Director Ammunition and Explosives Regulation Annual Report

Eighth Report to the Deputy Minister and the Chief of the Defence Staff

A Review from 1 January 2015 to 31 March 2016

National Defence Défense nationale

Canada

Cover Photo:
One of the small arms ammunition cartridge cases that ruptured when R22eR soldiers were on a range in Santa Margarida Army Base, Portugal, on 27 October 2015.

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Members of the 5e Régiment d'artillerie légère du Canada participate in a live shooting exercise during Exercise RAFALE BLANCHE held in the training areas of CFB Valcartier in Courcelette, Quebec on January 22, 2015.

Corporal Michaël Lafrenais-Dietrich of the Voltigeurs de Québec and Private Simon Tremblay of the 1st Battalion, Royal 22e Régiment (in background) fire the Carl Gustav short-range anti-armoured weapon, as Corporal Sonny Gauthier of 5e Ambulance de campagne (in foreground) supports their efforts, during a live-fire frontal assault exercise on a firing range in Cincu, Romania on April 9, 2016 during Operation REASSURANCE.

DAER Annual Report

Executive Summary

Introduction

The Director Ammunition and Explosives Regulation's annual report to the Deputy Minister and Chief of the Defence Staff provides an independent assessment of the state of ammunition and explosives safety within the Department of National Defence and Canadian Armed Forces. This is accomplished through careful consideration of organizational practices around the ammunition and explosives safety program, the management of ammunition and explosives risk, and organizational compliance with regulatory requirements. While previous editions of the report were based on a calendar year, this and subsequent reports are based on a fiscal year reporting cycle. This change was initiated to align the report with the annual program of compliance verification inspections performed by the Level 1 Ammunition Technical Authorities, and to allow for corrective actions to be considered within the context of the corporate business planning cycle.

Results

Overall, the 2015/2016 Level 1 results represent a positive trend across the Department of National Defence / Canadian Armed Forces. Sustained Level 1 organizational efforts towards achieving ammunition and explosives safety and minimizing personnel injury, death, or materiel losses have contributed to the Department of National Defence / Canadian Armed Forces' operational effectiveness and demonstrated departmental due diligence. A direct contributor to the department's success is the continued development of the Level 1 Ammunition Technical Authority community. Recognized as the subject matter advisors to Level 1s for all ammunition and explosives related matters, the Level 1 Ammunition Technical Authorities have played a pivotal role in supporting departmental safety and regulatory requirements.

The aggregated Level 1 Ammunition and Explosives Safety Survey results are also considered as a major accomplishment during the reporting period with improvements observed in nine aggregated scores from 2014 to 2015.

Funding for the Assistant Deputy Minister (Infrastructure and Environment)'s Legacy Unexploded Explosive Ordnance and Contaminated Sites Program for fiscal year 2016/2017 has been earmarked at $9.1M with an anticipated $13.5M and $13.9M for fiscal years 2017/2018 and 2018/2019, respectively. The increase in funding will contribute towards ensuring public safety on Unexploded Explosive Ordnance legacy sites.

Progress was also observed during the course of the year with the implementation of the distributed learning package for the Unit Ammunition Representative as well as near-finalization of that for the Unit Explosives Safety Officer course. Furthermore, the development of module one of the Ammunition and Explosives Safety Information Management System was completed during the reporting period and roll-out is pending development of the

supporting training package by the Assistant Deputy Minister (Materiel)'s Director Materiel Group Management Coordination. Together, these software driven solutions will: facilitate accurate reporting; allow for trend analysis; more efficiently identify potential safety concerns; and enhance the passage of information.

Efforts towards policy renewal continue to improve the status and standard of the regulatory model documents for governing the spectrum of activities involving ammunition and explosives under the direction or control of the Minister of National Defence. The implementation of a risk-based ammunition and explosives licensing process and a supporting Technical Review Board has evolved into an invaluable tool enabling risk-based decision-making by operational commanders for all aspects of ammunition and explosives related activities.

Acknowledging the overall progress made during the reporting year, some areas continue to present opportunities for improvement and are highlighted in the following paragraphs.

Key Issues – Compliance

The 2015 compliance verification program of work focused predominantly on continuous improvement regarding the execution of: the Ammunition and Explosives Safety Survey; Level 1 Ammunition Technical Authority communications; monitoring of existing safety concerns; as well as closing out several long standing issues. The 2015 compliance verification program highlights three critical areas that require specific attention as they represent potential safety concerns/departmental liabilities:

- Demilitarization and disposal. Despite increased awareness/visibility through the Ammunition Program Oversight Committee, the limited institutional capacity for large scale demilitarization and disposal continues to represent a capability deficiency in the life cycle materiel management function of the Engineering Program Management community. A recurring observation, this capability deficiency represents a potential safety concern associated with the continued requirement to store time-expired, deteriorated, obsolete, and/or surplus ammunition and explosives, and where the effectiveness of the stabilizing agents within propellants of large calibre ammunition continues to degrade with time. This issue also has the potential of impacting outcomes of Defence Renewal Strategic Initiatives: 2.1 – Inventory Management, 2.2 – Warehousing and Distribution, and 4.2 – Rationalize Real Property Portfolio;

- Ageing and deteriorating ammunition and explosives infrastructure. It is important to ensure storage facilities retain their structural integrity and that any changes in facility condition are accurately reflected through up-to-date licensing policies and practices. Ammunition and Explosives storage infrastructure is ageing and requires an assessment of its integrity; degrading infrastructure poses potential safety concerns to Department of National Defence employees/military personnel and a safety risk to stored ammunition and explosives. Resolution of this issue is complex and requires engagement at the most senior levels within various Department of National Defence / Canadian Armed Forces organizations. If unresolved, this issue could also adversely impact the outcomes of the following Defence Renewal Strategic Initiatives: 2.1 – Inventory Management, 2.2 – Warehousing and Distribution, and 4.2 – Rationalize Real Property Portfolio if unresolved. Increased visibility is provided through the Ammunition Program Oversight Committee's Ammunition Program Infrastructure Working Group. Key initiatives are:

  - The Assistant Deputy Minister (Infrastructure and Environment) is conducting a Facility Condition Assessment of all ammunition and explosives related facilities, and

  - The Strategic Joint Staff has initiated a Canadian Armed Forces Ammunition Program infrastructure study with the intent of conducting a first-principles analysis of the Ammunition Program and its constituent elements in order to properly inform senior management decision-making on Horizon 2 and Horizon 3+ Ammunition program real property and infrastructure investments and divestments. The study will encompass all Ammunition Program infrastructure at the strategic, operational and tactical level; and

- Legacy Unexploded Explosive Ordnance and Contaminated Sites Program. A prioritized program list of unexploded explosive ordnance affected legacy sites and clear Accountabilities, Responsibilities and Authorities between Assistant Deputy Minister (Infrastructure and Environment)'s program and project management organizations will enhance the Department of National Defence's ability to allocate resources to prioritized high risk sites. The linking of stable program funding to a multi-year strategic plan with clear rankings for completion of mitigation activities will be key in risk managing this critical public safety activity.

Key Issues – Policy

Policy work focused on key documents remaining in the modernization program of the Department of National Defence / Canadian Armed Forces orders and directives. Deputy Minister and Chief of the Defence Staff endorsement of the Defence Administrative Orders and Directives[1] is key prior to formal release of new ammunition and explosives Safety Program

1 DAODs 1000-8, Policy Framework for Safety and Security Management, DAOD 3002-0, Ammunition and Explosives and 3002-7, Ammunition and Explosives Risk Management.

Defence Administrative Orders and Directives[2] and related policy manuals, and will close the gap in the departmental policy framework.

Complex issues surrounding the design criteria of the Canadian Long Span Earth-Covered Magazine have prompted the requirement to confirm the current explosives licensing criteria of a 3-bar blast pressure rated magazine, and to retain the moratorium on new construction which was imposed in 2009. The 3-bar classification of the Canadian Long Span Earth-Covered Magazine will remain in place until a comprehensive assessment can be completed by Assistant Deputy Minister (Infrastructure and Environment)'s Director Architecture and Engineering Services.

Key Issues – Advocacy

As unit-level subject matter experts, Unit Ammunition Representatives and Unit Explosives Safety Officers play a critical role in establishing a safe ammunition and explosives working environment through a healthy and functional Ammunition and Explosives Safety Program. With the last classroom-based Unit Ammunition Representative course delivered in January 2014, recent roll-out of the course through a distributed learning package has started to bridge the current knowledge gap of trained, qualified and authorized Unit Ammunition Representatives across the Department of National Defence / Canadian Armed Forces. Delivery of the Unit Explosives Safety Officer training is expected early during the next reporting year and will meet the need to generate qualified explosives safety officers.

Progress in reporting through the Ammunition and Explosives Safety Program has been observed within the Canadian Army during reporting period. However, further improvement in the reporting culture would lead to more effective hazard identification, better trend analysis, greater corporate awareness, and possibly reduce the frequency and/or gravity of future occurrences.

Way Forward

There has been notable progress over the years since the Director Ammunition and Explosives Regulation first reported on the state of ammunition and explosives safety within the department. Acknowledging the accomplishment, it is important at this time to recognize the need to push for continuous improvement and heighten expectations for departmental regulatory compliance. With the advent of the Ammunition Program Study/Restructure, fiscal years 2016 and 2017 will be transitional in nature while the Director Ammunition and Explosives Regulation works with Level 1 organizations and the Level 1 Ammunition Technical Authorities to consider all elements of the Ammunition Program within the context of compliance activities. This holistic approach will lead to increased ammunition and explosives safety and greater awareness while improving the ammunition and explosives safety culture across the department.

2 DAOD 3002-3, Ammunition and Explosives Safety Program and DAOD 3002-4, Ammunition or Explosives Accident, Incident, Defect or Malfunction Reporting.

A technician moves 500 pound bombs around the munitions storage area at Camp Patrice Vincent, Kuwait during Operation IMPACT on April 29, 2015.

Section 1

Prologue

It is a distinct pleasure to present the Director of Ammunition and Explosives Regulation's eighth annual report to the Deputy Minister and Chief of the Defence Staff.

The Director Ammunition and Explosives Regulation is the Department of National Defence / Canadian Armed Forces regulatory authority for ammunition and explosives. Although ammunition and explosives activities under the direction or control of the Minister of National Defence are exempt from the provisions of the *Explosives Act*, the Department of National Defence / Canadian Armed Forces have an obligation to oversee the spectrum of their ammunition and explosives related activities and ensure safety throughout the effective control, management and use of this strategic commodity during its life cycle. The Director Ammunition and Explosives Regulation provides departmental regulatory policy, executes a compliance and verification program, and provides advice on how to manage ammunition and explosives activities safely and prudently, while supporting operational imperatives through an advocacy and safety program.

To ensure regulatory independence from departmental execution and delivery elements, a direct report from the Director Ammunition and Explosives Regulation to the Deputy Minister and the Chief of the Defence Staff was established in 2006; with a mandate of producing an annual report describing the state of ammunition and explosives safety within the Department of National Defence / Canadian Armed Forces.

The Department of National Defence / Canadian Armed Forces ammunition and explosives regulatory framework aims to support the "Defence Operations & Services Improve Stability & Security, & Promote Canadian Interests & Values" strategic outcome of the Department's Program Alignment Architecture, mostly through the following two programs:

- Defence Combat and Support Operations – effective management of the risk associated with ammunition and explosives activities to minimize or prevent non-battle casualties and damage which would impair combat effectiveness; and

- Defence Services and Contributions to Government – development of international ammunition and explosives safety standards through collaboration with North Atlantic Treaty Organization and other allies, the United Nations, and Natural Resources Canada's Explosives Regulatory Division. The alignment with international ammunition and explosives standards enhances the security, safety and well-being of Canadians by ensuring the appropriate risk management of domestic and deployed ammunition and explosives operations and training activities.

This annual report provides: a "health check" on the state of safety and risk management for ammunition and explosives activities for the Department of National Defence / Canadian Armed Forces; an overview of the main activities from the regulator's office; and a forecast of planned activities for the next two fiscal years. As the reporting cycle transitions from a calendar year to a fiscal year, this report covers the period of 1 January 2015 to 31 March 2016.

The report addresses the following key areas:

- Ammunition and explosives Compliance;
- Ammunition and explosives Policy;
- Ammunition and explosives Safety Advocacy and Analysis; and
- Way Forward.

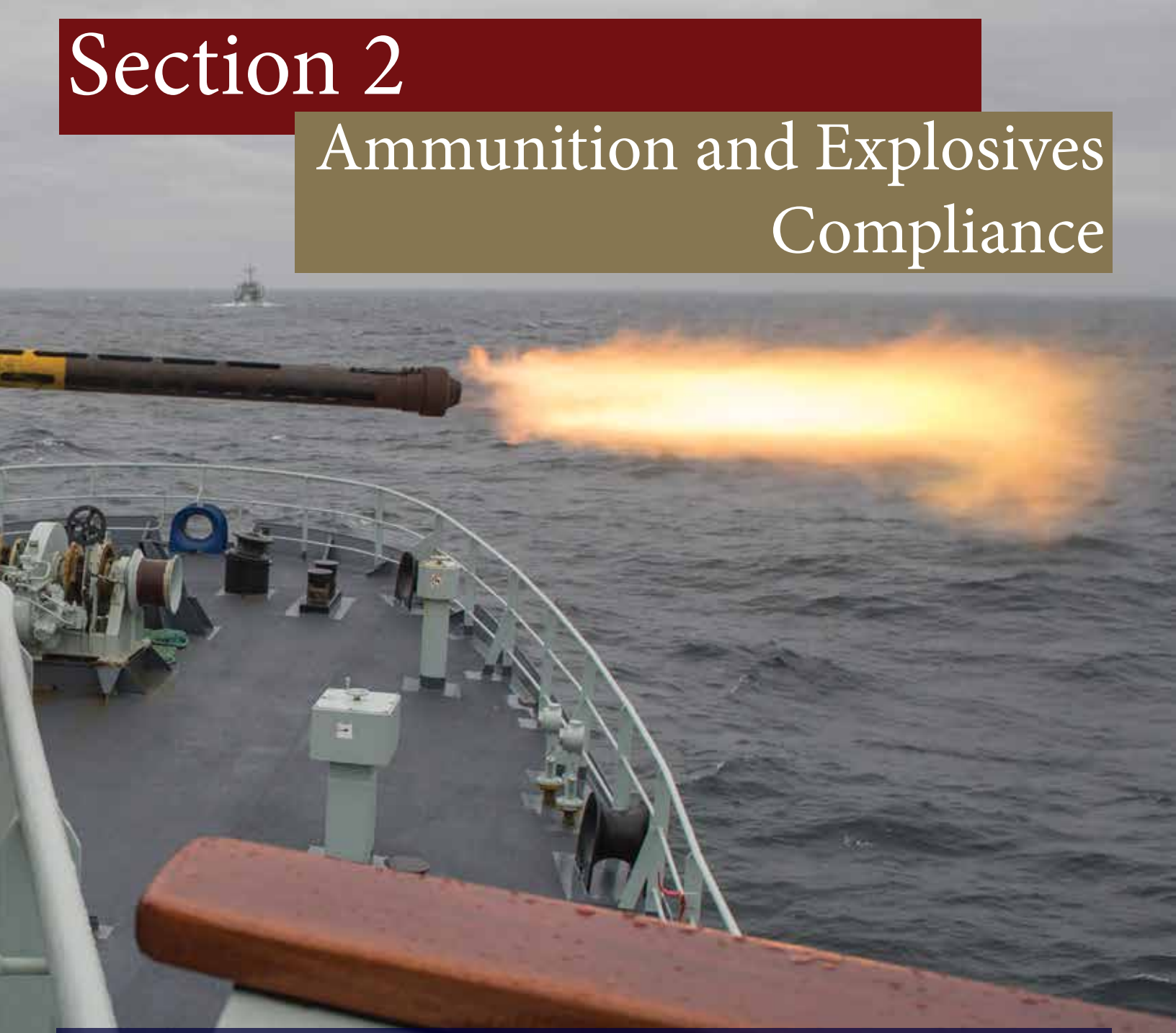
A foundational tenet of the report is that transparency, dialogue and collaboration will strengthen the regulatory framework. Accordingly, the enclosed report was coordinated and discussed with all Level 1 organizations, at the technical staff and senior leadership levels, prior finalization.

A Canadian Army soldier from the Princess Patricia's Canadian Light Infantry throws a dummy hand grenade during the Advanced Small Arms (ASA) course at CFB Shilo, Manitoba, on March 17, 2016.

The Petty Officer of the watch conducts firing drills with the browning 50 calibre heavy machine gun with a boatswain onboard Her Majesty's Canadian Ship (HMCS) Moncton starboard bridge wing in the Atlantic Ocean in preparation for Operation CARRIBE on January 27, 2016.

Section 2

Ammunition and Explosives Compliance



BACKGROUND

The staffing levels within Director Ammunition and Explosives Regulation 4 (DAER 4) during 2015 presented challenges for the execution of new initiatives but were sufficient to maintain minimal regulatory oversight and monitoring throughout the reporting period.

