hazardous materials management. The volumes of hazardous waste generated at this base appear high relative to the use of materials required for base activities.

indicated that they have had problems getting the system to work. However, version 3.0 (distributed in early 1999) may address some of these concerns. Initially, it was available only as a stand-alone system on CD-ROM, but Hi-Q has since been integrated with the Materiel Information Management System that is used mainly at base supply sections and headquarters.

13.49 Making Hi-Q more widely accessible will not alone resolve the problem of MSDS availability. When we compared MSDS on the Hi-Q CD-ROM with the 607 questionnaire responses on our product sample, we found up-to-date data sheets for only 41 percent of the responses (although some did not identify the product clearly enough to be sure it was the product on the disk). With Hi-Q in place, more MSDS on our sample items should now be available, but that will depend on access to Hi-Q information at the work site. Responsible authorities in the workplace will have to supplement Hi-Q with other sources of MSDS information, as they do now. We found, for example, that Hi-Q did not include 74 percent of the up-to-date MSDS we obtained on our sample.

13.50 The Department should ensure that responsible authorities at National Defence workplaces meet the requirement to make available hazardous materials safety and environmental information, particularly material safety data sheets.

Department's response: The Department is committed to rectifying situations where it is out of compliance with the requirements of the Workplace Hazardous Materials Information System. Accordingly, the Department will review and revise its standard operating procedures at all levels so that Material Safety Data Sheets (MSDS) accompany new products introduced into the Canadian Forces Supply System and introduced at Bases and Wings. The Department will establish a system to track the effective dates of MSDS and will review and revise its standard operating procedures to ensure that all data sheets are kept current. The revised standard operating procedures will define the responsibilities and the accountability of all personnel involved in these processes and will also address the issue of local procurement.

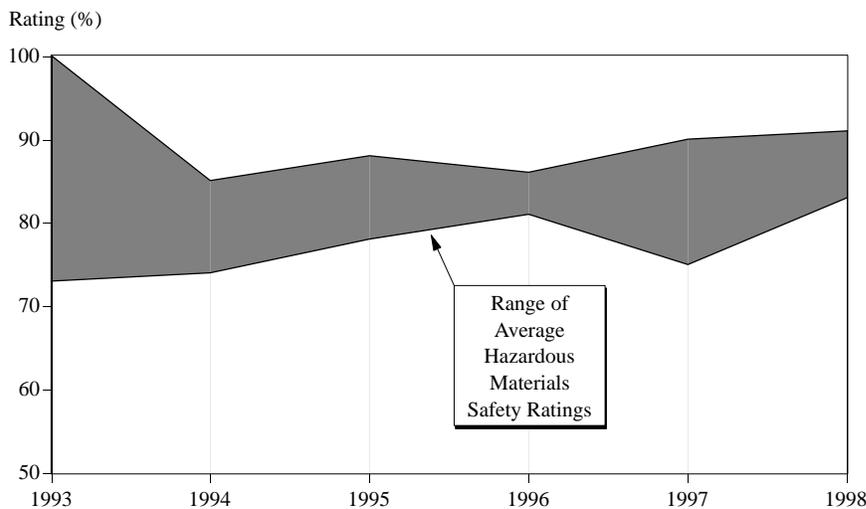


Exhibit 13.5
Safety Ratings – Self-Assessment by Eight Bases

Source: Safety Program Development and Evaluation Technique reports from Borden, Cold Lake, Edmonton, Esquimalt, Gagetown, Halifax, Montreal and Trenton, 1993–1998

Forty-five percent of personnel in our sample lacked training in interpreting information in the Workplace Hazardous Materials Information System.

Hazardous materials inventory systems need to include standard information.

There is a lack of training in hazardous materials

13.51 The third component of WHMIS is training. We examined the training records of a sample of 454 personnel selected at random from the 6,238 employees that the 10 bases identified as having access to selected hazardous materials inventories (information on our sample selection and response rates can be found in the section **About the Audit**). Since these individuals have access to hazardous materials, we expected that they would all have received training in interpreting WHMIS information. Both the Canada Labour Code for civilian employees and departmental policy for military personnel require that records of training be kept.

13.52 The departmental records available indicate that 205 of the employees in our sample, or 45 percent, did not have any WHMIS training. This compares with the 1993 internal audit, which found that 42 percent of a sample of 1,783 personnel had not received training.

13.53 Of the 249 workers in our sample who had received training, 28 had no record of it on their files. We found the information in other sources, such as safety officers' databases.

13.54 We also found poor record keeping on specific training in packaging, storage and handling, and transportation of hazardous materials. These courses are required only for personnel who work extensively with hazardous materials, such as supply technicians. A certificate is issued to each trained worker and it must be renewed every one to three years, depending on the qualification. Expired certificates must be kept on file for at least two years. Of the 32 workers in our sample who required some type of training in the packaging, storage and handling or transportation of dangerous goods, only 21 had a current recertification. Seven had been employed

for several years before they received their first training. Few certificates, current or expired, were kept on file.

13.55 Appropriate and up-to-date records of training in hazardous materials are important because, first, they are required by law and by the Department's policy. Second, they also ensure that training can be delivered efficiently: personnel could be overtrained or undertrained if no records exist to show when their training is to be updated. This is particularly important in an organization like National Defence, with a significant proportion of personnel moving frequently from one job to another.

Inventory lists are inaccurate and incomplete

13.56 Availability of accurate, complete and informative inventory lists was another area where frequent problems were identified by departmental audits and inspections, the 1993 internal audit, and our three base audits. At Halifax and Gagetown we found that inventory lists were not available at all locations where hazardous materials were stored. Where they were available, they were often out-of-date and did not accurately reflect the current inventory of hazardous materials — a problem also observed at Cold Lake. Across the 10 bases in our sample, departmental audits in 1998 noted 21 instances of missing, incomplete or outdated inventory lists of hazardous materials or hazardous waste.

13.57 We requested copies of all inventory lists of hazardous materials at the 10 bases we examined. In spite of the fact that the Department's hazardous materials safety manual provides clear guidance and examples showing how to prepare inventory lists, there was little uniformity in the documents we received. They ranged from handwritten lists of chemical products, with incomplete identification and no indication of quantities, to computerized base-wide

inventories with detailed product information, container sizes, quantities and storage limits, locations, points of contact and availability of MSDS.

13.58 Again, information systems technology, including commercially available database applications, would seem to offer a solution. This has been recognized at National Defence headquarters and at three of the bases in our sample; however, each has developed its own system. This has resulted in duplication of effort and wide variations in the type of information available.

13.59 The Department should ensure that hazardous materials inventory systems are implemented and that they contain standard information.

Department's response: The Department will define and issue minimum information requirements to be included in Base- and

Wing-level hazardous materials inventory systems.

13.60 Responses we obtained on our hazardous products sample also revealed that inventory lists were not up-to-date. A total of 17 percent of items on which we received a response could not be found, had never been used by the unit, or were no longer used. In a number of cases, units reported having disposed of the product once our request had alerted them to the fact that they had it in inventory.