The Level 1 Ammunition Technical Authority (L1 ATA) network across the department continues to strengthen and has actively pursued continuous improvement of the A&E safety inspections (AESI) and the A&E safety surveys (AESS)[1]. These efforts have resulted in an output focussed L1 ATA working group (WG) meeting semi-annually and proposed process improvements within the context of the AESS.

In monitoring existing issues, the goal has been to ensure continuous monitoring through communications and sharing of information. With the intent of expanding the current AESS process to consider all elements of the Ammunition Program (including procurement and disposal activities) by end of FY 17/18, the focus for FY 15/16 has been to close out longstanding issues where possible.

1 As per C-09-005-001/TS-000 Program Management and Life Cycle Safety, the AESI defines the requirements for A&E Safety Program review by qualified and authorized specialists while the AESS is the score-based worksheet against which the inspection is carried out.

A&E COMPLIANCE STANDING ISSUES

A&E Safety Inspections and Surveys

Introduction. The AESI and AESS are the fundamental cornerstones of the regulatory compliance program for reporting on the state of the Ammunition and Explosives Safety Program (AESP) at the command, base and unit level. DAER policy includes standards, frequency, process and reporting requirements through which the tactical, operational and strategic levels of the L1 chain of command are all involved. The overall state of the A&E safety program is most easily captured by the aggregate AESP Health Scores which summarize the results of the AESS process within each L1 across the seven program pillars of Table 1.

Results and Issues. Interpreting the aggregate results, there is significant improvement of A&E safety across the Department of National Defence (DND) and the Canadian Armed Forces (CAF) with a total of nine improved aggregate scores from 2014 to 2015.

There was nonetheless one degraded aggregate score related to the emergency preparedness pillar for the RCN. The emergency preparedness pillar is central to planning for unforeseen events as it integrates the A&E safety program into emergency preparedness planning, preparedness, inspections and drills (e.g. fire safety program, physical security program). Sustained attention at the base commander level will be instrumental in addressing this one element of the AESS.

Summary. The overall execution and reporting of the current AESS process is mature and well understood at the strategic and

L1 AESS Self-Evaluation	Safety Program	Storage	Operations	Transport	Disposal	Emergency Preparedness	Administration
Royal Canadian Navy (RCN)						↓	
Canadian Army (CA)	↑					↑	
Royal Canadian Air Force (RCAF)	↑	↑					↑
Canadian Joint Operations Command (CJOC)							
Canadian Special Operations Forces Command (CANSOFCOM)	↑	↑				↑	↑
Assistant Deputy Minister (Science and Technology) (ADM(S&T))							

Legend

	Aggregate L1 average score is over 75% for the element
	Aggregate L1 average score is between 60% and 75% for the element
	Aggregate L1 average score is below 60% for the element
↑	Improved stoplight from DAER Annual Report 2014
→	Status quo stoplight from DAER Annual Report 2014
↓	Degraded stoplight from DAER Annual Report 2014
Note	All green elements without arrows scored same category as 2014

Table 1 - Aggregate AESP Health Scores and Legend

operational levels. In conjunction with the introduction of a newly structured compliance model by the end of FY17/18, an extensive review of AESS policy will facilitate the tactical level acknowledgement, ownership and execution of a complete AESP. As such, the AESS policy process will continue to be a focus area for further improvement in FY 16/17.

The ATAs have been active within the L1 ATA WG for 2015, improving many aspects of the current AESS. Some of the changes under consideration for improvement include:

- Revisiting the requirement for five tiers of re-inspection frequency in order to simplify measurement but ensure regulatory compliance;
- Adapting the storage element to account for differences between L1s in inspecting 1st/2nd/3rd line ammunition lockups and facilities;
- Establishing minimum rank requirements for the AESI in-brief and out-brief by L1 ATAs as an enabler for base level visibility and ownership;
- Establishing a Management Action Plan process incorporating defined timelines to ensure corrective action plans are prioritized, addressed, actioned and closed;
- Incorporating risk management principles into the scoring methodology of the AESS process;
- Measuring infrastructure condition as a stand-alone value against the overall unit result of an AESS, providing a true representation of the AESP within the unit; and
- Adapting the AESS tool to reflect specific L1 inspection requirements and higher L1 level analysis.

A&E Licensing

Introduction. A&E storage licences require renewal every five years in order to ensure that they accurately reflect changed conditions to the facility or A&E being stored/processed and to ensure compliance with regulatory changes that may have been introduced within that timeframe. DAER maintains a register for all A&E storage licences and waivers. The national register had been maintained as a Microsoft Access database on a shared drive. It has recently been published on a SharePoint site which will make the records visible to L1 ATAs and other members of the ammunition community, eventually eliminating the requirements for L1 ATAs to maintain a register of all licences and waivers.

Results and Issues. DAER is currently developing revisions to the unit A&E storage licensing policy that are based upon proposals by L1 ATAs and other stakeholders. Future policy changes for licensing will assist L1 ATAs by reducing the number of storage locations that must be licensed and inspected. Once applicable policy direction is released, DAER will conduct a compliance review with L1 ATAs of unit A&E storage location licences.

There are currently five licensing waivers[2] in effect across DND/CAF; three of the waivers are for domestic storage locations and two for operations.

A central repository for magazine designs and ammunition facility blueprints is part of Phase 2 of Assistant Deputy Ministre (Infrastructure and Environment)'s (ADM(IE)) Business Modernization project. This central repository could potentially resolve licensing issues around building designations by populating A&E building and infrastructure data in the Real Property (RP) Spatial Data Warehouse. This RP data will provide a ready reference to determine the type and capability of every licensed A&E magazine in the CAF and will be available by the end of FY 16/17.

Summary. Improvements continue within the A&E licensing spectrum. Policy proposals from the ATAs will simplify and/or reduce inspection requirements while electronic master databases will standardize and facilitate the licensing verification process.

A&E COMPLIANCE OUTSTANDING ISSUES

There are many longstanding issues spanning the A&E community of practice which have various owners and stakeholders and which by virtue of their multi-year span require ongoing DAER monitoring and annual reporting. Whereas this section presents only a 2015/16 status update on each issue, previous DAER annual reports can be referenced for a complete description of the issues and historical actions taken.

Demilitarization and Disposal

Introduction. A fundamental Equipment Program Management (EPM) life cycle function for the Director Ammunition and Explosives Management and Engineering (DAEME) is the demilitarization and disposal of A&E in accordance with environmental, technical, safety and controlled goods requirements. There is a longstanding requirement for a dedicated large scale DND/CAF A&E demilitarization and disposal capability[3], that can be met either through contract with industry or internal infrastructure and equipment. In 2012 the CAF Ammunition Demilitarization Capability Project (Capability Initiatives Database #00001101 sponsored by CANOSCOM) was removed from the database with the unintended consequence of loss of senior leadership visibility over the requirement.

Results and Issues. The three central themes to the demilitarization and disposal issue for 2015/16 are described as follows:

- Noteworthy Accomplishments. A technical investigation and engineering support (TIES) contract with Magellan

2 Waivers are issued, supported by risk assessment and appropriate chain of command acceptance, to approve and control A&E storage locations where compliance with minimum Quantity Distance (QD) safety requirements cannot be achieved.

3 The term "capability" is separate from the capital program capability-based planning process. The word capability is used throughout this section to describe the lack of a mechanism to execute the demilitarization and disposal of DND A&E aside from the current methods, which are open burning/open detonation (OB/OD) and are not sustainable in the long run.

Aerospace Winnipeg (MAW) was awarded. This contract will be used to identify the most cost efficient and compliant means to dispose of the remaining Canadian Rocket Vehicle 7 (CRV-7) rocket motor stockpile (86,000 rocket motors weighing 328 tonnes). This investigation should be completed in mid-2017. Furthermore, the disposal plan for 155 mm M119 Red Bag propellant (79,848 155 mm M119 charges weighing 1,202 tonnes) is undergoing sign-off within Assistant Deputy Minister (Materiel) (ADM(Mat)) with the intent to sell the materiel in 2016, or commence disposal by destruction;

- Ongoing Operations. Ongoing working level management and execution of the demilitarization and disposal program by DAEME is proceeding. A total of 485 tonnes of A&E and related materiel were disposed of through a combination of sale and destruction – the majority by open burning and open detonation (OB/OD) during the Canadian Materiel Support Group (CMSG) annual Exercise DUSTY THUNDER held at Canadian Forces Ammunition Depot (CFAD) Dundurn, Saskatchewan. A categorized and complete inventory of the materiel under active management by DAEME, awaiting demilitarization and disposal, is contained at Annex A to this report. Table 2 of the main body of this report is a summary of major trends within the demilitarization and disposal program; and

- Capability Deficiency. The current strategy to address the capability deficiency was a commercially competitive solicitation of a bundled[4], multi-year services contract for the full demilitarization and disposal of all current and future DND A&E. To advance this strategy DAEME, through Public Works and Government Services Canada (now Public Services and Procurement Canada (PSPC)), executed a successful industry engagement process through a second letter of interest (LOI), which closed in June 2014. Early in 2015, the DAEME analysis concluded that the extant strategy was high risk and not feasible due to cost, technical complexities and potential departmental liabilities. Concurrently, the requirement was published on the Defence Acquisition Guide (DAG). In mid-2015 the requirement was absorbed into Defence Renewal's Sustainment Initiative/Sustainment Business Case Analysis (SI/SBCA) process. A first draft SBCA submission was made in fall 2015 with a view to de-bundle the requirements into more manageable and feasible elements (i.e. separating the high risk munition scrap from the other, lower risk, elements). This first submission failed the initial review process and the requirement remains a work in progress. Coupled with the SBCA process is the need to engage other implicated L1s (e.g. CJOC and ADM(IE)) and clarify the Authorities, Responsibilities and Accountabilities (ARAs) for end of life cycle A&E.

4 The term bundled refers to all A&E requirements (munition scrap, aids to production, salvage, and end items) contracted to one vendor operating at a single geographic location within Canada.

Summary. The limited institutional capacity for large scale demilitarization and disposal continues to represent a gap in enabling the life cycle materiel management function of the EPM community. This capability deficiency represents a potential safety concern associated with the continued requirement to store time-expired, deteriorated, obsolete, and/or surplus ammunition and explosives, and where the effectiveness of the stabilizing agents within propellants of large caliber munitions continues to degrade with time. The demilitarization and disposal issue is directly linked to three high priority Defence Renewal Initiatives (Inventory Management, Warehousing and Distribution and Rationalize Real Property Portfolio). Failure to identify a feasible mechanism could adversely impact the success of these initiatives. Sustained DND/CAF senior leadership focus, direction, resource allocation and prioritization on the issue are required. This topic should remain a high priority with ongoing oversight provided by the Ammunition Program Oversight Committee (APOC).

Legacy Unexploded Explosive Ordnance (UXO) and Contaminated Sites Program

Introduction. The management of legacy UXO sites is a key activity under the ADM(IE) Group's Environmental Protection and Stewardship (EP&S) Program. Based upon historical research of possible UXO sites there are 893 legacy sites that potentially contain UXO. Of the identified sites, 771 have been prioritized and 83 have been risk assessed. There are seven sites under site management and six undergoing mitigation measures.

Results and Issues. As presented in the 2014 DAER annual report, the ADM(IE) Group continues to undergo strategic transformation and internal definition of ARAs. This reorganization continued in 2015 with the goal of completion during FY 16/17. Pending conclusion of the restructure into a matrix, vice project-centric approach, there continue to be elements of programmatic risk to execution if ARAs are not clearly delineated.

The program was in its third year of a 50% budget reduction; however, the budget was increased to $9.1M for FY 16/17 with an anticipated $13.5M and $13.9M for FY 17/18 and FY 18/19 respectively. The current program performance measure is the number of UXO legacy sites assessed per year, with the target being 40. For FY 15/16, that target was achieved. For FY 16/17, an additional internal performance measure will be established as the number of UXO legacy sites (newly identified in that FY) with a site management plan.

A Chief Review Services (CRS)[5] review of 2014 contained two Management Action Plans (MAPs) aimed at improving both risk prioritization of sites as well as completing mitigation strategies. In part, the audit observed that:

- The IE Group should conduct a formal risk-based assessment on the rate of priority ranking and assessment of known UXO sites; and

5 Now the Assistant Deputy Minister (Review Services) (ADM(RS))

Category	2011 (tonnes)	2012 (tonnes)	2013 (tonnes)	2014 (tonnes)	2015 (tonnes)	# of magazines	Five Year Estimate (tonnes)	Trends
Munition Scrap	2,758	3,058	3,441	3,520	3593	6.6	5,500	Munition scrap quantities will continue to increase until a dedicated disposal and demilitarization capability is established. Five-year estimate includes approximately 1000 tonnes for priority cleanup of legacy site Lac St Pierre only.
Propellant ***-New-***	***3.9***	***29.2***	***1993***	***1218***	***1632***	***10***	***1800***	***DND/CAF is able to maintain the destruction by OB of propellant recovered from the range. The increase in 2015 is from the 155mm Red Bag.***
All Pyro	69.4	73.3	147.0	94.0	93	59	367	2015 was successful in reducing four natures of stocks awaiting disposal. However, further reductions will be a challenge without a disposal and demilitarization capability as the remaining pyrotechnics must be incinerated.
Small Arms Ammunition (SAA) ***-New-***		***166***	***220***	***442***	***658***	***4.14***	***1200***	***SAA must be incinerated. There is no DND/CAF or Canadian industry capability. A number of regulatory challenges prevent the inventory from moving outside Canada.***
Rocket Motors	322.5	321.6	320.8	328.9	363	9.9	1800	CRV-7 rocket motors represent the majority of items in this category. The increase in 2015 is associated with the recovery of Eryx missiles' launch and flight motors. A services contract is under development to dispose of CRV-7 motors.
Missiles and Rockets	118.7	21.5	103.0	97.0	.9	0.01	1	EX DUSTY THUNDER 2015 resulted in the disassembly of Eryx missiles. While the Eryx missiles' warheads have been destroyed, the rocket motors still require a method of disposal through a future services contract.
105mm through 155mm (Less 120mm and 155mm HE)	628.0	628.0	628.0	0.6	16.8	0.09	3	The increase in 2015 is associated with the disassembly of Cart 105mm Tank ammunition
AC Bombs	16.6	5.6	5.6	0	0	0	0	Further accumulation of these items is not anticipated. This item will no longer be tracked.
40mm Naval Through 104mm	564.2	390.8	120.9	32.8	0	0	0	Further accumulation of these items is not anticipated. This item will no longer be tracked.

	Trends where situation is forecast to worsen over 5 years and requires a dedicated demilitarization and disposal solution.
	Trends where situation is forecast to improve over 5 years assuming a discrete contracted solution can be implemented.
	Trends where situation is forecast to improve over 5 years given existing DND/CAF execution.
	New categories are indicated in italics

Table 2 - Major Demilitarization and Disposal Trends

- The IE Group should develop a multi-year plan with clear rankings to determine the order in which UXO sites have mitigation activities completed.

Progress has been made to address the ADM(RS) MAPs where:

- The UXO centre of expertise has developed a formal risk based assessment pro forma to assess public safety risks on legacy sites and is completing these in a peer review and standardized manner. This pro forma is a living document that is updated annually at a minimum; and

- ADM (IE) is in the process of implementing a stable long-term budget for UXO activities on legacy sites. This stabilization should permit predictable multi-year planning and funding for future UXO endeavours.

Summary. The linking of stable program funding to a multi-year strategic plan with clear rankings for completion of mitigation activities will be key in risk managing this critical public safety activity. ARAs and lines of internal communication are still under development within the IE Group and should move to a final resolution in FY 16/17 to minimize this programmatic risk.

Infrastructure

Introduction. Subsequent to the ADM (IE)'s transformation, the ADM (IE) Real Property Operations Group (ADM (IE)/RP Ops Gp) operates and maintains all DND/CAF Real Property to ensure responsiveness and to maintain a sustainable footprint against the DND/CAF operations and departmental programs. This represents an opportunity to address longstanding issues commented on in successive DAER Annual Reports since 2010, whereby the DND/CAF have ageing and decaying A&E infrastructure holdings that may not be fit for purpose. It is important to ensure storage facilities retain their structural integrity and that any changes in facility condition are accurately reflected through up-to-date licensing policies and practices. A&E storage infrastructure is ageing and requires an assessment of its integrity; degrading infrastructure poses potential safety concerns to DND employees and to military personnel, and a safety risk to stored ammunition and explosives.

Results and Issues. ADM (IE)/RP Ops Gp is conducting a Facility Condition Assessment (FCA) of the inventory and condition of all existing infrastructure that will complement the CAF AP infrastructure study. The completed study (summer 2018) will permit the Ammunition Program Infrastructure Working Group (APIWG) to make recommendations to APOC for recapitalization of existing, or construction of new, A&E infrastructure.

A Strategic Joint Staff (SJS) Director of Staff (DOS) authorized CAF AP Infrastructure study has been initiated. The intent of the AP Infrastructure Study is to conduct a first-principles analysis of the AP and its constituent elements with a view to properly inform senior management decision-making on Horizon 2 and Horizon 3+; AP Real Property & Infrastructure (RP&I) investments and divestments. The study will be comprehensive, encompassing all aspects of the AP infrastructure at the strategic, operational and tactical levels, and will lead to a Strategic RP&I Asset Management Plan for RP&I requirements to support the AP now and in the future. The study is scheduled for completion by December of 2017.