13.61 We noted that many of the locally procured products were purchased more than one year ago. In several cases, we found more of the product in inventory than had been purchased; in other cases, the full amount purchased was still in inventory more than one year later. Both circumstances suggest that material had been purchased unnecessarily or in excessive quantities.

INVENTAIRE DES MATIÈRES DANGEREUSES / BFC MONTRÉAL										
DATE MISE À JOUR (AA/MM/JJ):		98-03-09		RESPONSABLE DE L'INVENTAIRE						
COMPTÉ DE DISTRIBUTION:		BL0130		Nom:						
UNITÉ / SERVICE:		CE INFRA		Grade:						
PROCESSUS:				Titre:						
GARNISON / SITE:		GARNISON LONGUE-POINTE		Tâche principale:						
BÂTIMENT:		7		Téléphone:						
PIÈCE:		MAGASIN		Fax:						
PORTE:		121		CE, BeyondMail:						
RANGÉE / CABINET / TABLETTE:				Adresse Internet:						
LIEUX index:		a) armoire produits dangereux (vert);								
		b) tablettes								
A	B	C	D	E	F	G	H	I	J	K
PRÉF.	No	NOM DU PRODUIT	NOM MANUFACTURIER	# OTAN (NATO) # MANUFACTURIER	CAPACITÉ DU CONTENANT		STOCK ACTUEL	CAPACITÉ ENTREPOSAGE		FICHE SIGNALÉTIQUE
(index)					quantité	unité	nb us.	minimum	maximum	Date (AA-MM-JJ)
a	1	SILICONE REPELLENT (PEL)	SLUYTER	8030-21-112-7271	312	g	24	0	24	
a	2	ENDUIT CALORIFUGE	BAKELIGHT THERMOSET	120-18	4	L	1	0	1	
a	3	BDS-77 PLUS	BOWMAN	21877	425	g	1	0	1	
a	4	PENETRANT	ARDON	9PK51	400	g	6	0	6	
a	5	ANTI-SEIZE LUBRICANT	BOSTIK	80136	453	g	4	0	4	
a	6	ANTI-SEIZE LUBRICANT	SAF-T-EZE	80136	454	g	5	0	5	
b	7	NETTOYEUR À VITRES	CAPO	7930-21-853-8389	4	L	4	0	4	
b	8	NETTOIE-MAIN	UNSCA	60887 30006	4	L	8	0	8	
b	9	NETTOIE-MAIN	ARMSTRONG		1	kg	2	0	2	
b	10	SILICONE	G.K. CHEMICALS	6850-21-874-0593	250	ml	15	0	15	

DIFFUSION

Shannon Park
S.P.4.

Hazardous Materials:

1. Aero Tech High Heat Aluminium Paint
2. Aero Tech High Heat Black Paint
3. Acryal Hypocarbon Solvent
4. Silver Nitrate Reagent
5. Potassium Iodide Reagent
6. Hydrochloric Acid 20% Solution
7. Phenolphthalein Indicator Solution
8. Phenol Red-D Indicator Solution
9. Potassium Chromate Indicator Solution
10. Starch Reagent Stabilized Solution
11. Sulphuric Acid 2.0N. 32

Inventory lists show little uniformity. They range from handwritten lists, like the one here from Halifax, to computerized systems with detailed information like the inventory from Montreal (see paragraph 13.57).

Storage practices are deficient

13.62 At many bases, storage facilities do not meet legal and policy requirements. Departmental and external audits and inspections in 1998 found a total of 162 instances of non-compliance with storage requirements, with at least some instances at all 10 bases. At the three bases we audited, we observed the following non-compliance:

- many flammable storage cabinets at Cold Lake and Gagetown are metal office lockers, rather than regulation fire-resistant cabinets with containment for spills and proper ventilation;
- storage and handling areas at Cold Lake and Gagetown are not protected against leaks or spills, whether by secondary containment or paving and sealing to prevent seepage into the ground;
- incompatible products are stored together and compatibility information is missing at Cold Lake, Gagetown and Halifax; and
- storage areas are not properly marked with signs or placards at Cold Lake, Gagetown and Halifax.

Respiratory protection programs are not fully implemented

13.63 The use of hazardous materials at National Defence facilities generates several types of potentially contaminated air emissions. While all bases we audited have assessed work areas for airborne contaminants, we observed these improper respiratory protection practices:

- paint being mixed in unventilated rooms at Cold Lake and Halifax;
- personnel using inappropriate respiratory equipment at the hazardous waste area at Halifax; and
- incomplete testing of the fit of respirators at the Bedford Ammunition

Depot, Borden schools, Esquimalt, Gagetown and Montreal.

Monitoring of Continuing Emissions

Outdoor air emissions are not adequately monitored

13.64 Emissions of hazardous materials can contaminate the air outdoors. Sources of such emissions at Canadian Forces bases include:

- the burning of fuels in heating systems and vehicles that can emit large volumes of pollutants, including those that contribute to climate change;
- paint spray booths operating with forced-air ventilation that can result in the release of toxic chemicals, particularly if filter systems are not properly maintained; and
- poor storage practices, including open containers of hazardous material.

13.65 Federal guidelines govern opacity, sulphur dioxide and particulate levels in emissions from boilers. Of the 10 bases in our sample, Edmonton and Wainwright do not have central heating plants. Of the remainder, only Cold Lake, Halifax and Gagetown monitor for some of the pollutants whose emissions are limited by the federal guidelines. None monitor for all three of the contaminants on which limits are set.

13.66 The provinces set limits on the concentration of pollutants in the air, and provincial laws require that approvals be obtained for all sources likely to affect ambient (surrounding) air quality. The approvals list on a case-by-case basis the monitoring or other action required to ensure that the concentration limits are not exceeded. Because federal facilities are not subject to provincial laws, National Defence does not apply for provincial permits. Nonetheless, Cold Lake, Trenton, Halifax, Bagotville and Montreal monitor for at least one pollutant whose

concentration is limited by provincial law. No base indicated that it monitored paint booth emissions, though Borden did indicate that contractors regularly verify the efficiency of its paint booths.

Sewage treatment program meets standards for biological contamination at low cost

13.67 Hazardous materials can contaminate water leaving National

(See paragraph 13.62)



Waste oil pan being emptied into a floor drain in a garage at Gagetown.



Dirty and deteriorating dry filters inside a paint booth at Gagetown.



Unlabelled pails of waste stored outside of the heating plant at Halifax.



Drums of oil, solvent and WD10 stored on grass with no secondary containment, alongside a garage at Cold Lake.

Defence facilities through storm sewers and sanitary sewers. Possible sources include:

- run-off from vehicle or aircraft maintenance and storage areas;
- discharges resulting from ship maintenance;
- run-off and discharges from construction sites and fabrication shops; and
- spills.

13.68 The Department gives some recognition of contaminated emissions in the pollution prevention section of its sustainable development strategy. The strategy established a target requiring sewage treatment plants and storm sewer discharges to be compatible with applicable standards, including provincial and municipal standards, by 2000. No commitments were made for untreated discharge into municipal sanitary sewers.

13.69 To meet the target for sewage treatment plants, the Department is committed to completing a Sewage Treatment Plant Optimization Program at its six plants by 2001. Under the program, each plant's physical design and operating procedures are analyzed during an initial comprehensive performance evaluation. Then, with the assistance of sewage treatment experts, the design and operating procedures are changed during a comprehensive technical assistance phase to make the existing plant work at optimum performance.

13.70 The initial evaluation by National Defence of all six departmental sewage treatment plants found that they did not comply with the applicable legislation or departmental policy on effluent quality. Most often the causes of non-compliance were not the design of the facility but its administration and operation. At the time of our audit, changes proposed during the comprehensive technical assistance (CTA)

phase were completed at two plants, Borden and Trenton, at a cost of approximately \$350,000 each. By the end of the CTA, both met the applicable standards. Earlier studies by outside consultants had suggested that Borden would have to build an entirely new facility at an estimated cost of \$7.6 million and Trenton would have to spend an estimated \$2.8 million on upgrades to bring the plants into compliance. The optimization program appears to deliver significant savings over these earlier cost estimates.

Liquid effluent is not monitored for all contaminants that local standards limit

13.71 In spite of this success, however, effluent from departmental sewage treatment plants is monitored only for the contaminants (mainly biological) that the plants are designed to remove, and not for industrial contaminants such as solvents or trace metals (see Exhibit 13.6).

13.72 Sewage that leaves National Defence facilities for treatment at municipal sewage treatment plants is not subjected to regular testing for all contaminants limited by applicable standards. Of the six bases we examined that discharge sewage to municipal facilities, two (Edmonton and Wainwright) do no testing. Montreal has conducted one-time risk assessment tests, which failed to meet applicable standards in several respects. Esquimalt and Halifax regularly test sewage effluent from areas they consider to be high risks. Only Bagotville regularly tests its sewage effluent, but not for all contaminants on which limits are set (see Exhibit 13.7). Municipal laws, with which the Department does not have to comply, generally set limits on a wider range of contaminants. Of the bases in our sample that do monitor their effluent, all monitor for contaminants beyond those included in the federal guidelines. However, few of them monitor for all contaminants on which limits are set in local laws.

Changes in sewage treatment plant operations have met water discharge standards at a low cost.

13.73 As is the norm elsewhere, storm sewers at departmental facilities are generally not treated. At the time of our audit, effluent leaving National Defence facilities in storm sewers was subjected to varying degrees of testing (see Exhibit 13.8). In addition to federal and municipal laws and guidelines, the Air force has an effluent monitoring guide that requires its facilities to test their storm sewer effluent. The three Air force facilities we audited monitor storm sewers regularly, though not for all contaminants limited by applicable standards. Bagotville and Cold Lake have found that their effluent regularly fails to meet the standards set out by the Air Command Effluent Monitoring Manual or other applicable laws and guidelines. Of the other commands, Borden, Edmonton and Wainwright do not test storm sewers at all. Montreal and Gagetown each recently conducted a one-time risk assessment study and failed to meet applicable standards for several pollutants. Esquimalt and Halifax test their storm sewer effluent

regularly, but Esquimalt does not test for all regulated contaminants.

13.74 Base staff at Wainwright and consultants engaged by Edmonton and Gagetown have recommended that the regular testing of storm or sanitary sewer effluent be increased. This is both to ensure compliance with applicable laws and policies and, where there is a non-compliant emission, to identify the source.

13.75 National Defence should conduct an assessment of all liquid effluent and air emissions at its bases to ensure that the environment is not being contaminated by hazardous materials. The assessment should be repeated periodically, particularly when there are major changes to the base configuration or activities.

Department's response: The Department's Sustainable Development Strategy includes commitments for storm water and sanitary effluents. The actions associated

Contaminant	Borden	Cold Lake	Gagetown	Halifax	Trenton
pH*					
Dissolved oxygen					
Phenol*					
Total oil and grease*					
Mineral oil and grease					
Sulphides/sulphates					
Total phosphorus*					
Total suspended solids*					
Chemical oxygen demand*					
Biological oxygen demand*					
Glycol					
Ammonia					
Alkalinity					
Chlorides*					
Nitrates/nitrites					
Fecal coliform*					
Total coliform					

Exhibit 13.6
Monitoring of Sewage Treatment Plant Effluent

Not Tested

Tested

Failed at least 20% of tests

* Specific limits set in *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments*, April 1976.

with these commitments will be reviewed and revised as required. Similar action plans will be developed for air emissions. The Department undertakes to review and revise its existing effluent monitoring protocols as required and to develop monitoring protocols for air emissions that

conform to current federal regulations and guidelines. The Department will continue to participate in the interdepartmental sub-working group that is addressing effluent discharges from federal facilities. This sub-working group was established under the Federal Committee on

Exhibit 13.7

Monitoring of Effluent Discharged to Municipal Sewage Treatment Plants

Contaminant	Regular Testing			One-time Risk Assessment			No Testing	
	Bagotville	Esquimalt	Halifax	Montreal			Edmonton	Wainwright
				Longue Pointe	St-Hubert	St-Jean		
pH*								
Benzene								
Toluene								
Ethylbenzene								
Xylene								
Phenol*								
Cyanide								
Total oil and grease*								
Mineral oil and grease								
Sulphides/sulphates								
Total phosphorus*								
Total suspended solids*								
Chemical oxygen demand*								
Biological oxygen demand*								
Ammonia								
Chlorides*								
Acetone								
Formaldehyde								
Fecal coliform*								
Total coliform								
Petroleum hydrocarbons								
Aluminum								
Arsenic								
Cadmium								
Chromium								
Copper								
Iron								
Lead								
Mercury								
Nickel								
Silver								
Tin								
Zinc								

Not Tested
 Tested
 Failed at least 20% of tests

* Specific limits set in *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments*, April 1976.

Exhibit 13.8

Monitoring of Storm Sewer Effluent

Contaminant	Regular Testing					One-time Risk Assessment			No Testing		
	Bagotville	Cold Lake	Trenton	Esquimalt	Halifax	Montreal ¹			Borden	Edmonton	Wainwright
						St-Hubert	St-Jean	Gagetown			
pH*											
Dissolved oxygen											
Benzene											
Toluene											
Ethylbenzene											
Xylene											
Phenol*											
Cyanide											
Total oil and grease*											
Mineral oil and grease											
Sulphides/sulphates											
Total phosphorus*											
Total suspended solids*											
Chemical oxygen demand*											
Biological oxygen demand*											
Glycol											
Ammonia											
Chlorides*											
Nitrates/nitrites											
Fecal coliform*											
Total coliform											
Aluminum											
Arsenic											
Cadmium											
Chromium											
Copper											
Iron											
Lead											
Nickel											
Silver											
Zinc											

Not Tested
 Tested
 Failed at least 20% of tests

¹ These facilities have done only a one-time risk assessment study, in the fall of 1998. At St-Jean, the high counts for fecal coliform, total coliform, biological oxygen demand and total suspended solids may originate from the surrounding communities.