Both activities will contribute towards meeting Defence Renewal Strategic Initiatives (DR SI).

Summary. Various initiatives are focused on the identification, assessment and capability of A&E infrastructure within the department. These complementary reviews of infrastructure and capabilities will identify and prioritize the efforts required to ensure infrastructure renewal/investment is achieved leading to safer work/storage environments and alignment with the appropriate strategic horizon outlook of the department.

A&E RISK MANAGEMENT

Introduction

Approval of the Defence Administrative Order and Directive (DAOD) for A&E risk management remained outstanding for FY 15/16. However, and under the authority of C-09-005-001/TS-000 Ammunition and Explosives Safety Manual, Volume 1 – Program Management and Life Cycle Safety, the A&E risk assessment safety case (AERASC) model has been promulgated and is being used to assess and authorize a number of activities that would otherwise not be authorized without a waiver outside the parameters of existing policies and directives.

Results and Issues

The AERASC process has been used with effect to support risk-based decisions regarding A&E storage and operations:

- CFB Suffield – a risk-based licence was approved to allow operations in a workshop in close proximity to a storage facility;

- Legacy UXO and Contaminated Sites Program – approval of an amendment to procedures for dealing with UXO;

- 12 Wing Shearwater – approval of an amended aircraft loading procedure to facilitate an exercise/training requirement; and

- OP UNIFIER – approval of a storage plan for training ammunition within the area allocated to the support elements compound.

The issuance of Ammunition and Explosives Instruction (A&EI) 57 that instituted a Technical Review Board to assist in the preparation and submission of an AERASC proved to be a valuable adjustment to the process.

The risk management process is continually being reviewed for improvement based upon lessons learned and other sources such as the NATO Explosives Safety and Munitions Risk Management (ESMRM) Panel and the UN International Ammunition Technical Guidelines (IATG) updates.

Summary

The AERASC process is proving to be a useful tool in enabling risk-based decision making. The release of DAOD 3002-7 and the update of DAOD 3002-0 will grant flexibility to the process and assign accountabilities at the appropriate levels within the chain of command.

L1 AMMUNITION TECHNICAL AUTHORITY (L1 ATA) REPORTING

Introduction

In accordance with C-09-005-001/TS-000 Volume 1 Program Management and Life Cycle Safety, the DND/CAF regulatory framework requires L1s to establish L1 ATAs who are accountable to their respective L1s for all A&E issues. The L1 ATA is also responsive to, and a key enabler for, DAER in providing understanding on the status of compliance, risk management, safety and regulatory issues within their Command.

Results and Issues

There continues to be marked improvement in the frequency and quality of communications between the L1 ATAs, L1s and DAER. The introduction of formalized ATA continuation training coordinated by SJS J4 Ammunition, supported by associated subject matter experts, has greatly enhanced overall ATA awareness and responsibilities within the respective commands. DAER hosted two L1 ATA WG meetings in 2015 that identified AESI/AESS continuous improvements and policy renewal opportunities. These proposals will be assessed and, if warranted, implemented during the FY 16/17 transition year. It is vital that L1 ATA chains of command understand and actively support the A&E specialist role with both regulatory (responsive to DAER) and corporate (accountable to the chain of command) duties.

Summary

DAER will continue to ensure communication is active and robust through the L1 ATA network while leveraging results within the L1 ATA WG.

L1 ATA CONTRIBUTIONS

Introduction

The major users of A&E (RCN, CA, RCAF, CJOC and CANSOFCOM) have extremely knowledgeable and skilled L1 ATAs, which is paying dividends in ensuring DND/CAF due diligence in light of the department's exemption from the Explosives Act. These L1 ATAs have provided their views on AESS results as input to the annual report. Their summaries are presented in the paragraphs below.

RCN ATA

The RCN L1 ATA conducted compliance verifications on both Maritime Forces Atlantic (MARLANT) and Maritime Forces Pacific (MARPAC). The overall health of the RCN AESP is considered adequate with minor management issues that are monitored at the formation level. The expertise between the ATA, Formation Ammunition Technical Authorities (FATAs) and Fleet Ammunition Inspectors (FAIs) is outstanding and there is a growing culture of reporting and safety oversight within the RCN. The current AESS tool for the conduct of inspections within the RCN does not provide sufficient flexibility of application. The RCN ATA will formulate an amendment proposal encompassing improvements to the tool while maintaining regulatory policy oversight and the common look and feel structure.

CA ATA

Overall the CA has a healthy AESP which is reflected in the average AESS pass rate of 93%, with no failures. In AESI execution, the CA will continue to focus on the emergency preparedness element as a key enabler to a healthy AESP. Of note, only two of the eleven CA ammunition facilities held an Emergency Response Plan exercise in the past year; the affected bases have been made aware of the shortfall. Despite the publication of CANARMYGEN 001/16 Weapon Systems, Explosives and Ammunition Safety and Reporting, there is still room for improvement with regard to A&E accident and incident reporting within the CA. Although storage capacity is not an issue, the state of A&E infrastructure from a maintenance perspective continues to be a mission degrader within the CA.

RCAF ATA

The aggregate scores for the RCAF AESI have improved over the past year with continuing improvement demonstrated in the storage element. Contributing factors to the majority of AESI observations were the lack of experience, training and workload. The updated Ammunition and Explosives Management for Aerospace Operations (AEMAO) course syllabus from 2014 has helped improve the overall RCAF AESP. The new air weapon systems (AWS) technicians are now posted to the wings and the re-integration of the AWS technicians is ongoing. Aging A&E infrastructure across the RCAF is extensively deteriorated and will need to be addressed in the immediate future. In addition, delays in the delivery of the new A&E Packaging course and Unit Explosives Safety Officer (UESO) course are highlighted as areas of significant concern to the administration, oversight and conduct of the RCAF AESP and A&E operations.

CJOC ATA

All CJOC/CMSG facilities have continued to demonstrate solid AESPs while providing exceptional support to all primary customers and operations. The next focus will be on the AESPs of major operations. Providing ATA technical oversight to ADM(S&T) and VCDS, CJOC performed the AESIs for both organizations. Aging infrastructure and the accumulation of surplus, obsolete and deteriorated ammunition and munition scrap that cannot be disposed of by open detonation or open burning continue to represent a concern for all CJOC ammunition depots.

CANSOFCOM ATA

All CANSOFCOM's units were inspected between January 2015 and March 2016. All units have an AESP and have improved their score on the AESI/AESS, with scores ranging from 82%

to 95%. One of CANSOFCOM's units has ammunition stored under an AERASC which is currently under review. As per last year's report, CANSOFCOM continues to put emphasis on and is working to grow its culture of reporting within the constraints of its security requirements.

INSENSITIVE MUNITIONS (IM)

Introduction

The review of the DND/CAF Insensitive Munitions program was first introduced in 2014. In 2004 under DAOD 3002-2 (Insensitive Munitions), DND/CAF committed to implementing the requirements of the NATO Standardization Agreement (STANAG) 4439 – Policy for Introduction, Assessment and Testing for Insensitive Munitions. This implementation requires that, with the exception of A&E assessed as hazard division 1.4 and of those natures in use prior to 2004 and scheduled for replacement prior to 2020, all A&E must be assessed for compliance with STANAG 4439 and that every opportunity should be taken to introduce IM technology when procuring new ammunition and replacing stocks of in-service A&E.

Results and Issues

The migration towards a more IM compliant A&E inventory will take decades to achieve and is generally being effected through two processes: capital acquisition; and obsolescence management. Key to the introduction to service (during capital acquisition) are the Ammunition Safety and Suitability Board (ASSB) and challenge function which strive to ensure that IM requirements are considered by projects. Near the end of an item's life cycle, the EPMs, including DAEME, must re-assess IM requirements and reconsider feasible IM compliant solutions (i.e. all else being equal, the IM compliant solution should be selected to replace obsolete, non-IM compliant A&E). DAEME employs a three-pronged approach to manage the IM Strategy (Figure 1). The Strategy includes lines of operations (LOO) to Manage the Program, Manage the System, and Manage the Assets. The foundation of the program is the development and maintenance of the DND Inventory Signature, which is a characterization of all DND A&E against the STANAG[6].

DAEME estimates that 15% of the DND/CAF A&E inventory by nature currently conforms to the requirements of DAOD 3002-2. During introduction to service, the ASSB must assess the insensitive munitions status of the A&E being considered and capture the results in the decision document. However, as most new A&E are procured by capital projects, the insensitive munitions requirements must be considered upstream of the ASSB – during the project options analysis phase – which presents particular challenges for DAEME to influence. While there are

6 The work is executed by DAEME under TIES Contract W8484- 10XA07/001/BK. The engineering evaluation is performed by GD-OTS-C as part of the Munitions Supply Program, which is closely associated with the ongoing Defence and Technology (D&T) business line and is partially funded by DAEME

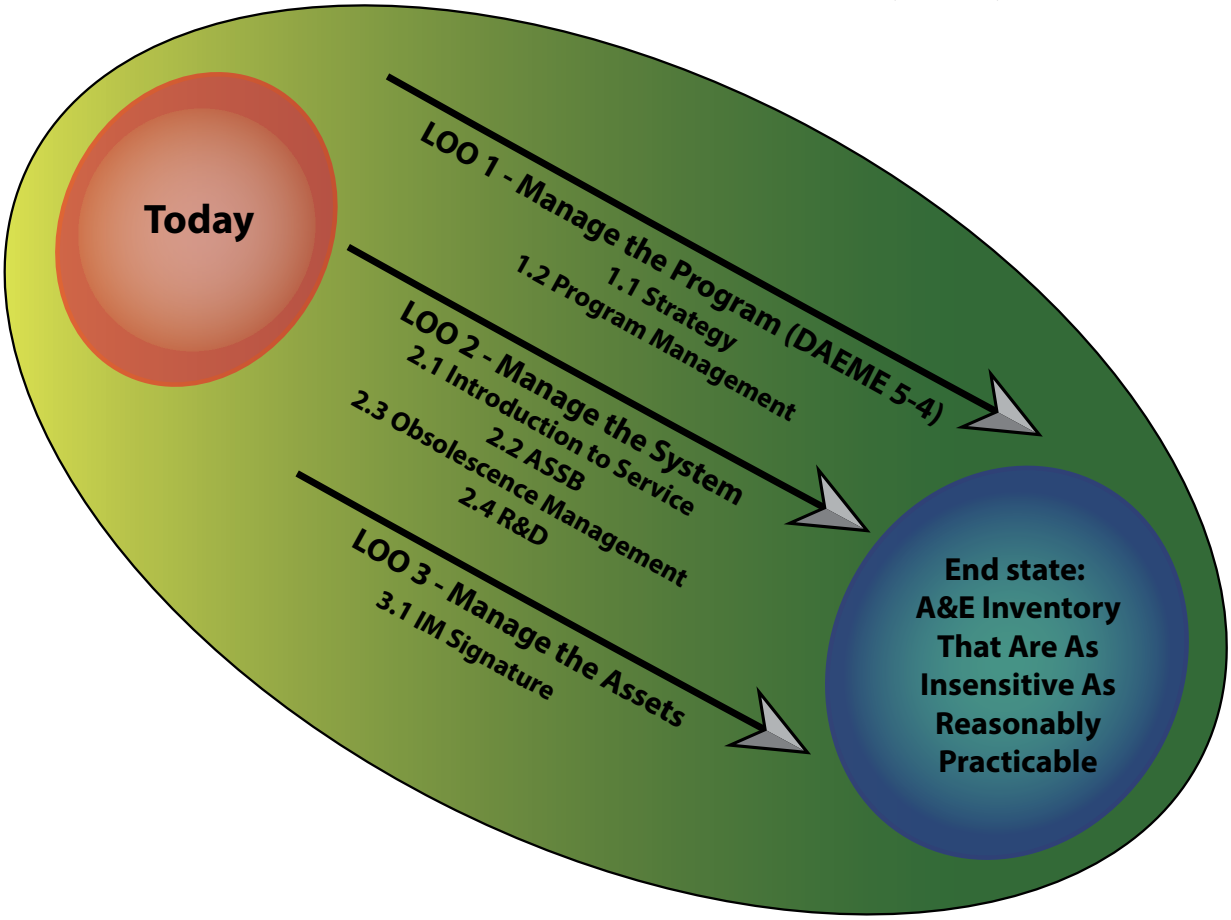


Figure 1 - DND Insensitive Munitions Inventory Signature

numerous references[7] that guide A&E activities, including the requirement to engage DAEME early on, there are few specific requirements for IM in the supporting documentation. An area where DAEME has influence is through the Munitions Supply Program (MSP); however, this opportunity is not being exploited to develop IM alternatives to in-service A&E due to the cost, technical risks and resources required to requalify the A&E.

Summary

DAEME actively monitors progress in meeting the requirements of DAOD 3002-2 and to implement its three-pronged strategy. The major challenge remains influencing and educating project staffs so they understand their responsibility to fully consider the requirements for A&E within their project documentation, including the associated IM properties, well in advance of the procurement and ASSB processes.

AMMUNITION PROGRAM RESTRUCTURE (APR)/TRANSITION

Introduction

The APR was completed in 2015 and identified nine core elements as depicted in Table 3. As a result, the Materiel Group J4 Ammunition (Mat Gp J4 Ammo) organization has transitioned to the Director Logistic Programs (SJS D Log Prog) and Strategic J4 Ammo (Strat J4 Ammo) within the SJS. SJS J4 Ammo focus will continue to support the governance framework and the holistic corporate overview of the AP and A&E management within the DND/CAF.

CAF / DND Ammunition Program Elements	
1.	Ammunition & Explosives (A&E) Regulation
2.	A&E Equipment Program Management
3.	Ammunition Program Planning & Management
4.	A&E Operations Support and Readiness
5.	Ammunition Program Strategic Policy & Doctrine
6.	A&E Practitioner Requirements
7.	A&E Infrastructure Requirements
8.	A&E Systems Requirements
9.	A&E Inventory Requirements

Table 3 - CAF/DND Ammunition Program Elements

Results and Issues

The APOC is supported by a sub-committee and working group structure (as required) to manage execution within the discrete program elements. The outputs and recommendations from the sub-committee and working groups are integrated by SJS J4 Ammo into the APOC for visibility and decision. In 2015 the sub-committee directed a plan of work encompassing all elements of the AP complete with tasks and key deliverables.

Summary

Considerable progress was made in 2015 through the establishment of the SJS Strat J4 Ammo within the SJS D Log Prog structure. The organization became output focused seeking to secure decisions on many longstanding A&E programmatic issues. In support, DAER will assess progress and achievements related to A&E safety as set by the many working groups co-led by SJS Strat J4 Ammo within the context of APOC.

COMPLIANCE AND VERIFICATION SUMMARY

The Process

Current standard L1 compliance verification activities will continue throughout the upcoming FY, however a revised, comprehensive compliance structure will be introduced and implemented for the FY 17/18 campaign. This new structure will establish a cyclical compliance verification model within the department and cover all elements of the Ammunition Program. Future reports will focus on the execution and results of the newly implemented compliance model structure and associated L1 observations. Opportunities for expansion of the model may continue beyond the current ATA umbrella as compliance activities broaden.

AESS

The AESS is a mature process that is well executed and managed, effectively providing senior leadership an executive level picture of the state of A&E safety across DND/CAF. Transformation of the compliance structure and AESS improvement initiatives will further enhance the detail and perspective of A&E compliance activities to all leadership levels. The AESS will continue to evolve and become a multifaceted, flexible instrument regardless of the environment in which it is applied.

A&E Licensing

The oversight by L1 ATAs in execution of licensing is generally very good. The knowledge and experience at the tactical levels in developing licence submissions is good but effort continues to be required to ensure a quality product. Licensing will be the subject of a future DAER compliance verification to ensure that requirements are understood and communicated, and that oversight responsabilities are executed at the appropriate levels.

A&E Compliance and Verification Issues

Critical issues of focus from 2015/16 for DND/CAF senior leadership oversight continue to be:

- **Demilitarization and Disposal**. Despite annual departmental disposal activities to reduce the current holdings of time-expired, deteriorated, obsolete, and/or surplus ammunition and explosives, the limited

7 The key A&E related publications are: Project Approval Directive Chapter 14, DAOD 3002-2 (Insensitive Munitions), C-09-05-007/TS-000 (Ammunition and Explosives Safety Manual – Volume 7 – Certification of Ammunition, Explosives and Accessories for Service Use), D-09-002-009/SG-000 (Standard – Procedures for the Type Classification of Ammunition and Explosives), and D-09-002-010/SG-000 (Standard – Assessment of the Safety and Suitability for Service of Ammunition and Explosives).

institutional capacity for large-scale demilitarization and disposal continues to represent a potential safety concern and a gap in enabling the life cycle materiel management function of the EPM community and will impact DR SIs linked to departmental infrastructure renewal; and

- **Departmental A&E Infrastructure**. Collaborative SJS DOS and ADM(IE) RP Ops Gp efforts are underway to assess and identify current and future requirements of A&E infrastructure. These mutually supporting reviews encompassing A&E infrastructure and capability mandates will synchronize efforts to ensure infrastructure renewal and investment are achieved, leading to safer work/storage environments and alignment with the strategic A&E infrastructure horizon outlook. These results will have a direct effect on progress of the associated DR SIs highlighted in the annual report.