* Specific limits set in *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments*, April 1976.

Environmental Management Systems (FCEMS), which has a mandate to identify and resolve environmental issues common to all federal departments. The Department will make a formal request to the FCEMS to investigate whether a gap exists with respect to air emissions and whether this gap should be addressed by FCEMS at the national level.

National Defence participates in national emission reporting programs

13.76 The Department participates in national programs that require the reporting of hazardous material emissions into the environment. The National Pollutant Release Inventory (NPRI) is a legal requirement under the *Canadian Environmental Protection Act*; it requires that use or release of more than 10 tonnes be reported for 176 specified chemicals. Of these chemicals only one, ethylene glycol for aircraft de-icing, is used by National Defence in quantities that may meet the reporting criterion, depending on annual usage. Releases have been reported in recent years at Goose Bay and Trenton, and at Greenwood in 1994.

13.77 Accelerated Reduction/Elimination of Toxics is a voluntary program under which emissions of 117 toxic substances are to be reported and reduced. Because the Department's procurement and use of hazardous materials is decentralized, National Defence is not able to report on uses or emissions. Instead, it has reduced the range of products it uses that contain the targeted toxic substances. By October 1998, the Department had eliminated from use more than 70 percent of the nearly 700 NATO stock number items it had identified as containing the substances.

13.78 National Defence has also committed to reducing its emissions of dichloromethane, used in stripping aircraft paint. The commitment is made under the Strategic Options Process that entails developing mechanisms ("options") for

reducing or eliminating chemicals declared toxic under the *Canadian Environmental Protection Act*. Air force wings have been directed to implement the dichloromethane management plan.

Compliance Management at National Headquarters

Managing for compliance reduces risks

13.79 Given the persistent compliance problems we observed, we looked at the management systems intended to ensure that the Department meets the legal and policy requirements governing hazardous materials. A management system is a process used to provide an organization with reasonable assurance that its work is conducted in accordance with applicable regulatory requirements, professional standards and the organization's own policies and procedures.

13.80 In the environmental field, the International Organization for Standardization's (ISO) 14000 series is emerging as the voluntary standard for management systems. National Defence has made a commitment to implement environmental management systems that are compatible with this standard.

13.81 We used selected elements from the ISO 14004 standards of Environmental Management Systems Principles (see Appendix) to evaluate the systems the Department uses to ensure compliance with the legal and policy requirements governing hazardous materials. We did not audit the entire environmental management system at any level in the Department.

National policy has some gaps

13.82 In December 1997 the Department's sustainable development strategy identified hazardous materials as one of its five key issues. In 1998, the Department reviewed its policy on hazardous materials management and reissued it in the form of a Defence

Administrative Order and Directive (DAOD). However, DAODs for ammunition management and nuclear safety regulation and control have remained in draft form for over a year and a half.

13.83 The DAOD on management of hazardous materials commits the Department to reduce their use, avoid or minimize the creation of pollutants and wastes, and limit storage to the quantities needed for operational requirements. Similarly, the draft DAOD on nuclear safety commits the Department to protect the environment and minimize human exposure to ionizing radiation. More broadly, several statements in the sustainable development strategy, and particularly the targets established for hazardous materials, commit the Department to continually reduce the amounts of material used and their potential for entering the environment. However, as explained in paragraph 13.26, the Department's policy statements on hazardous materials management include a commitment to meet or exceed applicable federal legal and policy requirements, but be compatible with provincial, municipal and international requirements only "where appropriate".

13.84 As well, the DAOD on hazardous materials management does not define the responsibility and accountability of every organization involved. It does define the responsibilities of various line authorities, including users and their supervisors, as well as material technical authorities and hazardous material control authorities. However, unlike the draft DAODs on ammunition and radioactive material, it does not define the responsibilities of functional experts at headquarters, such as the Director Supply or Director General Environment. Lists of responsibilities can be found in some of the hazardous materials manuals, but they are not necessarily authoritative, complete, or up-to-date.

13.85 National Defence should define the circumstances in which it will apply provincial and municipal laws relevant to hazardous materials management, and should specify the standards that it accepts.

Department's response: In accordance with the environmental management system adopted by National Defence, the Department is required to review environmental legislative and regulatory requirements associated with site- and event-specific activities. Based on these assessments, Bases and Wings will update their environmental management systems to reflect the provincial and municipal regulations and policies that are applicable to their location.

13.86 The responsibility and accountability of National Defence headquarters organizations involved in the management of hazardous materials should be defined, documented and kept up-to-date.

Department's response: The Department will review and revise its internal policy on hazardous materials management to include the responsibilities and the accountability of functional experts involved in the management of hazardous materials.

National plans, procedures and objectives met our expectations

13.87 The 1997 sustainable development strategy meets the ISO 14004 criteria that require an initial national environmental review, an action plan to carry out policy, and established objectives and targets.

13.88 In his May 1998 Report to the House of Commons, the Commissioner of the Environment and Sustainable Development reviewed the sustainable development strategies tabled on behalf of 28 federal organizations in December 1997. The review essentially asked whether the sustainable development strategies included all the

Hazardous materials management policy does not define the responsibilities of headquarters experts.

components required by the *Auditor General Act* and *A Guide to Green Government*. The Commissioner concluded that in preparing its strategy, National Defence did what it had been asked to do.

13.89 In accordance with the ISO requirement to define, document and update operational processes and procedures, a series of top-level departmental manuals provide general guidance and some additional policy requirements in the following areas:

- hazardous materials procurement, storage, packaging, waste disposal, PCB handling and spill response;
- hazardous materials safety, shipping and transportation;
- explosives safety, handling and storage; and
- nuclear safety, use, handling, storage, transportation, disposal, decommissioning and emergency response.

13.90 Most of these manuals were recently updated or reissued. As well, headquarters produces dozens of technical publications that define operational processes and procedures for handling specific hazardous materials in the course of performing specific tasks.

National policies are not effectively communicated to the field

13.91 We found evidence that base and unit personnel in some cases were not aware of the existence or relevance of the national publications; in other cases they were not using the latest versions, even several months after publication. For example, when the 224 people who responded to our hazardous products sample questionnaire were asked to identify policy and procedure documents on acquiring hazardous chemical products, only 35 — 16 percent — mentioned the hazardous materials DAOD, manual, or equivalent base or unit procedure. Another

29 identified other supply manuals or procedures that contain elements of the hazardous materials acquisition policy and procedures. We also observed several instances where base or unit documents on hazardous materials management that were prepared in late 1998 referred to national policy documents that had been superseded at the beginning of the year.