A Canadian Armed Forces sniper rifle sits ready to fire during Exercise IRON SWORD at General Silvestras Žukausas Training Area in Pabradė, Lithuania on November 10, 2015 during Operation REASSURANCE.

Bomb disposal robot, tEODor, fires a disruptor at an Improvised Explosive Device (IED) to disarm it beside a decommissioned transit bus during Exercise ARDENT DEFENDER at Ogden Point, Victoria, British Columbia on May 29, 2015.

Section 3

Ammunition and Explosives Policy

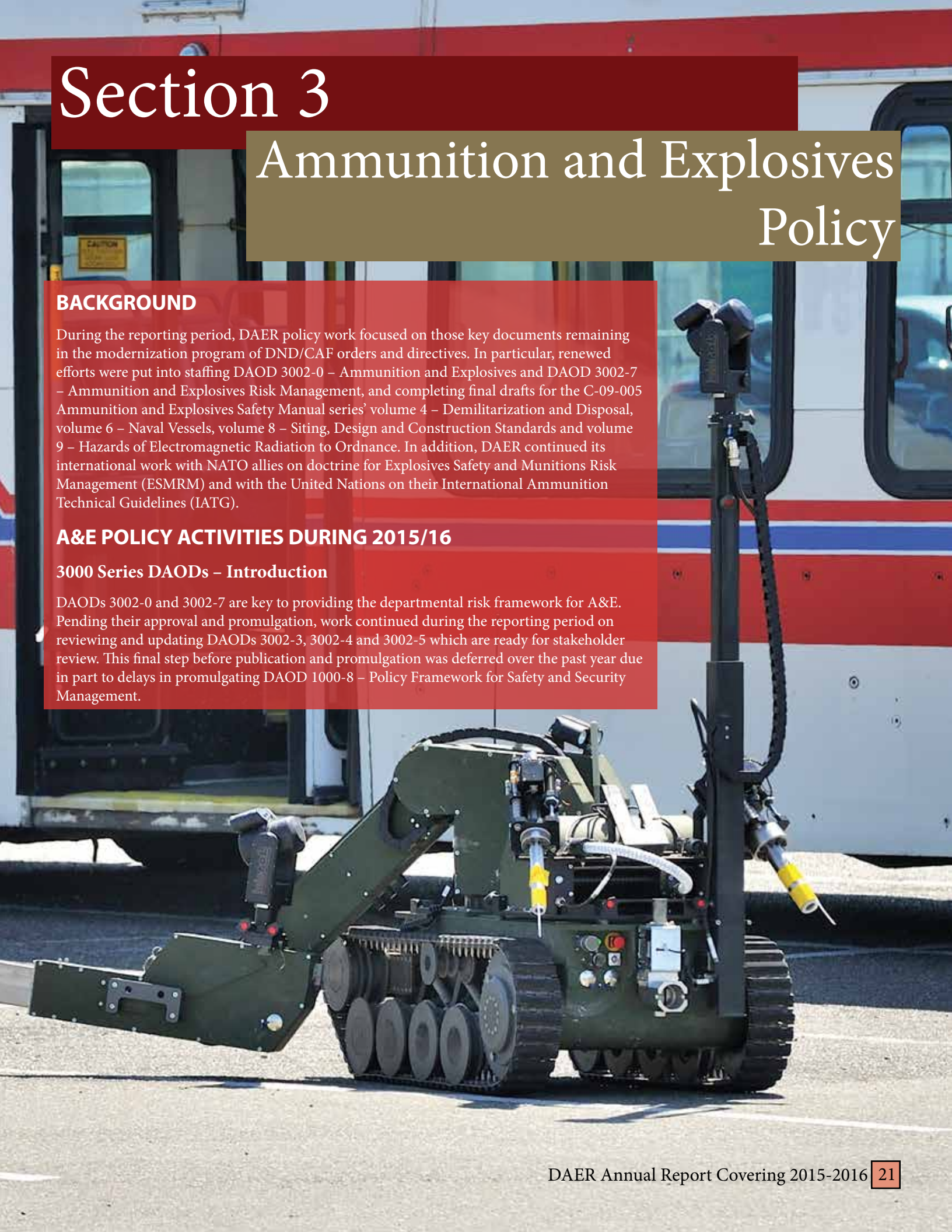
BACKGROUND

During the reporting period, DAER policy work focused on those key documents remaining in the modernization program of DND/CAF orders and directives. In particular, renewed efforts were put into staffing DAOD 3002-0 – Ammunition and Explosives and DAOD 3002-7 – Ammunition and Explosives Risk Management, and completing final drafts for the C-09-005 Ammunition and Explosives Safety Manual series' volume 4 – Demilitarization and Disposal, volume 6 – Naval Vessels, volume 8 – Siting, Design and Construction Standards and volume 9 – Hazards of Electromagnetic Radiation to Ordnance. In addition, DAER continued its international work with NATO allies on doctrine for Explosives Safety and Munitions Risk Management (ESMRM) and with the United Nations on their International Ammunition Technical Guidelines (IATG).

A&E POLICY ACTIVITIES DURING 2015/16

3000 Series DAODs – Introduction

DAODs 3002-0 and 3002-7 are key to providing the departmental risk framework for A&E. Pending their approval and promulgation, work continued during the reporting period on reviewing and updating DAODs 3002-3, 3002-4 and 3002-5 which are ready for stakeholder review. This final step before publication and promulgation was deferred over the past year due in part to delays in promulgating DAOD 1000-8 – Policy Framework for Safety and Security Management.



DAOD 3002-0 – Ammunition and Explosives and DAOD 3002-7 – Ammunition and Explosives Risk Management. The DAODs are inextricably linked due to the requirement to establish authorities in a -0 DAOD. These key policy documents will provide the departmental risk framework for A&E as highlighted within the 2005 CRS Evaluation of the DND/CAF Ammunition Safety Program[1]; incorporating risk-based decision-making into A&E management. Initially scheduled for September 2014, DM and CDS endorsement of the DAODs was deferred as a result of changes in senior leadership appointments and the 2015 Federal elections. The DAODs have been re-submitted for DM and CDS sign-off with expectations of securing DM/CDS endorsement by fall 2016.

DAOD 3002-3 - Ammunition and Explosives Safety Program. This DAOD has been revised to meet corporate level required changes of formatting and will be circulated for stakeholder review once DAOD 1000-8 is approved.

DAOD 3002-4 - Ammunition or Explosives Accident, Incident, Defect or Malfunction Reporting. Definitions have been amended to address oversights in the extant published version to ensure reporting requirements apply to all affected events. The DAOD has been revised and will be circulated for stakeholder review once DAOD 1000-8 is approved.

C-09-005 Series Technical Orders

Although work continues to complete the remaining four technical orders and update two of the nine volumes, no new volumes of the C-09-005 series – Ammunition and Explosives Safety Manual – were promulgated during the reporting period. Delays were incurred due to the unexpected requirement of identifying funds and initiating a tendering process for formatting services previously provided under a contract through Director Supply Chain Operations (DSCO).

C-09-005-002/TS-001 and TS-002 Volume 2 – Storage and Facility Operations. This volume has incorporated revisions to the quantity-distance (QD) tables that were promulgated in Allied Ammunition Storage and Transport Publication (AASTP) 1 Edition B Version 1. The revised unilingually formatted volumes were received back from DSCO in December 2015. Translation accuracy check is nearing completion; the revised volumes will be published in the last quarter of 2016.

C-09-005-004/TS-000 – Demilitarization and Disposal. This volume was intended for publication in 2015; however a departmental policy change on intranet publishing prompted the requirement to reformat the volume and display separate English and French versions as opposed to the initial bilingual side-by-side format. Release of the volume is anticipated for mid-2016.

C-09-005-007/TS-000 – Certification of Ammunition, Explosives, and Accessories for Service Use. A periodic review is in progress to remove duplicate material. Two revisions within a short period may be required due to the ongoing review process of D-09-002-010/SG-000, Standard – Assessment of the Safety and Suitability for Service of Ammunition and Explosives. Some material will be removed from C-09-005-007/TS-000 and incorporated into D-09-002-010/SG-000.

C-09-005-008/TS-000 – Siting, Design and Construction Standards. The Director, Architecture and Engineering Services (DAES), as publication OPI, has completed their technical input to the manual. This unique and highly technical production required close collaboration between DAES and DAER over an extended period. Requiring formatting and translation, the publication is expected to be promulgated in 2017.

C-09-005-009/TS-000 – Hazards of Electromagnetic Radiation to Ordnance. As the OPI for the policy document, QETE has completed the draft which has also been translated. Publication was deferred in 2015 awaiting formatting; promulgation is expected in late 2016.

Canadian Long Span Earth-Covered Magazine

Complex issues surrounding the design criteria of the Canadian Long Span Earth-Covered Magazine (CLSECM) have prompted the requirement to confirm the current explosives licensing criteria of a 3-bar blast pressure rated magazine.

In light of the anticipated time and cost implications of scaled explosive testing or contracted engineering analysis, an independent engineering evaluation was pursued by engaging the US Department of Defense Explosives Safety Board (DDESB). Until the final results have been received and accepted by the DAES, the 3-bar classification remains in place, as does the 2009 construction moratorium, potentially impacting new construction projects or infrastructure recapitalization.

1 1258-101-2(CRS) Evaluation of DND/CF Ammunition Safety Program, February 2005.

Ammunition and Explosives Instructions (A&EIs)

A&EIs are used for the timely promulgation of relevant information to users, technical support personnel and facilities. Table 4 lists the A&EIs that were published during this reporting period:

Title	Description	Action
A&EI 27 Change 1 – Ammunition Safety and Suitability for Service Assessments – Class Decisions, 23 April 2015	Policy now in C-09-005-007/TS-000 has been removed; the content remaining in Change 1 is "process" and will be incorporated in D-09-002-010/SG-000	Reduced
A&EI 51 – Storage of A&E Excluded from Hazard Class 1, 28 April 2015	Provides policy direction for the storage of A&E excluded from hazard class 1, but which may contain explosives. Also provides direction for the storage of other hazard classes with hazard class 1	Promulgated
A&EI 57 – A&E Risk Assessment Safety Case (AERASC) Technical Review Board, 30 June 2015	Provides details for the conduct of the AERASC TRB	Promulgated
A&EI 58 – Packaging and Handling of Class 1 Dangerous Goods, 29 May 2015	Details policies and procedures relating to the certification of packaging of Class 1 substances for shipment. Addresses issues regarding currency of qualifications	Promulgated
A&EI 59 – Registered Unit A&E Storage Lock-ups and Licensed Unit A&E Storage Lock-ups, 16 February 2016	Defines exemptions to A&E storage approvals, the approval process, and minimum requirements for storage of limited natures and quantities of A&E	Promulgated

Table 4 - A&EIs Published From 1 January 2015 to 31 March 2016

Risk Management

Tools designed to assist with A&E risk management continue to be assessed with the intent of acquiring relatively simple software applications to assist with most A&E risk assessments. An example is the DDESB Field Assessment Spreadsheet Tool for Operational Munitions Risk Management in Explosives Safety Site Planning (FAST-Site) which has been adapted for Canadian use, supporting ATAs in their analysis of A&E risk. More complex tools, which often require formal training, are retained by DAER for use in technical reviews of higher risks.

The creation of the AERASC Technical Review Board (A&EI 57) allows for the application of these tools within the AERASC submission process. The risk management process is continually being reviewed for improvement based upon submitted AERASCs and other sources such as the NATO ESMRM Panel and the UN IATG updates.

Notably, Canada has provided its DND/CAF A&E Risk Management Program as input to NATO's AASTP-4 Manual on Explosives Safety Risk Analysis.

International Policy

STANAG 4440, covering AASTP-1, Edition B, Version 1 (Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives), was promulgated 11 December 2015. Canada ratified the standard on 9 April 2015 and will implement through amendments to the relevant C-09-005 series, planned for 2016. Among its many updates are revised QD tables.

Other A&E-related STANAGs that were ratified during the period of this report are listed in Table 5:

STANAG	Title	Ratification Date
2617 Ed 1 (ALP-16 Ed A)	Explosives Safety and Munitions Risk Management in NATO Planning, Training and Operations	10 Mar 15
4440 Ed 2 (AASTP-1 Ed B V1)	NATO Guidelines for the Storage of Military Ammunition and Explosives	9 Apr 15
4700 Ed 1 (AOP-4700 Ed A V1)	Energetic Materials Specifications for Guanylurea Dinitramide	4 Nov 15
4666 Ed 1	Assessment of Polymer Bonded Explosives – Cast-cured Compositions Using Inert or Energetic Binders	4 Jan 16
4491 Ed 2	Explosives Thermal Sensitiveness and Explosiveness Tests	4 Jan 16
2486 Ed 2 (AOP-40 Ed B V1)	Ammunition Data Sheets	11 Jan 16
4719 Ed 1 (AOP-4719 Ed A)	Energetic Materials Specification for Triethylene Glycol Dinitrate	4 Feb 16

Table 5 – A&E STANAGs Ratified From 1 January 2015 to 31 March 2016

NATO Explosives Safety Munitions Risk Management (ESMRM)

In March 2015, STANAG 2617 was promulgated as the covering document for Allied Logistics Publication-16 ESMRM in NATO Planning, Training and Operations. This work addressed gaps in NATO's operations planning process for A&E observed during multinational operations in Afghanistan. The ESMRM Panel, with strong Canadian participation, continued its work toward implementation of this NATO Tier 1 Strategic Defence Initiative. DAER will ensure Canadian implementation by working with SJS to update Canadian operational A&E safety policy and doctrine in order to bridge identified gaps.

United Nations' International Ammunition Technical Guidelines (IATG)

The IATG were developed by the UN Office of Disarmament Affairs (UNODA) to improve safety, security and efficiency in international conventional ammunition stockpile management. They are intended for use primarily by nations that do not have an existing framework. From a wider perspective, this is also the focus of the UN's effort to control illegal proliferation of ammunition and explosives by providing guidance on the management of stockpiles, which is a UN priority in its efforts to promote global A&E safety. Version 2 of the IATG was published in 2015, with Canadian input being provided through DAER's membership on the IATG Technical Review Board. The importance of the IATG and its relationship to NATO guidelines was presented by DAER to the Australian Explosives Safety Seminar (PARARI) in November 2015, on behalf of the UNODA and the NATO Ammunition Safety Group.

NATO Munitions Safety Information Analysis Centre (MSIAC)

MSIAC is a member-funded NATO project office which deals primarily with the collection, analysis and dissemination of explosives design and safety data from international sources to member nations. As a secondary function, it reserves a significant portion of its technical capacity to provide direct research and analysis support to Allied Committee 326, the NATO group of experts in the area of A&E safety. In 2014, a Canadian representative from DAER was voted Chairman of the MSIAC Strategic Planning Group and the MSIAC Steering Committee. He was re-elected for a second one-year term in 2015.

Participation in MSIAC provides the DND/CAF with direct access to MSIAC's technical support staff, its controlled libraries and associated databases. Canadian industry also has access, although to fewer documents. The explosives safety information contained in these resources would otherwise be unavailable or extremely difficult and expensive to acquire through other means. Information obtained through MSIAC is used to support A&E safety policy decisions, allowing Canada to mitigate costly and lengthy testing, particularly in relation to storage policy. In addition, software tools developed by MSIAC are used during the assessment of safety and suitability for service of A&E. More information on how to access MSIAC's resources is available through the DAER website.

Table 6 lists the technical questions that were sent to MSIAC in 2015/16. Responses to these questions will be used, amongst other purposes, to inform decisions regarding the licensing of CLSECM, reducing the environmental impact of A&E throughout the life cycle and development of safe methods for identification of UXO.

Question	Rationale
What is the basis for HD 1.1 NEQ limits for earth-covered magazines?	Information required supporting ongoing research into classification of CLSECM design.
Canada is investigating the possibility of replacing C4 plastic explosive with a PETN-based explosive, such as DM12 manufactured in Germany. Have any other nations reported accidents related to the use of PETN-based explosives?	Information required in support of investigation into an occurrence related to PETN-based plastic explosives.
Environmental and human health impact of brass flakes technology in obscurant smoke.	Information required in support of conducting an environmental assessment.
Request any data or reviewed literature relating to the integrity of aging reinforced concrete ammunition and explosives infrastructure and its ability to perform as expected.	Information required in support of the current review of A&E storage infrastructure.
Explosive ordnance disposal (EOD) of RIM-7 seeking an approved EOD routine for a RIM-7 missile in its launch canister.	Information required to fill a gap in EOD procedures.
In 1931 HW Heinrich developed a concept and illustration of injuries - the safety triangle - that is still in use today. He developed a ratio of fatal accidents, to serious accidents, to accidents and then to incidents. Having applied this theory to the reports received within the Canadian military and the Department of National Defence, these ratios seem to point to a lack of reporting. But there is also the possibility that "our industry" is sufficiently unique that our ratios should be significantly different from the theoretical findings. Has a country pursued the theory using national military data or NATO data and, if so, what were the findings?	Information required to validate results of the study.

Question	Rationale
Canada has long been pursuing a dedicated ammunition and explosives disposal capability that is compliant with environmental, safety and controlled goods requirements. DND is currently reliant on open burning/open detonation techniques and stockpiling time expired stocks. As such: which MSIAC Nations have (or do not have) a dedicated disposal and demilitarization capability; and which MSIAC nations allow (or have banned for environmental reasons) open burning and/or open detonation as an acceptable (or unacceptable) practice?	Information requested in support of a project to acquire an A&E demilitarisation and disposal capability for DND/CAF.
What deployable submersible (approximately 2 – 4 metres) technologies currently exist for non-intrusive and non-destructive investigation of complete military ammunition items, to determine whether a payload contains energetic materials or inert substitutes?	Information required in support of UXO legacy site clearance operations.

Table 6 – Questions Asked of MSIAC in 2015/16 (Paraphrased for Brevity)

A&E-Related Projects

Current practices for the storage of Hazard Division (HD) 1.3 A&E such as flares, pyrotechnics, and weapon effect simulators involve office-type cabinets, with an upper limit of 35 kg net explosives quantity (NEQ). During the reporting period DAER conducted a trial to generate safety data to determine if user-requested increases in storage limits for HD 1.3 are safe.

The scope of work included evaluating the lockers for their relative level of protection in terms of thermal flux, dynamic pressure, structural integrity, and flame pathway. In addition, the tests were designed to determine the safe separation distance between multiple lockers utilized to store typical HD 1.3 items.

The data collected demonstrated that the transfer of heat from burning of propellant[2] in Locker #1 to Locker #2 was significant but limited in duration, therefore the effects were minimal. The next phase of the trial will be to select typical pyrotechnic stores to confirm how the earlier results may apply to actual A&E and to determine if a higher storage limit may be authorized. The trial is expected to be completed by the end of 2016 with a final report expected in early 2017. Pending final results, any recommended/accepted changes will be published in the form of an A&EI pending publication amendment.

2 Gun propellant was used as it was readily available and reacts very similarly to natures that would normally be stored in this type of scenario and therefore could act as a baseline.

Canada-New Zealand-Australia-UK Multilateral Cooperation

Canada-UK-Australia Tri-lateral Discussions. While attending the Australian Explosives Safety Seminar (PARARI) in November 2015, the A&E Regulators from the United Kingdom, Canada and Australia met in several side sessions in order to discuss and compare programs. This consisted of cross-briefings on the organizational governance of A&E safety programs, including recent changes by the UK and pending changes by Australia. The trilateral discussions were invaluable in terms of comparing our Allies' challenges and developments in the area of A&E regulation and safety. The discussions will support DAER's efforts in establishing a regulatory model during the course of FY 16/17's transitional year.

Canada and New Zealand Exchange (CANZEX). The strategic aim of CANZEX is to promote cooperation and understanding between the CAF and the New Zealand Defence Force (NZDF), through:

- Promoting joint capabilities;
- Enhancing interoperability;
- Promoting combined co-operation and capability understanding;
- Facilitating skills and experience transfer; and
- Promoting team building and leadership development.

In September 2015, DAER hosted an exchange officer of the NZDF as part of a three-week exchange between the Canadian and New Zealand regulatory organizations. During the first two weeks, the exchange officer was introduced to and engaged with the many DND/CAF organizations responsible for A&E management within the National Capital Region. The final week was spent at CFB Cold Lake, observing an ammunition and explosives safety inspection and an air weapons range inspection.

In February 2016 and as part of the same exchange program, a DAER representative visited New Zealand with a focus on developing potential solutions to policy and infrastructure challenges. As the host organization was within the Royal New Zealand Air Force (RNZAF), most of the sites visited were on RNZAF bases. However, ammunition depots managed by the Army and Navy were also visited in addition to NZDF headquarters.

Terminology

Standardized terminology supports a common interpretation and understanding of policy and ensures consistency in translation. The DND and CAF therefore have a Defence Terminology Programme, which leverages expert panels to standardize and promote the use of departmental and Allied terminology. Between January 2015 and March 2016, a total of 13 terminology proposals from the Ammunition and Explosives Terminology Panel (AETP) were accepted by the Defence Terminology Standardization Board. Several of these were new definitions

required in support of A&E storage policy assigning different storage limitations to varying types of ammunition magazine. Although many proposals originated from within DAER, several were submitted to the AETP chair from the wider A&E and doctrine communities during the first quarter of 2016, indicating an increased awareness within the A&E community of the importance of proper terminology.

Capital Construction

DAER continued its engagement on ammunition facility capital construction projects through its review of siting proposals, construction details and equipment features. Table 7 lists a number of examples:

Facility	Project
CFAD Angus	Transit building – plans revisited prior to construction
CFB Petawawa	Explosives Ready Use building – 450 Squadron revisited to consider site-built as well as pre-engineered options
CFB Trenton	Initial plan for storage magazines and Transit Building – CANSOFCOM

Table 7 – A&E Related Infrastructure Projects

Policy Guidance

Policy guidance was provided to DND/CAF personnel throughout the reporting period and ranged from reviewing AERASCs for operations to advising projects on A&E storage regulations. Currently not captured within a performance metric, this function represents a critical role in support to A&E practitioners within DND/CAF.

A&E POLICY PROGRAM OF WORK FOR FY 16/17

DAODs

Work will continue to ensure sign-off and promulgation of DAODs 3002-0 and 3002-7. Subsequent DAODs will be circulated to stakeholder for review in anticipation of the approval of the 1000-series DAODs.

C-09-005 Series

A change in DND/CAF policy now requires A&E regulatory volumes to be published in separate English and French versions, complying with intranet publishing requirements. Published volumes will reflect this change in policy as they are amended.

C-09-005-001/TS-000 – Program Management and Life Cycle Safety. This manual will be updated to reflect changes to the qualification and authorization matrices and the ammunition program organization. In addition, HERO content will be removed once C-09-005-009/TS-001 and -002 are published.

C-09-005-002/TS-001 and -002 – Storage and Facility Operations. This publication will be revised based upon the promulgation of AASTP-1 - Manual of NATO Safety Guidelines for the Storage of Military Ammunition and Explosives Edition B Version 1. Changes to situations not requiring a storage licence and to storage by cadet units and training establishments are also planned and will incorporate A&EI 59.

C-09-005-005/TS-000 – Deployed Operations. This document will be updated during 2016 in order to incorporate applicable aspects of STANAG 2617 (ALP-16) and AASTP-5 Ed 1 Version 3. It will also be expanded to include joint and multinational aspects and changes recommended by L1 ATAs.

C-09-005-009/TS-001 and -002 – Hazards of Electromagnetic Radiation to Ordnance (HERO). This manual will be formatted and published in 2016. The intent is to incorporate the latest information and safety guidance, including international best practice. Additionally, QETE has reviewed other manuals with HERO content, with the aims of identifying and eliminating duplication in content and updating information.

Ammunition and Explosives Instructions

A&EI 60 – Clean Working Conditions. This document has been translated and is awaiting a translation accuracy check with promulgation expected in the fall of 2016.

Other topics for which A&EIs are in development are: operational storage limits in unit lines (primarily for Search and Rescue), designated smoking areas, battery charging and revision to the temporary storage policy.

A&E Related Projects

Table 8 lists safety-related projects that have been identified to DAER. Recognizing its regulatory role, the intent is to identify a lead L1 organization with functional authority and re-assign accordingly.

Project	Initiated By
The next phase of the HD1.3 Trial will select typical pyrotechnics to confirm earlier results and determine if a higher storage limit may be authorized	L1 organizations
Determine whether the civilian industry standards for non-sparking tools are acceptable for military use, or if there is a requirement to develop a military standard	DAER through compliance activities; transferred to DAEME.
Evaluate whether volatile vapours or airborne particulates are present and are a hazard in A&E facilities	DAER as part of ongoing work to modernise electrical standards
Determine the operational climatic environmental conditions for explosives containment vessels	L1 organizations
Evaluate suitability of in-service A&E containers to safely store search and rescue items on aircraft	RCAF through compliance activity

Project	Initiated By
Establish a test method for assessing the largest allowable quantity of explosives to be used in A&E laboratory work areas	DAER as part of work to update QD tables
Identify a suitable igniter to replace the "explosive countercharge method" for disposal of malfunctioned pyrotechnics	CA as part of work to identify environmentally friendly alternatives to current techniques

Table 8 – Planned A&E Projects for 2016/2017

United Nations' International Ammunition Technical Guidelines (IATG)

In keeping with UN SaferGuard Programme for knowledge resource management on the IATG in accordance with the United Nations General Assembly Resolution 68/52, the main objective of the UN IATG Technical Review Board (TRB) and Strategic Coordination Group (SCG) meeting is to continue the ongoing dialogue on projects and practices related to physical security and stockpile management of A&E. In addition the TRB and SCG promote the implementation of the IATG with a view to enhancing coordination and synergies and improving the review of the IATG through feedback from partners. A DAER representative will attend the next meeting of the Technical Review Board and Strategic Coordination Group scheduled for Dec 2016.

NATO Munitions Safety Information Analysis Centre (MSIAC)

The current memorandum of understanding (MOU) covering MSIAC is 25 years old (1991). Participants in the program, prompted by the US, agreed that a revised document is required. The US Navy International Programs Office is currently working on a draft of an updated MOU with the intent to have a pre-approval copy out for national review by representatives in early 2017.

MSIAC aims to hold one of the two annual meetings at participating nations. This allows nations to showcase A&E facilities and capabilities as well as encourage international cooperation. The November 2016 meeting of the MSIAC Steering Committee will be held in the city of Québec. DAER will act as facilitator and coordinate a visit to the Defence Research and Development Canada centre at Valcartier.

International Cooperation

Following the tri-partite discussions held at PARARI, the A&E regulators of Canada, the United Kingdom and Australia agreed to maintain closer ties: secretarially through e-mail and video conferencing; and by meeting regularly in conjunction with other meetings, including PARARI, the DDESB Seminar, NATO meetings, and MSIAC Steering Committee meetings.

Canada-New Zealand Cooperation

Contact between the A&E regulators of DND/CAF and the NZDF is expected to continue, particularly as the NZDF works towards creating of a tri-service regulator for explosives similar to the DND/CAF model. In addition, the CAF may be able to benefit from NZDF expertise as the RCAF continues to invest in the Air Weapons Systems Technician occupation.

A&E POLICY SUMMARY

As a result of changes to DND/CAF publication policies, termination of the formatting services previously contracted through DSCO, and lengthy internal review processes, DAER's finalization of A&E policy renewal has not progressed as quickly as intended during 2015/16.

Although the current state of policy documents is a stark improvement over that which existed when DAER was first stood up, work remains to finish the volumes necessary to complete the update of the A&E Safety Manual. Many of these documents are being developed in collaboration with subject matter expertise outside DAER. In FY 16/17, the focus will primarily be on completing the modernization program as well as maintaining and updating existing publications.

Picture of projectiles found in a former disposal site on 7 August 2015 during preparations for a construction project.

Section 4

Ammunition and Explosives Safety Advocacy and Analysis

INTRODUCTION

Staffing levels within DAER 3 impacted DAER's ability to establish an effective and efficient outreach program and limited the effectiveness of the Ammunition and Explosives Safety Program.

The Advocacy and Analysis 2015-2016 Program of Work focused mainly on the following issues:

- Analysis of A&E accidents and incidents within the reporting period;
- Continued collaboration with Assistant Deputy Minister (Information Management) (ADM(IM)) project staff to develop the Safety Information Management System (SIMS) module for the reporting of hazardous occurrences involving A&E; and
- Collaboration with ADM(Mat) on developing the storyboards for a training package for all user roles in relation to the A&E SIMS module.

SAFETY ADVOCACY AND ANALYSIS PROGRAM ACTIVITIES FROM 1 JANUARY 2015 – 31 MARCH 2016

Policy

DAODs 3002-3 and 3002-4. In 2015 the periodic review of DAOD 3002-3 (Ammunition and Explosives Safety Program) and DAOD 3002-4 (Ammunition or Explosives Accident, Incident, Defect or

Malfunction Reporting), as well as the safety manual A-GG-040-006/AG-001 (DND/CAF Ammunition and Explosives Safety Program) were held in abeyance contingent upon the release of:

- DAOD 1000-8 Policy Framework for Safety and Security Management; and
- DAOD 3002-7 Ammunition and Explosives Risk Management.

Promulgation of DAOD 3002-7 is expected by the fall of 2016; allowing for the resumption of policy review as it pertains to the administrative order and directive of the AESP.

Terminology

In 2013, DAER requested a revision of the terms "accident" and "incident" as defined in DAODs 3002-3 and 3002-4[1]. The terms, as currently defined, are considered overly restrictive and do not take into account occurrences wherein A&E functioned as designed, or occurrences wherein A&E were involved but did not function[2]. Since A&E function as designed in over 80% of all occurrences within the context of the AESP, existing definitions tend to skew results by essentially removing a large portion of accidents/incidents that should have been reported. The definitions forwarded for approval by the Defence Terminology Standardization Board in 2013 are as follows:

- Ammunition accident: "Any undesired event involving ammunition or explosives that results in injury, death, damage to the environment or materiel loss, excluding theft"; and
- Ammunition incident: "Any undesired event involving ammunition or explosives that could have resulted in injury, death, damage to the environment or materiel loss".

The following definition was adopted on 23 March 2016 and included in the Defence Terminology Bank as record # 694257: "hazardous occurrence: *an event or series of events that results, or has the potential to result, in injury, illness or death, or damage to materiel, real property, immovables or the environment, regardless of the severity of the injury, illness or damage*"[3]. These three definitions will be adopted and reflected in DAODs 3002-3 and 3002-4 once DAODs 1000-8 and 3002-7 are approved[4].

1 Ammunition and Explosives Terminology Panel submissions number 2013-4035 / 2013-4036.

2 Present DAOD definitions refer to the "premature or unintended detonation of A&E".

3 The definition was the result of a proposal from the Hazardous Occurrence Investigation and Reporting Working Group from the DND/CAF Occupational Health and Safety Advisory Council.

4 There is also the possibility DAER may opt to use existing DTB definitions of "accident", record number 41507, "An unintended event or sequence of events that causes death, injury, environmental or material damage" and "incident", record number 41803, "Unexpected event which degrades safety and increases the probability of an accident" in the DAODs along with wording such as "accidents involving A&E" or "incidents involving A&E", to clarify which ones the policy applies to.

A&E Safety Related Training – Development of Courses

Unit Ammunition Representative (UAR) and Unit Explosives Safety Officer (UESO) Training. As reported in previous annual reports, DAER has been working with various organizations within the Chief Military Personnel (CMP) since 2008[5] to develop and deliver distributed learning-based (DL-based) courses to bridge the current knowledge gap of trained, qualified and authorized UARs and UESOs across the DND/CAF. As unit-level subject matter experts (SMEs), UARs and UESOs play a critical role in establishing a safe A&E working environment through a healthy and functional AESP.

The last classroom-based UAR course was delivered in January 2014 and the first completely DL-based UAR course was delivered in September 2014. Delivery of the course was subsequently suspended by CFLTC in October of that year as it was felt that the DL package did not adequately meet the requirements of the qualification standard. In the spring of 2015, CFLTC offered a revised UAR course, combining a modified DL-based course with an on-job performance record (OJPR) package. Following feedback provided by the community, CFLTC modified the standard and amended the course by dispensing with the OJPR. A final version of the DL-based UAR course was made available in April of 2016. The UESO course should be made available in May of 2016; bridging the knowledge gap in trained and qualified UESOs.

Following delivery of the UESO training, a DAER-issued ammunition and explosives instruction (A&EI) will be released highlighting the requirement for the UAR and UESO qualifications as prerequisites for units to be issued A&E across the department.

L1 Ammunition Technical Authority (ATA) Training. A half-day training package for newly appointed L1 ATAs has been developed and covers: the importance of safety; elements required in an A&E safety program; how to investigate an occurrence; and how to conduct trend analysis. This addition to the A&E training continuum will further strengthen the DND/CAF AESPs at the Command and Group level.

Educational and Promotional Products

There were no new promotional materials or training DVDs released in support of the AESP for the period 2015-2016. Safety related issues were communicated via the Defence Information Network (DIN), the most prominent product being a Bulletin on the dangers of inappropriately controlled C13 hand grenades (Figure 2). DAER also continued to support the Defence Occupational Health and Safety Digest with articles, and intra-unit A&E safety training through the vignettes (topical safety presentations) distributed through the DAER DIN site and DNDLearn.

5 CDA 1969-1 (SSO LCE) LCE Project Charter DAER/CFSAL Basic Explosive Safety Training, dated 28 September 2008, is the original document that initiated the development process. The project was cancelled and the task was transferred to the formations in 2010; resulting in a CFSTG tasking to CFLTC.