National hazardous materials audit programs are not complete or consistent

13.92 Each of the national headquarters of the Maritime, Land and Air forces operates an environmental audit program. The Land program aims to audit every base at least every three years. The Air force's aim is to audit every wing at least every two years. Because the Maritime force operates only two bases, its environmental audit program aims to cover all units every three years. The audit programs are based on detailed checklists or audit protocols that include sections on hazardous materials and on related issues such as management systems, air emissions, wastewater or stormwater emissions, petroleum products and used oil.

13.93 Since the Land and the Maritime environmental audit programs were less than three years old at the time of our audit, not all bases had been audited yet. However, their audit cycles were on schedule and all audits planned to date had been carried out. The initial audit plan for the Air force was incomplete since only 7 of the 11 wings would be audited between 1997, when the revised audit protocol was issued, and 1999. The plan has since been revised to visit all wings between 1998 and 2000.

13.94 The inspection program for licensed radioactive material facilities requires biennial inspections by the Director General Nuclear Safety. Inspection programs for ammunition facilities require annual inspections either by the Director Ammunition Program Management or a qualified explosives

inspector from the Chiefs of Staff. Checklists are used for these inspections.

13.95 Both the ammunition and the radioactive material inspection programs have experienced problems due to a lack of resources. In 1998, ammunition storage was not inspected at 8 out of 40 facilities. Additional inspectors have since been hired in an effort to close the gap. The radioactive material inspection process faces greater difficulty. In 1997 and 1998, only 65 percent of the 425 licensed units were inspected. Moreover, the 1999–2004 Business Plan for the Infrastructure and Environment group in National Defence headquarters has identified a long-term inability to oversee the radiation safety program and nuclear safety compliance. Additional resources have been requested to close this gap.

13.96 We did not audit the quality of the audit protocols or the audit and inspection reports. However, we did note that the protocols are all different. As a result, it is not possible to consolidate the audit and inspection findings to produce meaningful performance information on the Department as a whole.

13.97 Moreover, there are significant gaps in the audit programs. The headquarters groups responsible for personnel and materiel management command several field units, including Canadian Forces Base Borden, Canadian Forces Supply Depots at Edmonton and Montreal, and 202 Workshop in Montreal. None of these facilities is subjected to regular external environmental audit that would include assessing hazardous materials compliance.

Performance measurement could improve compliance

13.98 Weaknesses in the audit and inspection programs are compounded by the fact that the Department's sustainable development strategy contains limited targets and performance measures for hazardous materials compliance. While

the strategy met the expectations of the Commissioner of the Environment by including targets that set detailed, clear, measurable and time-bound performance requirements, the Commissioner's review did not look at whether the targets and measures were complete.

13.99 The strategy's compliance targets cover only fuel storage tanks, sewage treatment plant discharges, and storm sewer effluent. As we have noted, our audit revealed compliance problems covering many more aspects of hazardous materials management at National Defence facilities. As the Commissioner noted in his 1998 Report, "Environmental performance that is measured, managed and rewarded continually improves." We believe that establishing performance measures and targets for a broader range of compliance requirements and reporting on them annually to Parliament would provide an incentive to improve the current state of compliance.

13.100 Since publication of the Department's sustainable development strategy, the interdepartmental Committee on Performance Measurement for Sustainable Government Operations developed draft indicators for government-wide reporting. The Committee, which includes representatives from National Defence, was formed in 1997 to focus on how to build environmental performance reporting systems. Two of the four hazardous materials performance indicators proposed by the Committee focus on compliance (see Exhibit 13.9). Using performance indicators to measure compliance for more aspects of hazardous materials management in the next revision of the Department's sustainable development strategy could therefore contribute to the development of government-wide reporting. As the Commissioner of the Environment has suggested, using consistent measures could allow departments to build on each other's experience and information, and to

There are significant gaps in headquarters audit and inspection programs.

realize economies of scale in developing information systems.

13.101 Measures of compliance might also be an effective way to incorporate radioactive materials and ammunition into the hazardous materials component of National Defence's sustainable development strategy. The Department currently holds an inventory of ammunition worth more than \$3.5 billion, and over 130,000 items of equipment with a total value of more than \$200 million that contain controlled amounts of radioactive material. We believe that inventories as large and as hazardous as these cannot be excluded from the sustainable development strategy's performance reporting on hazardous materials. Because ammunition and radioactive materials are operational necessities, environmental performance measures for them need to demonstrate continual improvement in their safe management rather than reductions in their use. Reporting in these areas should be able to make use of the existing facility inspection programs and analyses, as well as existing processes for accident and incident reporting and analysis.

13.102 In the revision of its sustainable development strategy due in 2000, National Defence should provide performance indicators for hazardous

materials compliance. The indicators should measure continual improvement toward a target of full compliance, contribute to government-wide reporting, and include ammunition and radioactive material.

Department's response: In the revision of its Sustainable Development Strategy due in 2000, the Department will include appropriate performance indicators for hazardous materials by:

- *establishing a departmental definition of the term "full compliance";*
- *reviewing and updating, as required, the performance indicators for the hazardous materials targets included in the Department's current Sustainable Development Strategy;*
- *continuing to participate in the interdepartmental process that is developing government-wide performance indicators. The Department will include government-wide performance targets in future Sustainable Development Strategies where it is appropriate to do so; and*
- *establishing appropriate performance indicators for ammunition and radioactive materials.*

13.103 To assist in reporting on compliance, headquarters audit and inspection programs should be consistent across the Department, should cover all departmental facilities and units, and should provide for inspecting all facilities and units at least every three years.

Department's response: The Department will review and revise current audit and inspection programs, as required, so that protocols used at all levels include core requirements that must be examined during audits and inspections. The Department will also establish guidelines for the frequency of these audits and inspections of its facilities and units.

Exhibit 13.9

Proposed Environmental Performance Indicators for Hazardous Materials in Sustainable Government Operations

- number of storage facilities meeting regulations, policies and procedures
- amount of hazardous waste sent to disposal (by weight/class), timeframe will vary
- number of on-site recycling, treatment, destruction and disposal facilities meeting regulations, policies and procedures
- amount of hazardous waste sent to on-site recycling, treatment, destruction and disposal

Source: Federal Committee on Environmental Management Systems, Committee on Performance Measurement for Sustainable Government Operations

Slow implementation of performance measures for sustainable development

13.104 We examined progress to date in reporting against the targets and performance measures for hazardous materials included in the Department's sustainable development strategy. The strategy defined six targets and 13 performance measures; however, we did not audit the target for contaminated sites or the four related performance measures. The Department's 1998 Performance Report provided information on only one of the remaining targets, concerning fuel storage tanks, but not on the performance measure associated with it.