AMMUNITION & EXPLOSIVES SAFETY PROGRAM

PROGRAMME DE SÉCURITÉ DES MUNITIONS ET EXPLOSIFS

Ammunition and Explosives Safety Bulletin 01/2015 (Amended)

C13 Grenade Hand Fragmentation

Picture of a C13 grenade with a confidence clip, provided by Mr. Norm King from Director Ammunition and Explosives Management and Engineering

Since DAER started tracking occurrences in 2006, live C13 HE grenades have been left uncontrolled in various circumstances, found in salvage returns, and deposited into amnesty boxes - five in 2014 alone.

Each event represents unecessary safety risks: a risk to the population in general, a risk to fellow soldiers, a risk to aircrew, or a risk to support personnel such as supply technicians handling materiel, and technicians emptying amnesty boxes or taking care of salvage.

These grenades are self-contained weapons and are subject to specific controls. When preparing for training activities or operational deployments, remind leaders and users of the risks attached to those items and of their responsibilities. Put measures in place on ranges and at unit level to ensure safe and secure use and to avoid becoming a statistic.

If for whatever reason grenades need to be returned, contact your ammunition support facility.

National Defence Défense nationale

Released by the Director Ammunition and Explosives Regulation (DAER) - June 2015

Canada

Figure 2 - DAER Safety Bulletin 1/2015

Communications

DAER Intranet Site on the DIN. The DAER DIN site continues to serve as the central communications portal for the AESP. During the period covered by the report, the contents of the various pages were reviewed to ensure up-to-date information was available to the community. DAER's main efforts were focused on reflecting the transition of the Materiel J4 Ammunition to the new Strategic J4 Ammunition as well as implementing the Government of Canada's new Web 2.0 standard. With a requirement to have all web posted documents represented in separate English/French documents (vice the previous bilingual side-by-side format) by mid-summer 2016, publications not able to be reformatted in time will only be available, as an interim measure, through the electronic publications site from Director Supply Chain Operations (DSCO).

DAER Shared Workspace. The DAER Shared Workspace provides the A&E community with another means to exchange information. In the latest reporting period, the Storage Approval page was amended to include copies of all approved licences, along with numerous new spreadsheets to assist users in preparing licences and waivers.

Electronic Tools

Safety Information Management System (SIMS). The development of the Ammunition and Explosives Safety Information Management System (AESIMS) has been a difficult and laborious process dating back to DAER's first annual report, covering the years 2007 and 2008. In 2011, the following five of eleven requirements of AESIMS were selected for development by the Information Management Group (IM Group) in concert with required updates to the Flight Safety Occurrence Management System (FSOMS):

- Hazardous Occurrences Reporting;
- Defects and Malfunctions Reporting;
- A&E Safety Inspections and Surveys;
- A&E Licensing and Storage, including waivers; and
- Risk Management.

The desired end-state is to provide a common corporate solution under the Safety Information Management System (SIMS). The Business Process Mapping and the Business Requirements Document were completed with development initiated in the summer of 2012.

The development of the first two requirements under a single module took more time than originally scheduled and User Acceptance Trials were pushed to February 2016. Notwithstanding, successful roll-out of Release 1 is predicated on the development of a training package through ADM(Mat)'s Director Materiel Group Management Coordination (DMGMC) and corporate implementation of Microsoft Internet Explorer 11 (IE 11).

Release 1 of the first module is expected to be rolled out to the A&E community by mid-summer 2016 at the earliest. SIMS will greatly contribute towards DND/CAF's ability to accurately report on and monitor hazardous occurrences and defects and malfunctions. Following the roll-out of Release 1 and follow-on development of the remaining three requirements, ADM(Mat) anticipates closing out a long-standing 2005 CRS Evaluation Management Action Plan[6].

SUMMARY OF 2015 ACCIDENT AND INCIDENT ANALYSIS

Statistics

A detailed analysis for 2015 is attached as Annex C. Along with the analysis is a summary of accidents and incidents, which is intended to promote dialogue down to the unit level and to illustrate the potential seriousness of any incident or accident involving A&E. Figures 3 and 4 provide a trend analysis for reported occurrences (accidents and incidents) and deaths and injuries over the period 2010-2015.

6 MAP Item 6.3 (AERMS Item 9.1) of the DND/CF Ammunition Safety Program 1258-101-2 (CRS).

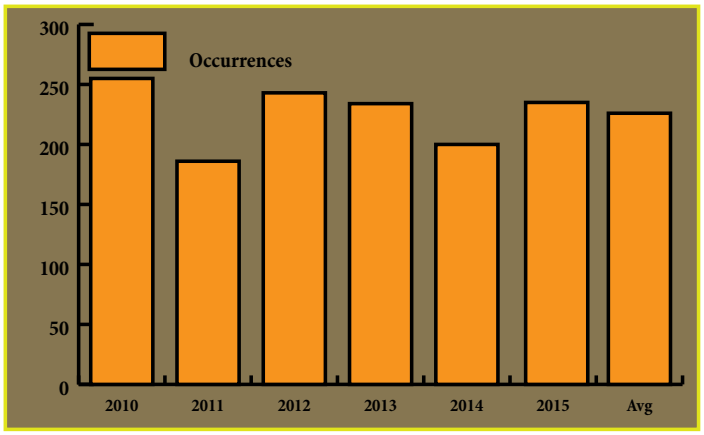


Figure 3 - Occurrences 2010-2015

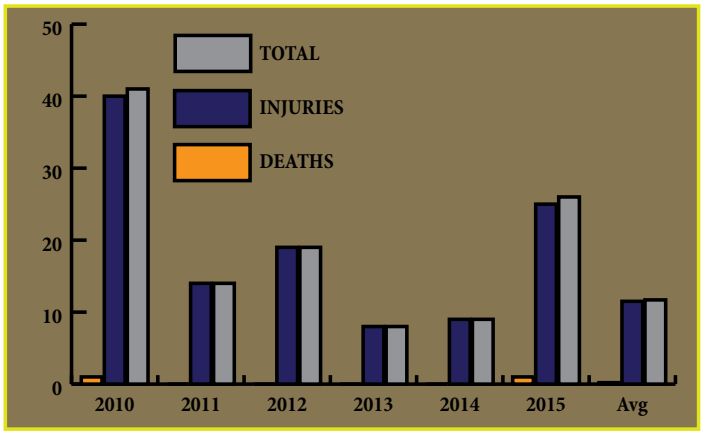


Figure 4 - Deaths and Injuries 2010-2015

Analysis

Based on the historical averages and the detailed analysis at Annex C, the following points are worthy of note:

- In the vast majority of reported cases, the ammunition or explosives worked as designed. There was one injury due to an ammunition fault: while igniting a smoke pot one member received minor burns on one hand. The two principal ammunition faults reported in 2014 – case-neck separation of 20mm and failure/partial failure to eject aircraft flares – continued to occur into 2015. The manufacturing processes behind the faults have been identified. Manufacturing defects were also reported concerning 5.56mm, Marine Location Marker (missing crimp), and an Evolved Sea Sparrow Missile (ESSM);

- A number of incidents were reported exclusively through the defects and malfunctions reporting process. There is a requirement to re-emphasise the use of the process for reporting accidents and incidents (in addition to the CF 410 – Ammunition and Explosives Defect and Malfunction Report);

- Common user natures, as well as natures frequently used by the operating environments, continue to be involved in a high percentage (70%) of reported incidents and accidents. Out of a total of 64 accidents, 50 were associated with common user natures, causing 22 of the 25 injuries and one death. This rate is in line with past reporting;

- Most occurrences (69%) are attributable to human error;

- Deliberate deviations from procedures caused 9% of occurrences (11% in 2014, 9% in 2013), resulting in seven injuries. The deliberate deviations were broken down as follows: RCN (1), CMP (1), RCAF (8) and CA (11). The number of accidents and incidents categorized as deliberate deviations, and the nature thereof, tend to suggest more emphasis on the AESP is required;

- Within the RCN and RCAF, reporting is well engrained. CA reporting requires improvement: six out of seven unreported A&E occurrences, including one death and 10 injuries, that were gleaned from General Safety Program (GSP) records, occurred in CA units;

- Thre is concern over the number of incidents/accidents that occur once ammunition has been used: live A&E found in salvage and scrap returns, inappropriate disposal of A&E, A&E found post kit/vehicle clearances – all indicate a need for closer supervision and a greater general awareness of safety;

- Improvement was noted in reporting from CFB Borden. Meaford is reported against the CA since annual inspections and occurrence reporting are done by the latter. However, Meaford falls under CFB Borden within the Human Resources Management System (HRMS). This discrepancy should be addressed through a Service Level Agreement or similar agreement; and

- Improvement was noted in reporting from CANSOFCOM.

Lessons Learned

There is a requirement to strengthen the unit control of ammunition and ammunition processes, particularly in CA units where ammunition is more readily available and more widely distributed. Greater diligence during post exercise clean-up and declaration procedures would reduce risk to personnel conducting post-firing range sweeps, personnel transporting ammunition and ammunition salvage from ranges, and technicians taking and processing the returns. It would also reduce finds of stray ammunition.

Recommendations

A change in reporting ethos is required within many CA units. Robust outreach/education programs should be pursued to increase individual and unit awareness of A&E safety.

As in previous years, a number of accidents were reported through the General Safety Program (injuries or death) and not to the AESP. Current policy requiring reporting under multiple safety systems is clearly an issue that warrants attention at the

corporate level. A single common reporting tool with appropriate annexes or components for each specific program, such as SIMS, could help resolve this issue.

SUMMARY OF 2015 ACCIDENTAL DISCHARGES

Statistics

This is the fifth year accidental small arm weapon discharges (ASAWDs) have been reported separately from other incidents, following the promulgation of A&EI 30 in 2010. The decision to report ASAWDs separately was made in order to avoid skewing the data when comparing incidents from year to year.

In 2015, see Figure 5, DAER received a total of 25 ASAWD Reports broken down as follows:

- Pistol: no occurrence, or 0.0 %;
- Rifles/Carbines: 23 occurrences, or 92.0%; and
- Machine Gun: two occurrences, or 8.0%.

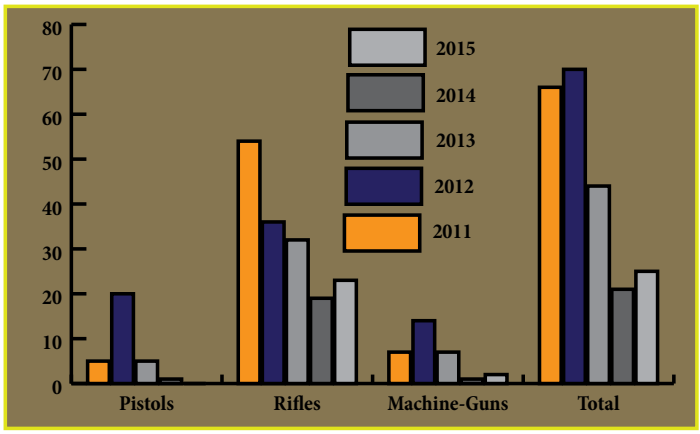


Figure 5 - Comparison of First Five Years of Reporting

Observations

Although the number of reports received is too low for valid statistical analyses, the majority involved weapon handling drills not being properly followed.

When comparing the limited number of ASAWD reports to the 107 negligent discharge summary trials of FY 14/15[7], it is apparent that the DND/CAF reporting culture remains a challenge within the context of the AESP.

Future Reporting

With the roll-out of the first module of SIMS, there will be a component that will allow for the reporting by UESOs of accidental discharges. Combined with the UESO training, it is hoped there will be a considerable increase in reporting, leading to a better corporate understanding of potential safety concerns.

7 Annual Report of the Judge Advocate General, A Report to the Minister of National Defence on the Administration of Military Justice from 1 April 2014 to 31 March 2015, Cat. No. D1-16E-PDF, ISSN 1497-7192.

L1 AMMUNITION TECHNICAL AUTHORITIES (ATAs)

Function of L1 ATAs

The L1 ATA performs a key function within environmental commands, operational commands, and L1 organizations and is central to ensuring due diligence under DND/CAF's exemption under the Explosives Act and in accordance with the DAOD 3002 series. On behalf of his respective L1, the incumbent is responsible for all safety, security, and other matters related to A&E located on DND/CAF establishments and while being transported or used, in training or operations, at home or abroad. The ATA is the recognized SME and primary point of contact (POC)/advisor for coordination of all things ammunition-based within the L1 organization. The L1 ATA network is structured and leveraged by DAER not only to ensure policy and regulatory compliance within the L1 organization, but also to achieve a central point of coordination amongst all L1s for synergy of effort. This network is central to efficient and effective delivery of ammunition oversight within the department. As stipulated within the C-09-005-001/TS-000 – Ammunition and Explosives Safety Manual, Volume 1, Program Management and Life Cycle Safety, one of the responsibilities of L1 ATAs is to:

"Develop, implement, monitor and evaluate an Ammunition and Explosives Safety Program within the Command, which fosters best safety practices in all aspects of A&E management"

Status of L1 ATAs

While some L1s have permanent, fully qualified L1 ATAs to support and advise the L1 advisor on A&E, others rely on Service Level Agreements (SLA) to secure the required support. Table 9 provides a list of ATAs by L1, comparing what had previously been reported to DAER in 2012 to what currently exists at the end of March 2016. As can be seen, there has been a marked improvement since last reported.

#	Level 1, Command or Entity	Qualified L1 ATA in 2012	Qualified L1 ATA in 2016
1	VCDS	No	SLA
2	SJS	No	No
3	ADM(Pol)	No	SLA
4	ADM(Mat)	Yes	Yes
5	RCN	Yes	Yes
6	CA	Yes	Yes
7	RCAF	Yes	Yes
8	CJOC	Yes	Yes
9	CMP	No	SLA
10	CANSOFCOM	Yes	Yes
11	CFINTCOM	No	SLA
12	ADM(Fin)/CFO	N/A	N/A
13	ADM(IE)	No	Yes
14	ADM(HR Civ)	N/A	N/A

#	Level 1, Command or Entity	Qualified L1 ATA in 2012	Qualified L1 ATA in 2016
15	ADM(IM)	No	SLA
16	ADM(S&T)	No	SLA
17	ADM(RS)	N/A	N/A
18	JAG	N/A	N/A
19	DND/CFLA	N/A	N/A
20	ADM(PA)	N/A	N/A
21	Corp Sec	N/A	N/A
	Total	6/14	13/14

Table 9 - List of L1 ATAs

With the exception of ADM(IE), where the position is held by a civilian, current positions for qualified L1 ATAs are at the major/lieutenant-commander rank. Recognizing the progress made, there will be a requirement in the upcoming reporting period to review and update the respective SLAs.

Need for Increased Awareness of the L1 ATA Network

2015-2016 Defence Occupational Health and Safety (OHS) Annual Report. Within the context of preparing the Defence OHS Annual Report, it was noted that many OHS representatives and members within L1 organizations are unfamiliar with the role and responsibilities of their respective L1 ATAs. Consequently, several L1 organizations did not submit their L1 AESP assessment to the Defence Secretariat in the preparation of the Defence OHS Annual Report. As a result, the assessment of the AESP within the department is incomplete and may be inaccurate. The production process of the Defence OHS Annual Report is continually evolving with support and input from functional authorities.

Future Developments

In an effort to increase L1 ATA as well as AESP visibility, DAER will develop a communications strategy and plan.

A&E SAFETY ADVOCACY AND ANALYSIS PROGRAM OF WORK FOR FY 16/17

Policy

DAODs and A-GG-040 Series. Following approval of the DAODs 1000-8 and 3002-7, the DAODs related to the AESP and the related A-GG-040 series manuals will be updated and circulated to L1 ATAs for final stakeholder review prior to publication in 2016.

Establishment of a Performance Measurement Strategy. A performance measurement strategy, aligned with Treasury Board guidelines[8], will be designed to better manage the AESP at a national level.

Development of Courses

UESO. DAER will continue to work with and support Strategic J4 Ammunition and CFLTC to deliver the UESO course and resolve potential issues that could impact production of the DL packages.

L1 ATA Training. DAER will continue to support Strategic J4 Ammunition in further developing the L1 ATA training package for newly appointed individuals.

Communication

E-Business Environment. As processes for the Intranet, Shared Workspaces and DNDLearn tools mature, options for secure and Internet sites will be investigated to support community members dealing with classified information, or those, such as contractors, who do not have access to the DIN.

Annual Symposium. The intent is to continue organizing one major safety symposium per year for ammunition practitioner communities.

AESP Communications Plan. An AESP Communications Strategy and implementation plan will be developed to increase corporate awareness and contribute towards a safer A&E environment.

Educational and Promotional Products. Educational and promotional products will be made available to L1 organizations for use in activities promoting the AESP.

Electronic Solutions

SIMS. The bulk of the work in 2016 and 2017 will concentrate on the roll-out of the first module, including the development of a training package, and the development of the remaining modules of SIMS.

HORIZON 2 PROGRAM OF WORK

A number of issues are being considered:

- Mapping A&E Positions to Qualifications to Courses. To ensure personnel are qualified, and in support of succession plans and training budgets, A&E positions will be linked to qualifications and courses. This mapping will assist in determining priorities and facilitate AESP compliance activities across the department, ensuring currency and early identification of potential issues;

- L1 ATA Delegation of Authorities. To ensure qualified personnel occupy key L1 ATA positions within L1 organizations and as the functional authority, DAER will review the qualifications of all candidates prior to

8 Government of Canada Treasury Board Centre of Excellence for Evaluation manual "Supporting Effective Evaluations: A Guide to Developing Performance Measurement Strategies", available at http://www.tbs-sct.gc.ca/hgw-cgf/oversight-surveillance/ae-ve/cee/dpms-esmr/dpms-esmrtb-eng.asp

their appointment as an ATA. L1s will receive a letter delegating authorities to the ATAs;

- Hazardous Occurrences Investigation Course. Following the delivery of the UESO DL package, the intent is to develop a training curriculum for the investigation of hazardous occurrences;

- AESP Awards Program. This important initiative will be used to recognize deserving individuals; and

- Development of an Investigation Capability for Remote Locations. While most bases have the ability to investigate occurrences located within their geographical locations, there are many small units that can be considered as isolated. Hazardous occurrences investigations in those locations would require particular support arrangements within a deployable capability.

A&E SAFETY ADVOCACY AND ANALYSIS SUMMARY

The period 1 January 2015 to 31 March 2016 can be summarized as follows:

- Approvals of DAODs 1000-8 and 3002-7 is a prerequisite to the release of updated AESP DAODs and related policy manuals;

- There is a requirement to further strengthen the reporting culture within the DND/CAF;

- All L1s are supported by fully qualified L1 ATAs;

- Roll-out of the DL versions of the UESO course will close the current gap in qualified A&E personnel and support safer unit operations; and

- Roll-out of the SIMS module will modernize reporting methods, facilitate accurate reporting and trend analysis, and more effectively communicate potential safety issues.

A light armoured vehicle is designated as damaged using green smoke during a simulated compound assault and rescue mission as a part of Exercise RAFALE BLANCHE in Valcartier, Quebec on February 6, 2016.

Section 5

Way Forward

MEASURING CORPORATE AMMUNITION AND EXPLOSIVES SAFETY

When the Director Ammunition and Explosives Regulation (DAER) was initially formed in 2006, it faced the daunting challenges normally associated with the creation of an entirely new organization. With its initial efforts focused on establishing an independent regulatory structure, DAER also recognized the pressing need to: update, clarify and promulgate ammunition and explosives (A&E) safety policies; revitalize the Ammunition and Explosives Safety Program (AESP); develop a system for timely reporting and analysis; and initiate a process to monitor compliance. These critical components of the organization's mandate were successfully implemented within the first five years of its creation and greatly improved the department's ability to self-regulate considering its exemption from the *Explosives Act*.

Through development of tools such as the Ammunition and Explosives Safety Survey (AESS), DAER is able to assess the department's compliance with established safety policies. Recognizing that personnel interaction with A&E primarily occurs during inventory management and in-service use, DAER deliberately focused its attention on conducting 100% compliance verification of A&E activities within those areas.

Now with the AESS firmly established within the department and with the advent of the Ammunition Program Study/Restructure (APR), there is a requirement to push for continuous improvement by ensuring all nine elements of the APR are considered within the context of a compliance verification model. Through continued monitoring of what has already been achieved and by expanding the scope of the AESS, DAER hopes to introduce a structured compliance verification program for corporate A&E enablers such as infrastructure and personnel training and qualifications.

Similarly, models will also be considered for the AESP covering explosives safety training, outreach, data collection, data analysis and interpretation, as well as the processes governing A&E Policy review. These coordinated efforts will instill additional rigour to DAER's concept of operations and will increase its efficiency in delivering its mandate.

With corporate-wide cyclical models firmly in place by the end of fiscal year 17/18, benefits to the department will include: facilitated reporting and trend analysis; better decision-making capability; and better corporate explosives safety awareness leading to the institutionalization of an A&E safety culture within the department. Building on the success of the past, these initiatives will establish a robust, repeatable, predictable, and measurable regulatory framework within the department and will only add to the department's already established A&E safety record.

APR-driven organizational changes must also be considered and incorporated into the compliance capability framework. Future reports will therefore need to reflect the advent of the Strategic J4 Ammunition residing within the Strategic Joint Staff; possibly requiring the definition of new performance metrics and assessment criteria.

Finally, while recognizing the advantages that were associated with portraying the status of A&E safety within DND/CAF through Treasury Board's MAF, DAER will focus some effort towards developing measurable departmental performance metrics that accurately address all elements of the established ammunition program.

Search and Rescue technician, Master Corporal Gregory Hudson arms a marker location marine C2A2, onboard a CC-130 Hercules aircraft while flying over the Atlantic Ocean during a training exercise on January 22, 2016.

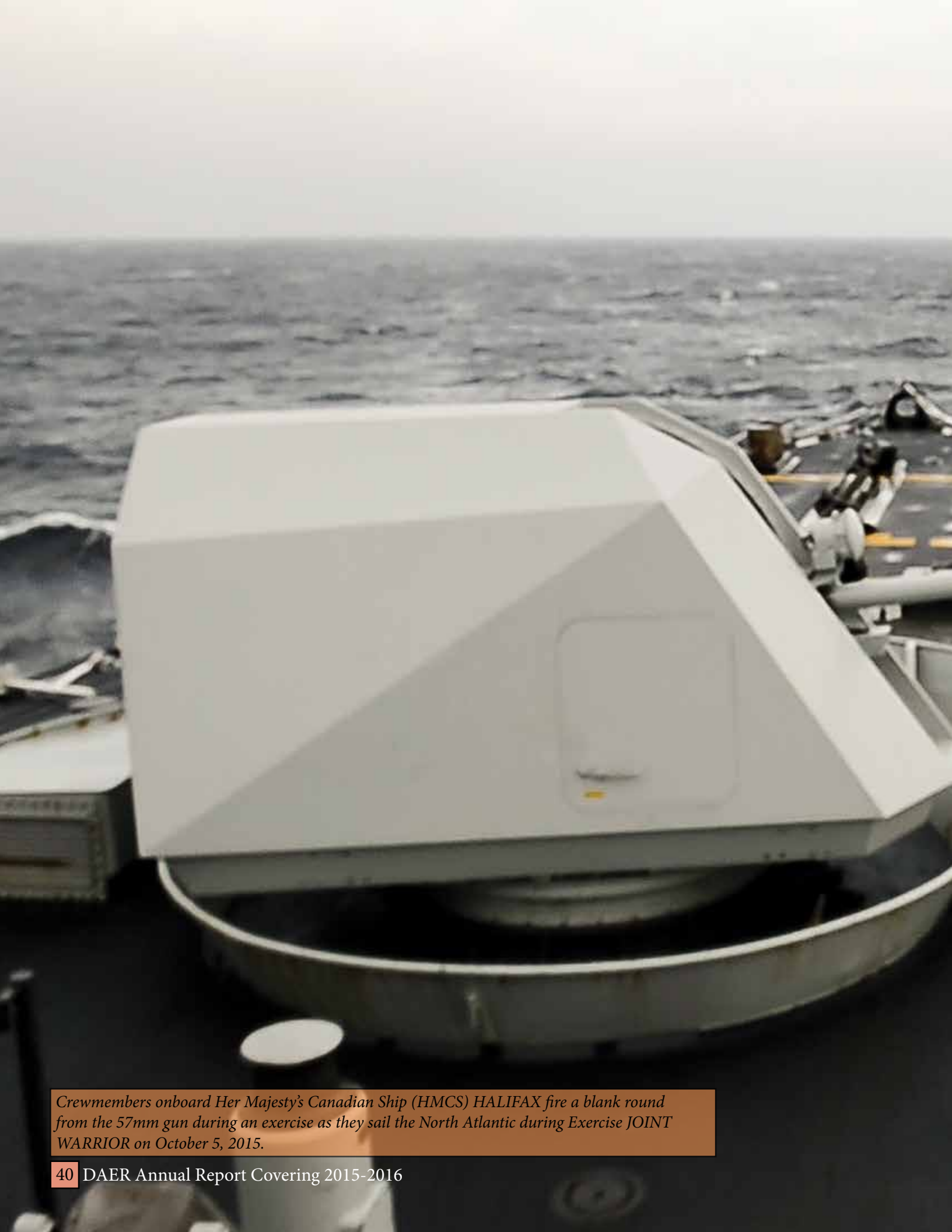
Section 6

Conclusion

Ten years after the creation of an independent safety regulator for ammunition and explosives, several initiatives designed to strengthen the regulatory framework and decrease the risk to the Department have become institutionalized. The complete re-write of safety related policy documentation is nearing completion, modern program tools such as the Ammunition and Explosives Risk Assessment Safety Case have been fielded, implementation of the Ammunition and Explosives Safety Information Management System is just around the corner, and the compliance verification program using the Ammunition and Explosives Safety Survey has helped strengthen the ammunition program.

Through successful implementation of the Ammunition and Explosives Safety Survey, the department has steadily improved its Ammunition and Explosives Safety Program and has witnessed a gradual trending of the Ammunition and Explosives Safety Survey elements for each Level 1. By establishing and maintaining clear policies and through a rigorous corporate compliance verification program, the department is demonstrating its commitment towards continued improvement and ammunition and explosives safety.

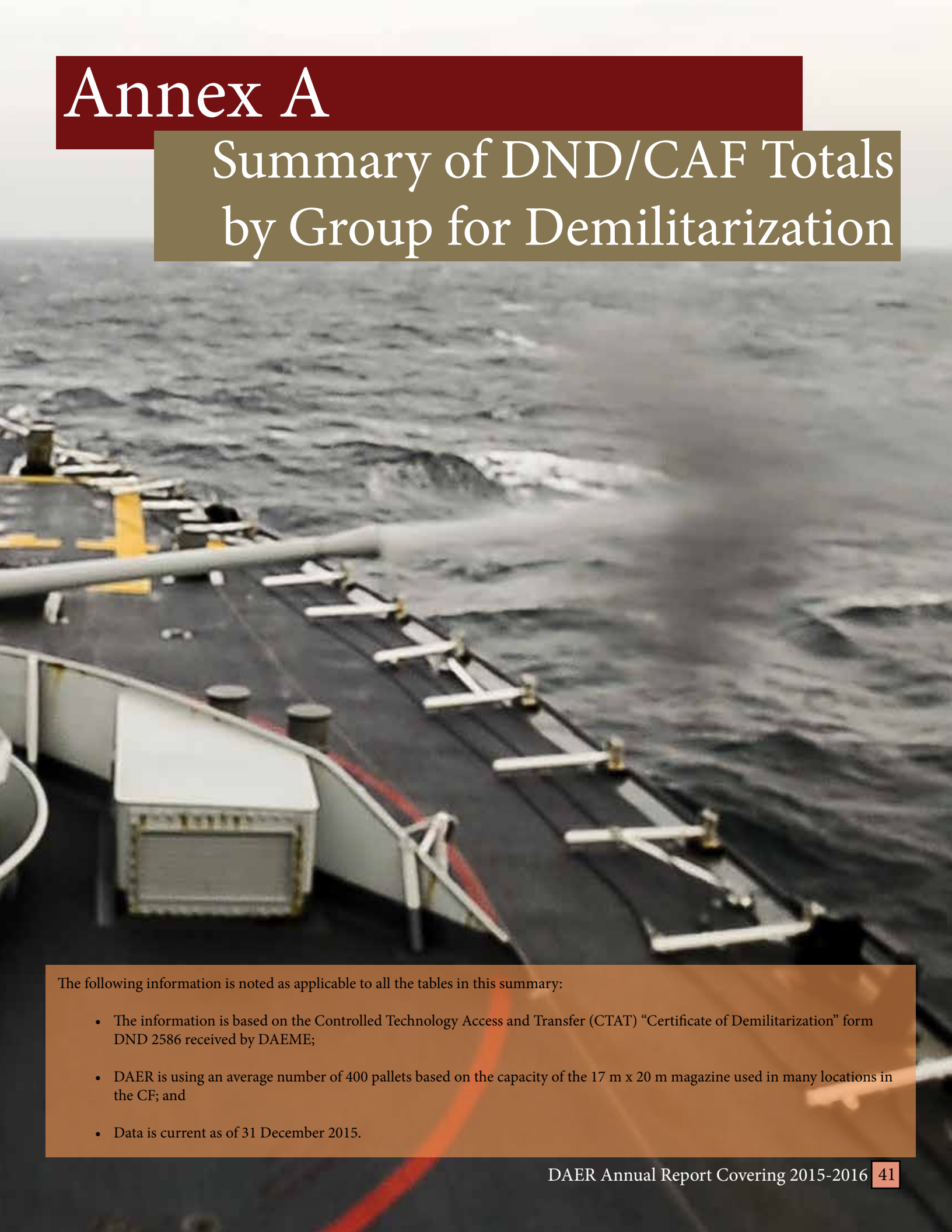
The next two reporting periods will represent a transitional period while the Director Ammunition and Explosives Regulation works with Level 1 Ammunition Technical Authorities towards establishing a comprehensive cyclical regulatory model that will consider compliance verification over all elements of the Ammunition Program. Through increased ammunition and explosives safety awareness, it is believed this initiative will also improve the ammunition and explosives culture across the department.



Crewmembers onboard Her Majesty's Canadian Ship (HMCS) HALIFAX fire a blank round from the 57mm gun during an exercise as they sail the North Atlantic during Exercise JOINT WARRIOR on October 5, 2015.

Annex A

Summary of DND/CAF Totals by Group for Demilitarization



The following information is noted as applicable to all the tables in this summary:

- The information is based on the Controlled Technology Access and Transfer (CTAT) "Certificate of Demilitarization" form DND 2586 received by DAEME;
- DAER is using an average number of 400 pallets based on the capacity of the 17 m x 20 m magazine used in many locations in the CF; and
- Data is current as of 31 December 2015.

TABLE 1 - A&E PENDING DEMILITARIZATION OR DESTRUCTION

Table 1 summarizes the totals of A&E awaiting demilitarization or destruction.

Item	Group	Grouped Munitions Types Totals	Current	Total	Total	Total	Total	Remarks
		Munitions Type	Quantity	Weight kg	Weight Ton	Pallets	Maga-zines	
1	A	Small Arms Ammunition (SAA) up to and including 50 Cal	9,118,161	658,827	658	414	1.04	Must be incinerated
2	B	20mm through 24mm	390,859	33,745	34	14	.01	Must be incinerated
3	C	25mm Through 40mm	437	8.6	0.009	11	0.03	Must be incinerated
4	D	40mm Naval Through 104mm	16,183	32,758	32.8	71.6	0.179	84mm HEAT/HEDP for demilitarization, 76mm projectiles HE, Warheads 2.75 inch HE for EOD Training
5	E	105mm Through 155mm (Less 120mm and 155mm HE)	6,346	16800	16.8	361	0.09	105mm Tank
6	F	120mm HE and 155mm HE	1	15	0.02	1	0.000	
7	G	AC Bombs	0	0	0	0	0	
8	H	Propellant	20,926	21,278	21.8	68	0.17	Recovery from ranges and workshop operations
9	I	Cartridge Actuated Devices (CADs) Propellant Actuated Devices (PADs)	469,963	37,259	37.3	105	0.26	Must be incinerated
10	J	Demolition Material	855	649	0.65	4	0.00	
11	K	Fuzes, Primers and Tracers	88,755	16200	16.2	21	0.05	Must be incinerated
12	L	Grenades	647	1132	1.1	1	0.000	Frag Grenades without fuzes going to be utilize for EOD Training
13	M	Rocket Motors	95,277	362,227	363.2	1240	3.1	Eryx launch & flight motors recovered from workshop operations and CRV 7 pending approval, demilitarization by service contract
14	N	Missiles and Rockets	469	898	.9	2	0.01	66mm warheads for EOD Training
15	O	All Pyrotechnics	257,542	93,702	93.7	235	0.59	Must be incinerated
16	P	Decoy Devices	8940	6906	6.9	9	0.02	Must be incinerated
17	Q	Naval Ordnance	0	0	0	0	0	
18	R	White and Red Phosphorous (WP/RP) and CS Irritant	73,789	189,317	189.3	147	0.30	Must be incinerated
19	S	Mines	0	0	0	0	0	
20	T	Battery Components	0	0	0	0	0	
21	U	Munition Scrap (Range and Workshop operations) in kg		3,593,072	3593	2695	6.73	Must be thermally treated and mutilated
22	V	Not assigned						
23	W	Inert Training (Dummy and Display)	42,540	18032.9	18.3	35	0.09	Pending mutilation
24	X	Aids to Production - Repack material	21,382	23,983	24	318	0.8	Pending mutilation
25	Y	Spent Brass and Steel Cartridges	9,390	13,350	13.4	78	0.2	Pending mutilation
26	Z	Salvage (links, launch Tubes)						
		Totals	**10,622,462**	**5,120,160**	**5121.2**	**5830.6**	**14.58**	

TABLE 2 - A&E AWAITING DISPOSAL BY SALE, DONATION OR AS SUPPLIED MATERIAL

Table 2 summarizes the totals of A&E awaiting disposal by sale.