13.105 Given the short period of time between the tabling of the strategy in December 1997 and the March 1998 cut-off date for the first progress reports, we recognize that the Department might not have been able to report on all its targets. In particular, in December 1997 there were no precise definitions and information mechanisms for the targets of reducing the use of high-risk hazardous materials and showing downward trends in reportable spills and hazardous waste sent for disposal. Since then, the Department has defined terms and developed reporting mechanisms. However, because existing data on hazardous waste and reportable spills are not consistent, baselines will not be established until the new system contains data for a full year (March 2000). Information for a second year will be required before the system can provide the first indication of whether the downward trend targets are being met. Therefore, meaningful information on progress toward two of the hazardous materials targets will not be available before the Department's fall 2001 Performance Report.

Year 2000 certification of computer systems for hazardous materials is on target

13.106 Ensuring that its mission-critical computer systems can accept dates from the year 2000 onward is a priority for National Defence. As a result, it has established a process to confirm the readiness of those systems. We reviewed the Department's status reports on 168 systems that play a role in hazardous materials management, including national management systems, base-level networks, systems that control fuel farms, sewage treatment plants and heating systems, and computerized munitions. As of mid-May 1999, the Department had certified 54 systems as compliant. Plans were in place and on schedule to certify the remaining 114 systems by the end of September, though 24 had missed some deadlines. The Department has mechanisms in place to verify a sample of systems in order to ensure that procedures are followed and technical requirements are met. Verification reports had been completed on nine of the systems we selected. Significant problems were found with the procedures followed for two systems, but they have been rectified.

Compliance Management at Bases

Base-level managing for compliance could be improved

13.107 We reviewed the management systems at 10 Canadian Forces bases against the selected criteria of ISO 14004 (see Appendix). Management system elements were assessed at both the base and unit levels. The results are presented in Exhibit 13.10.

13.108 Very few of the compliance management components fully met the ISO 14004 criteria. The main exception was the requirement for an initial

Exhibit 13.10

Assessment of Hazardous Materials Management Systems at 10 Bases

ISO 14004 – Environmental Management Systems (EMS) Criteria

	Bagotville	Edmonton	Cold Lake	Trenton	Borden	Wainwright	Montreal	Gagetown	Esquimalt	Halifax
<p>1. Commitment and Policy An organization should define its environmental policy and ensure commitment to its EMS.</p> <ul style="list-style-type: none"> Does the policy embody commitments such as continual improvement; monitoring; meeting or exceeding legal requirements? Has an initial environmental review been conducted? 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<p>2. Planning An organization should formulate a plan to fulfil its environmental policy.</p> <ul style="list-style-type: none"> Does the plan address legal and policy requirements? Does the plan establish objectives and targets? Is a management program established to address objectives and targets; is the program reviewed, monitored and revised? 	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<p>3. Implementation For effective implementation, an organization should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.</p> <ul style="list-style-type: none"> Are responsibility and accountability clearly defined? Are reports containing compliance evaluations and opportunities for improvement communicated to those responsible? Are operational processes and procedures defined, documented and updated? 	<input checked="" type="radio"/>									
<p>4. Measurement and Evaluation An organization should measure, monitor and evaluate its environmental performance.</p> <ul style="list-style-type: none"> Does the organization measure and monitor ongoing performance against objectives and targets? Does the organization evaluate compliance with legal and other requirements? Does the organization document findings, and corrective and preventive actions taken? Is there a systematic follow-up to ensure the effectiveness of preventive actions taken? Are records (such as training activity, inspection activity, details of non-conformance) maintained and reviewed? Has the system been audited to determine if it conforms to planned arrangements and is properly implemented and maintained? 	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>				
<p>5. Review and Improvement An organization should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.</p> <ul style="list-style-type: none"> Has the system been reviewed to ensure its continuing suitability and effectiveness in order to identify opportunities for improvement? Does the system embody continual improvement by determining root causes of non-conformance/deficiencies and developing plans to address root causes? 	<input type="radio"/>	<input checked="" type="radio"/>								

Source: Office of the Auditor General

● Fully met ● Partially met ○ Not met

environmental review, which was met in most cases by the environmental baseline studies conducted at all bases starting in the mid-1980s. Department-wide, some two thirds of the recommendations from those studies were related to hazardous materials.

13.109 The key weakness in compliance management is the failure to regard it as a continual improvement feedback system. While most bases evaluate compliance to some degree, there are no established objectives and targets, and therefore no plan for achieving any.

13.110 Bases have no performance measures for compliance. We have already noted that base-level audit and inspection programs are highly fragmentary. Moreover, the structure for compliance management is not reviewed to determine whether it is effective and to examine the root causes of problems. In these circumstances, it is not surprising that bases repeatedly display the same problems.

13.111 Although difficult to measure, factors contributing to compliance management problems include the many pressures that the Department and its managers have faced in the last five or more years. Budgets have been cut and devolved, requiring managers to learn new skills. Units have moved; bases have been closed and others restructured, requiring that new procedures be established. Personnel levels have fallen, reducing the reservoir of functional expertise. Particularly at the unit level, the jobs of environment officer or hazardous materials co-ordinator are assigned as secondary duties, perhaps added to other secondary duties, while pay has been frozen for years at a stretch. In such an atmosphere, leadership is vitally important in setting goals, providing direction, and following up to ensure that the goals and direction are carried out.

13.112 The potential impact of an effective compliance management system is indicated by the fact that, at the three bases we audited in more detail, we found that the more complete the system, the better the overall state of compliance. Better management systems will protect workers and the environment better.

13.113 National Defence headquarters has begun to provide guidance to bases and units on developing ISO 14000-compatible environmental management systems. If successfully implemented, the systems should begin to address the many weaknesses in compliance management at the base level. However, no deadline has been established for implementing environmental management systems across the Department.

13.114 **National Defence should ensure, as part of implementing environmental management systems, that bases and units establish performance measures for hazardous materials compliance that measure continual improvement toward a target of full compliance.**

Department's response: Departmental direction with respect to environmental management systems will be expanded to permit the measurement of continual improvement toward the Department's definition of "full compliance".

Some promising developments were noted

13.115 We noted (see Exhibit 13.10) that both Maritime bases in our sample (Esquimalt and Halifax) scored in the top half of the range of ISO 14004 results, while all three Air bases (Bagotville, Cold Lake and Trenton) were in the bottom half. Results for Land bases (Edmonton, Gagetown, Montreal and Wainwright) were mixed, while the Personnel Group base (Borden) was in the middle. There may be opportunities for the Maritime bases to share their better practices.

13.116 Some of the bases we examined have combined the various functional

Compliance management is not implemented as a continual improvement feedback system.

The Department has not set deadlines for implementing environmental management systems.

experts responsible for safety and the environment (and therefore also for hazardous materials) into a single office that reports directly to the base commander. In Montreal and Bagotville, this has resulted in the development of a consolidated base-level safety and environmental inspection process. All base functional experts (safety officer, environment officer, hazardous materials officer or co-ordinator, radiation safety officer, explosives safety officer, fire chief and preventative medicine technicians) inspect a unit at the same time, using checklists. All base units are subjected to this “multi-disciplinary” inspection once a year. The result is an annual “snapshot” of each unit’s state of compliance. These snapshots are expected to be comparable across units and over time, thereby providing useful performance information.

13.117 The Department should require the use of a consistent methodology for annual environmental audits and inspections at the base level. Implementing the methodology should involve all hazardous materials functional experts.

Department’s response: In the response to the recommendation at paragraph 13.103, the Department committed to establishing core requirements with respect to hazardous materials management that must be examined during audits and inspections programs at all levels. The Department will review and revise its methodology for audits and inspections of Bases and Wings as required so that functional experts participate in the audits and inspections. The Department will also provide guidance on the frequency of these audits and inspections at the Base and Wing level.

13.118 We noted another useful initiative at Halifax. Acquisition of hazardous materials has been restricted to Base Supply, except for a list of items considered to be low-risk. The approach at Halifax goes part way toward initiatives

introduced in the United States armed forces to centralize hazardous materials management at the unit or base level. The essential features of the American programs are:

- a single point at the unit or base responsible for acquiring, storing and dispensing all hazardous materials and providing associated safety, health and environmental information;
- an authorization process that identifies who is permitted to obtain what products;
- tracking of materials issued to individuals, through bar-coding;
- requiring the return of empty or partially used containers before new ones are issued;
- reissue of unused or partially used material; and
- centralized disposal of hazardous waste.

13.119 The American programs have reduced hazardous materials acquisition costs, waste disposal costs, shop stocks and chemical use. According to the UK National Audit Office, the Royal Air Force has introduced a simplified version of the American system that has resulted in reduced shop stocks and improved waste disposal practices.

13.120 National Defence should conduct a formal assessment or trial of a centralized hazardous materials management system at the base or unit level, aimed at determining:

- the costs of implementing a centralized system;
- the optimal level of centralization, whether at the base, the unit or another level;
- the potential savings in acquisition and disposal costs; and
- the degree of potential improvement in compliance.

Department's response: The Department commits in principle to conducting a formal assessment of a centralized hazardous materials management system incorporating the requirements outlined in the recommendation. As part of this assessment, the Department will also investigate the centralized hazardous materials management systems used by other militaries. Trials will be conducted on an as-required basis to validate or confirm these assessments.

Choosing Safer Products

13.121 The most effective means to minimize the risks posed by hazardous materials is to minimize their use. This is also the most effective way to prevent pollution. The Department has recognized this in its directive on hazardous materials management and in its sustainable development strategy.

13.122 The Department is participating in a number of voluntary programs to reduce its use of hazardous materials, including the Accelerated Reduction/Elimination of Toxics program and the Strategic Options Process. Its sustainable development strategy also includes a target of eliminating the use of specified high-risk hazardous materials.

13.123 The Department's approach to these programs is to identify items with NATO stock numbers in the Canadian Forces Supply System that include the targeted chemicals. Headquarters staff then review the products to determine if they are still needed or if there are environmentally friendly substitutes available. Tools such as the Hazardous Material and Preferred Product Selector database have been developed to help base and unit personnel identify the most appropriate substitute for their needs.

13.124 However, because procurement of many hazardous chemical products is decentralized, not all products used have NATO stock numbers. Approximately 10 percent or 400 of the chemical

products in the Hi-Q information system, for example, do not have a stock number, a proportion that is likely to increase as more products are procured locally. Moreover, as a result of local procurement, headquarters may be unaware of the products used at the local level. The Department has recognized this problem, and the hazardous materials directive therefore makes it mandatory to use the materiel information management system for life cycle management of hazardous materials. However, it appears that many personnel are unaware of this requirement and rarely comply. Of the 607 items in our hazardous products sample, the personnel responsible for acquiring them confirmed that only 247, or 41 percent, were recorded in the system. Lack of information at headquarters may mean that products are not included in the lists to be assessed and eliminated or replaced.

13.125 The Department should strengthen mechanisms for ensuring that headquarters is aware of hazardous products in use, and that users are aware of less hazardous substitutes that are available.

Department's response: The Department has developed a process to replace products containing substances of concern with more environmentally friendly products, through its voluntary participation in Environment Canada's Accelerated Reduction/Elimination of Toxics program. This process requires that restrictions be placed on those products containing substances of concern where replacements are not possible, are not cost-effective or affect operational readiness. The Department will develop an appropriate communications strategy to inform departmental staff at all levels about the replacement products, including the products that they are replacing. The Department also commits to conducting annual reviews of the screening methodology that it uses to identify products containing substances of

There are widespread, frequent and recurring instances of non-compliance with legal and policy requirements governing hazardous materials.

concern. The screening methodology will be updated as required so those products posing the highest risk to workers and the environment will be the first priority for replacement.

Conclusion

13.126 Departmental policies, plans and procedures at the national level indicate that National Defence is aware of the legal framework and best practices for hazardous materials management. At the base and unit levels, however, implementation has been uneven. As a result, there are widespread, frequent and recurring instances of non-compliance with the legal and policy requirements. Non-compliance puts workers and the environment at increased risk. Nonetheless, we did find instances of efforts to improve the management of hazardous materials in the Department; and injury trends, particularly among civilian employees, have shown marked improvement since 1993.

13.127 A major factor in the lack of compliance is that the existing management systems to ensure compliance do not promote continual improvement. At the base level, objectives are not set and hence plans do not exist to achieve any. At both the national and base levels, audit and inspection programs are not consistent or implemented fully, and their results do not feed into performance measures aimed at continual improvement toward full compliance.

13.128 Performance measures in controlling and reducing emissions are also inconsistent, targeting some sources but not others. In part, this reflects the fact that departmental policy applies standards found in provincial and municipal laws only “where appropriate”, without defining what this means. As a result, the Department’s standards are compatible with some provincial and municipal laws, but not with others.

13.129 Information and communication are problem areas in several aspects of hazardous material management. National policies do not seem to be communicated effectively, and information on hazardous materials that are used is not readily available and communicated. Improved information systems or approaches used in other countries may offer solutions in some areas.

13.130 National Defence has committed itself to implement environmental management systems at all levels. If it succeeds, the objective to continually improve compliance will be embedded in policy, plans and procedures at all levels. Effective implementation of environmental management systems would also increase the frequency, comprehensiveness and consistency of internal audits at all levels, which should ensure that external inspections find fewer instances of non-compliance. However, no deadline has been set for implementing environmental management systems across the Department.



About the Audit

Objectives

The audit objectives were to determine whether National Defence:

- manages its use of hazardous materials in a way that minimizes the risks to its employees' health and safety and to the environment;
- has systems in place that are effective in ensuring continuing compliance with applicable hazardous materials management laws, regulations and policies; and
- has established appropriate sustainable development targets for hazardous materials and can measure its performance in meeting them.

Scope

Our audit focussed on two management levels: National Defence headquarters, where policies and procedures are developed and disseminated; and the base level, where hazardous materials are stored, handled, used and disposed of. We looked at policies, procedures and results in the following areas:

- local acquisition of hazardous material;
- systems to ensure compliance with legal and policy requirements;
- audits and inspections;
- programs to monitor air and liquid emissions;
- records of hazardous materials training; and
- progress in developing and implementing the Department's sustainable development strategy objectives for hazardous materials.

Approach

At the headquarters level, we met with all the organizations in the Department responsible for the various types and life-cycle components of hazardous materials. We obtained and reviewed documentation on legislation, regulations, policies, audits and management systems. We also discussed implementation of the Department's sustainable development strategy.

To assess the state of hazardous materials management at the base level, we selected a sample of 10 Canadian Forces facilities. Our criteria in selecting the bases were representation of all three services and major types of activity, quantities of hazardous material held, number of injuries occurring in recent years, and proximity to populated areas. The bases selected were 3 Wing Bagotville, Canadian Forces Base (CFB) Borden, 4 Wing Cold Lake, CFB Edmonton, CFB Esquimalt, Combat Training Centre (CTC) Gagetown, CFB Halifax, Montreal (Area Support Units Longue Pointe, St-Hubert and St-Jean), 8 Wing Trenton, and Western Area Training Centre Wainwright. Reserve force units and outlying detachments supported by the bases were excluded.

While the bases are not statistically representative, they are significant in their own right. The facilities represent almost one third of Canadian Forces bases, stations and depots. They hold almost 60 percent of the ammunition and radioactive material recorded in the Canadian Forces Supply System, and almost 80 percent of the hazardous chemical products. The bases also employ 35 percent of the Department's regular force military and civilian personnel. The conclusions from this audit should therefore be of interest to departmental officials involved in environmental and materiel management.

At the base level, we met with officials responsible for the environment, hazardous materials, safety, preventative medicine, and fire prevention, and with users of the materials. We obtained and reviewed documentation on management systems, acquisition, training and effluent monitoring.

At three bases, CFB Halifax, CTC Gagetown, and 4 Wing Cold Lake, a team led by certified environmental auditors conducted audits to determine the current state of compliance.

To obtain information on policies and procedures for acquiring hazardous materials and bringing them into inventory, we selected a sample of hazardous products. We chose 10 types of materials that are widely used across the Department, are authorized for local procurement and are among the more hazardous. They included specific types of camouflage paint, paint thinner and remover, anti-seize lubricant, propane and acid. We obtained copies of all 1,760 inventory listings of hazardous chemical products at the 10 bases. We then selected each instance of the materials on the inventory lists and distributed a questionnaire to the person responsible for acquiring it. Because the same person was often responsible for acquiring several products for each inventory, most people who responded filled out more than one questionnaire.

- We found 1,096 instances of our 10 target materials on 609 of the 1,760 inventory lists, and distributed 1,096 questionnaires.
- We received responses to 734 of the questionnaires.
- 127 of the responses indicated that the product was no longer used or in inventory, leaving 607 responses providing information on processes.
- The 607 questionnaires were completed by 224 workers.

To obtain information on training, we requested lists of all personnel who had access to the 609 inventories that included our hazardous products sample items. A total of 6,238 personnel were identified as having access to those inventories, representing 21 percent of the total personnel on the 10 bases. We then randomly selected from among them 50 people per base at 9 of the bases and 65 at Halifax, for a total of 515. Of these, 61 had recently left the Department or been transferred, or were deployed overseas; therefore, we obtained the hazardous materials training records of 454 people.

Criteria

We expected that:

- departmental activities would comply with all requirements for hazardous materials management contained in federal legislation and regulations, and in departmental policy;
- departmental activities would be compatible with provincial acts, regulations, guidelines and municipal and international standards, where applied;
- the Department would have in place management system elements, consistent with the principles of ISO 14004, to ensure compliance with legal, regulatory and policy requirements; and

- the Department would have identified and implemented hazardous materials management objectives and performance indicators that are complete, meaningful, reliable and practical.

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Appendix

ISO 14004 – Environmental Management Systems

ISO 14004 is one of a number of standards published in 1996 by the International Organization for Standardization under the 14000 series. Two of the standards, ISO 14001 and 14004, specifically address environmental management systems (EMS).

An EMS is a systematic process that has roots in a tenet of quality management — namely, continual improvement is a cyclical process that must address internal and external changes. As defined in the ISO 14000 series, an EMS is “that part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.”

Both ISO 14001 and 14004 are process standards, not performance standards. By having the elements of an EMS in place, an organization should be better able to manage its environmental concerns, which in turn should lead to better environmental performance.

Whereas ISO 14001 is a specification standard, ISO 14004 is a guidance standard. On the one hand, ISO 14001 identifies specific elements that must be met for an organization to seek third-party registration or to self-declare as a 14001-certified organization. In doing so, an organization has committed itself to meeting all requirements specified in the standard.

On the other hand, ISO 14004 is a guidance document for organizations. It does not identify specific requirements. Rather, through the use of descriptions, examples and options, it provides information organizations can use in implementing and improving an EMS.

We used the 14004 standard to assess the capability of National Defence to manage hazardous materials, because it provided a more liberal assessment of the existing environmental management framework in place at the Department’s facilities.

There are five main principles under the 14004 standard, with each principle subdivided into numerous elements. We selected a number of the elements that are particularly important to compliance and continual improvement.

The principles and elements are:

1. **Commitment and Policy.** An organization should define its environmental policy and ensure commitment to its EMS.
 - Does the policy embody commitments such as continual improvement; monitoring; meeting or exceeding legal requirements?
 - Has an initial environmental review been conducted?
2. **Planning.** An organization should formulate a plan to fulfil its environmental policy.
 - Does the plan address legal and policy requirements?
 - Does the plan establish objectives and targets?
 - Is a management program established to address objectives and targets; is the program reviewed, monitored and revised?
3. **Implementation.** For effective implementation, an organization should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.
 - Are responsibility and accountability clearly defined?
 - Are reports containing compliance evaluations and opportunities for improvement communicated to those responsible?

- Are operational processes and procedures defined, documented and updated?
4. **Measurement and Evaluation.** An organization should measure, monitor and evaluate its environmental performance.
- Does the organization measure and monitor ongoing performance against objectives and targets?
 - Does the organization evaluate compliance with legal and other requirements?
 - Does the organization document findings, and corrective and preventive actions taken?
 - Is there a systematic follow-up to ensure the effectiveness of preventive actions taken?
 - Are records (such as training activity, inspection activity, details of non-conformance) maintained and reviewed?
 - Has the system been audited to determine if it conforms to planned arrangements and is properly implemented and maintained?
5. **Review and Improvement.** An organization should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.
- Has the system been reviewed to ensure its continuing suitability and effectiveness, in order to identify opportunities for improvement?
 - Does the system embody continual improvement by determining root causes of non-conformance/ deficiencies and developing plans to address root causes?