Item	Group	Grouped Munitions Types Totals	Current	Total	Total	Total	Total	Remarks
		Munitions Type	Quantity	Weight kg	Weight Ton	Pallets	Magazines	
1	E	105mm Through 155mm (Less 120mm and 155mm HE)	1,258	28,324	28.3	68	0.17	120mm Tank APFSDS-T, 105mm Tank APFSDS-T M428
2	H	Propellant	78,838	1,616,179	1,616.2	3942	9.9	Propelling charge 155mm M119 Red Bag is pending Materiel Group approval
3	M	Rocket Motors	386	1,658	1.658	4.2	0.01	Donation to NASA (National Research Laboratory). Currently awaiting approval from Minster
4	Z	Salvage (links, launch Tubes) (kg Weight)		200,821	200.8	1347.5	3.36	Processed material scrap. Waiting for disposal by sales through PSPC GC Surplus
		Totals	**80,482**	**1,818,658**	**1818.7**	**5361.7**	**13.4**	

TABLE 3 - A&E DISPOSAL BY SALE

Table 3 is a summary of A&E disposal by sale that occurred in 2015.

Item	Group	Grouped Munitions Types Totals	Current	Total	Total	Total	Total	Remarks
		Munitions Type	Quantity	Weight kg	Weight Ton	Pallets	Magazines	
1	Z	Salvage (kg Weight)		215413	215.4	364	0.91	Processed material scrap. Sold through PSPC GC Surplus at value of $899,604.00 Canadian
		Total		**215,413**	**215.4**	**364**	**0.91**	

TABLE 4 - A&E DISPOSAL BY DESTRUCTION AT DND LOCATIONS AND CONTRACTED OUT

Table 4 is a summary of A&E disposal by destruction, mutilation and contracts that occurred in 2015.

ENERGETICS FILLED A&E INVENTORY DESTROYED BY DND/CAF LOCATIONS							
Unit	**Number of Items**	**NEQ**	**Weight kg**	**Weight Ton**	**Pallets**	**Magazines**	**Remarks**
Dundurn	8,300	13,700.87	28,078.42	28.8	118.31	0.29	
DUSTY THUNDER 2015	149,905	67,657.97	226,165.35	226.16	1352.8	3.38	
Angus	0	0	0	0	0	0	
Rocky Point	1,617	653.35	1221.64	1.2	3.35	0.0084	
Bagotville	340	2.64	61.04	0.061	1.25	0.003	
Chilliwack	0	0	0	0	0	0	
Cold Lake	1,047	2,820	8231.68	8.23	17.29	0.043	
Edmonton	0	0	0	0	0	0	
Gagetown	1,748	6.43	24.77	0.02	0.1	0.0002	
Greenwood	0	0	0	0	0	0	
METC	0	0	0	0	0	0	
Petawawa	6,828	5,181.36	5,029.92	5.03	4.82	0.012	
Valcartier	633	352	707.2	0.71	0.67	0.0017	
Wainwright	1	0.97	5.2	0.0052	0.01	0	
Sub total	**170,419**	**90,375.59**	**269,525.22**	**269.53**	**1498.6**	**3.75**	
ENERGETICS FILLED A&E INVENTORY DESTROYED BY DEMILITARIZATION SERVICE CONTRACTS							
No inventory was disposed of or demilitarized in FY 2015 by Service Contract.							

TABLE 5 - A&E DISPOSAL SUMMARY

Table 5 is a summary of A&E disposal by that occurred in 2015.

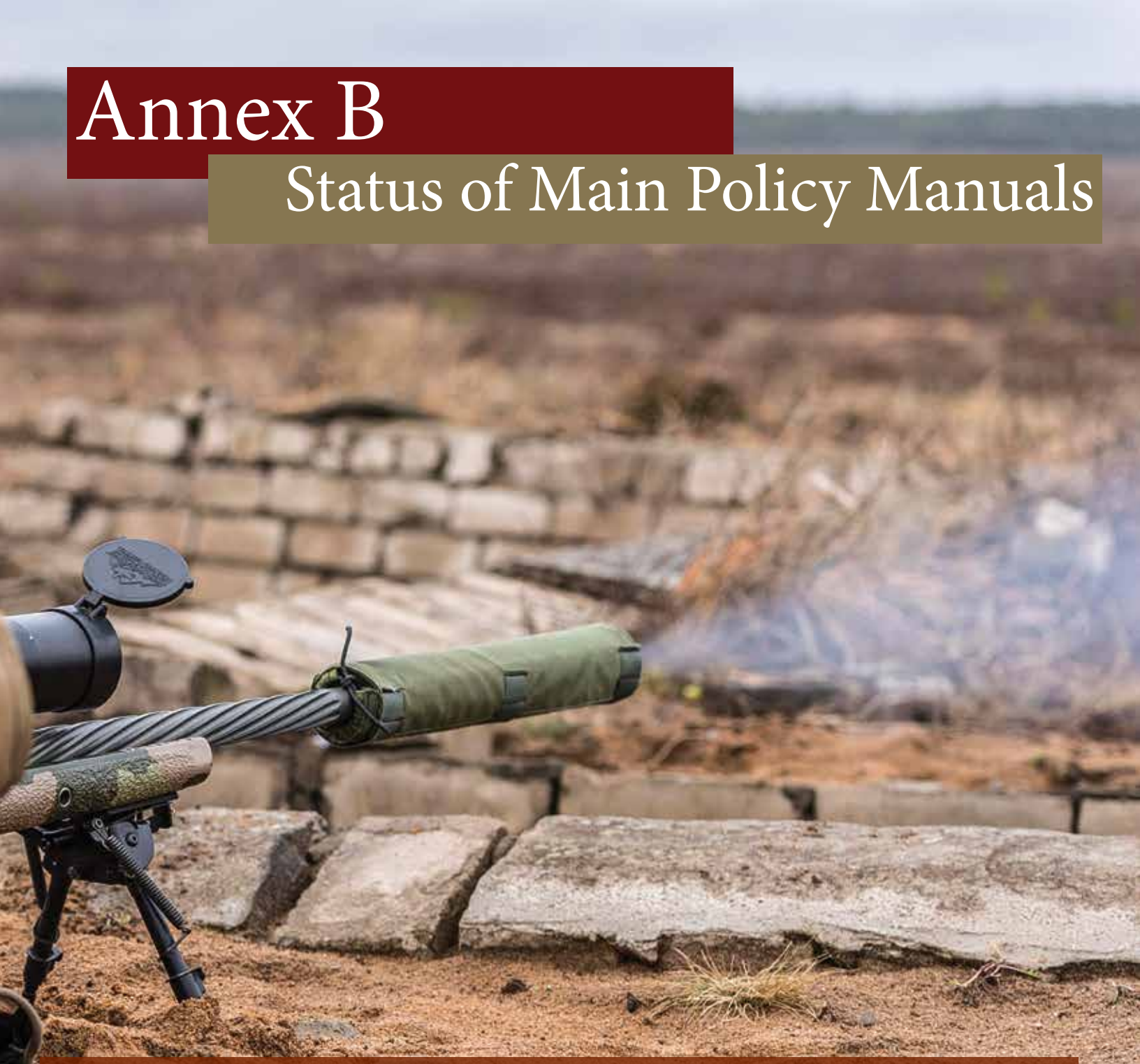
Combined Totals	Number of Items	NEQ	Weight kg	Weight Ton	Pallet	Magazine	Remarks
Inventory Destroyed	170,419	90,375.59	269,525.2	269.52	1498.6	3.73	
Inventory Sold Totals			215,413	215.41	364	0.91	Scrap material only
Grand Total	**170,419**	**90,375.59**	**484,938.2**	**484.94**	**1862.6**	**4.64**	

End of an era: Mr. Dan Beauregard (Chief Warrant Officer Retired) retrieved the last two sets of guiding wires from the last practice TOW Missiles in the CAF inventory, following a shoot in May 2015.

Canadian Armed Forces snipers work as a team to hit a target while conducting a firing range exercise with other nations during Exercise IRON SWORD at General Silvestras Žukausas Training Area in Pabradė, Lithuania on November 10, 2015 during Operation REASSURANCE.

Annex B

Status of Main Policy Manuals



Development of volumes in the new Ammunition and Explosives Safety Manual continues, despite delays in the publication process. Implementation of some volumes is also dependent on the approval of DAODs, notably 3002-7 on Risk Management and revisions to 3002-0, Ammunition and Explosives.

The significant planned restructure of DAOD 1000-0 is underway. Although the replacement 1000-series DAODs are not yet promulgated, DAOD 1000-8, Policy Framework for Safety and Security Management, will give DAER functional authority for A&E regulation and safety. All extant 3002-series DAODs are currently in some stage of periodic review, but staffing has suffered delays due to the 2015 election, changes in senior DND/CAF appointments, and legal questions raised during the staffing of the new Departmental Organization and Accountability document.

Although C-09-005-002/TS-001 (English) and -002 (French), Ammunition and Explosives Safety Manual Volume 2, Storage and Facility Operations has been published, the DAODs detailing risk management requirements (3002-7) and risk acceptance authorities (the revised 3002-0) have yet to be promulgated. Consequently, the provisions relating to risk-based waivers included in Volume 2 are not yet in effect. As an interim measure A&EI 45 provided updated direction on waivers and risk-based explosives storage licences, and DAER has begun to receive requests for risk-based licences.

A&E DAODs			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
3002-0	Ammunition and Explosives	Nov 2006	Entered "sign-off" step in September 2014; will include risk acceptance authorities.
3002-1	Certification of Ammunition and Explosives	Aug 2012	Periodic review in progress.
3002-2	Insensitive Munitions	Aug 2012	Periodic review in progress.
3002-3	Ammunition and Explosives Safety Program	Dec 2007	Review in progress. Pending approval of DAOD 1000-8.
3002-4	Ammunition or Explosives Accident, Incident, Defect or Malfunction Reporting	Dec 2007	Review in progress. Pending approval of DAOD 1000-8.
3002-5	Use of Firearms, Ammunitions and Explosives	Dec 2007	Review in progress. Pending approval of DAOD 1000-8.
3002-6	Display Fireworks	Dec 2010	Review in progress.
3002-7	Ammunition and Explosives Risk Management	N/A	Entered "sign-off" step in September 2014; risk acceptance authorities to be detailed in 30020.
Ammunition and Explosives Safety Manuals			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
C-09-153-001/TS-000	Ammunition and Explosives Safety Manual Volume 1 – Storage and Transportation	Version dated Aug 2013; published Nov 2013	Will be cancelled when C-09-005-008/TS-000 is published.
C-09-153-003/TS-000	Explosives Safety Manual Volume 3 – Naval Vessels	Mar 2008	To be replaced by C-09-005 Volume 6.
C-09-005-001/TS-000	Volume 1 – Ammunition and Explosives Program Management and Life Cycle Safety	Version dated 1 Aug 2013	Replaces A&EIs 13, 19 (Draft), 15, 17 and portions of C-09-153-001/TS-000.
C-09-005-002/TS-000	Volume 2 – Storage and Facility Operations (including storage related operations)	Feb 2013	A&EI 45 remains in effect for waivers and risk-based licences. Update planned for the last quarter of 2016, based on NATO AASTP-1 Edition B Version 1.
C-09-005-003/TS-000	Volume 3 – Transportation	Jun 2013	First revision.
C-09-005-004/TS-001 (English) C-09-005-004/TS-002 (French)	Volume 4 – Demilitarization and Disposal	To be published 2016.	Replaces C-09-008-001/TS-000 dated Oct 1993 and C-09-008-002/FP-000 dated Sep 2011.
C-09-005-005/TS-000	Volume 5 - Deployed Operations (encompasses ammunition storage and holding areas, forward operating bases (FOB), field storage, deployed operations risk assessment & clearance of battle-damaged vehicles (BDV)	Version 2014-02-01; published Dec 2013.	Replaced A&EI 23 and C-09-153-001/TS-000 Part 4 Section 15. Updates planned, based on NATO work (STANAG 2617 covering ALP-16 and AASTP-5 Edition 1 Version 3, to be issued mid-2016).
C-09-005-006/TS-000	Volume 6 – Naval Vessels	To be published in 2017.	Will replace C-09-153-003/TS-000. Initial (but incomplete) draft provided by RCN.
C-09-005-007/TS-000	Volume 7 – Certification of Ammunition, Explosives and Accessories for Service Use	Oct 2011	Partially replaced D-09-002-010/SG-000 Published Mar 2007. In periodic review.

C-09-005-008/TS-001 (English) C-09-005-008/TS-002 (French)	Volume 8 – Siting, Design and Construction Standards	To be published in 2017	Will replace A&EI 26(Draft), 28(Draft), 39, 44, and 48 and portions of C-09-153-001/TS-000.
C-09-005-009/TS-001 (English) C-09-005-000/TS-002 (French)	Volume 9 – Hazards of Electromagnetic Radiation to Ordnance (HERO)	To be published in 2016	Will replace and expand upon Part 10 of C-09-005-001/TS-000.
Ammunition and Explosives Instructions			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
01/07	Ammunition and Explosives Instructions	Cancelled	Included in Volume 1 of the C-09-005 series.
02/07	Review of Ammunition and Explosives Regulations and Instructions	Cancelled	Replaced by A&EI 50.
03/07	Ammunition and Explosives Storage Licensing	Cancelled	Replaced by Volume 2 of the C-09-005 series and by A&EI 45.
04	Transportation of Ammunition and Explosives Recovered during Domestic Explosive Ordnance Disposal Operations	Cancelled	Included in Volume 3 of the C-09-005 series.
05	Transportation of Munition Scrap	Cancelled	Included in Volume 3 of the C-09-005 series.
06	Removal of Hard Targets from CF Ranges and Training Areas	Dec 2008	Change 1.
07	Ammunition Accident/Incident Investigation and Reporting	Aug 2013	Change 1.
08	Plastic Coated Tape, Explosives Safety Hazard – Electrostatic Discharge	Cancelled	Superseded by C-09-008-002/FP-000.
09	Crimping of Non-Electric Blasting Caps – Procedures and Protective Equipment	Cancelled	Superseded by C-09-008-002/FP-000.
10	Cartridge Signal 16mm No 1 Mk3	Cancelled	Superseded by C-74-370-CA0/TA-000.
11	Disposal of Ammunition and Explosives at the End of Life Cycle	Sep 2011	Change 1 (labels replaced by A&EI 36).
12	Ammunition Salvage Processing Buildings	Cancelled	Included in Volume 2 of the C-09-005 series.
13	Ammunition Amnesty Box Program	Cancelled	Included in Volume 1 of the C-09-005 series.
14	Mitigation of Blast and Fragmentation Effects Utilizing Sandbags	Dec 2008	To be included in Volume 4 of the C-09-005 series.
15	Recognized Civilian Qualifications Applicable to Ammunition and Explosives Employment	Aug 2010	Change 2.
16	Small Quantity Distance Tables	Cancelled	Included in Volume 2 of the C-09-005 series.
17	Civilian Qualification Expiry Criteria	Jan 2009	To be included in new Volume 1 of the C-09-005 series.

18	Civilian Ammunition Technician Specification	Nov 2009	
19	Personnel Qualifications matrix	Never issued	Included in Volume 1 of the C-09-005 series.
20	Gauging for Serviceability – Cartridge 20mm Dummy C145A1	Cancelled	
21	Containment Vessels Siting and Storage Instructions	Cancelled	Included in Volume 2 of the C-09-005 series.
22	Public Traffic Routes and Densities	Cancelled	Included in Volume 2 of the C-09-005 series.
23	Explosive Clearance Inspection of Battle Damaged Vehicles	Cancelled	Included in Volume 5 of the C-09-005 series.
24	Transfer of Small Quantities of Ammunition and Explosives Within HMC Dockyards	Mar 2010	Change 1.
25	Stowage of Expendable Targets on Board HMC Ships	Feb 2010	
26	Construction Guidance for Facility Electrical Systems	Never issued	To be included in Volume 8 of the C-09-005 series.
27	Ammunition Safety and Suitability for Service Assessments – Class Decisions	Apr 2015	Change 1. To be included in the next version of D-09-002-010/SG-000.
28	Construction Guidance for Facility Heating Appliances	Never issued	To be included in Volume 8 of the C-09-005 series.
29	Packaging and Return of Surplus Gun Propellant and Increments	Cancelled	Included in C-09-005-003/TS-000.
30	Accidental Small Arms Discharge Reporting	Dec 2010	Change 1 .
31	Destruction by Open Burning of Surplus Propellant on Approved Burning Trays	Aug 2012	Change 2. To be included in Volume 4 of the C-09-005 series.
32	Ammunition and Explosives Safety Survey and Inspection	Cancelled	Included in Volume 1 of the C-09-005 series.
33	Flare Aircraft Parachute LUU-2D/B		Contact LCMM for document.
34	Approved Misfire Procedure for Electrically Initiated Disposal Operations	Oct 2011	To be included in Volume 4 of the C-09-005 series.
35	A&E Risk Management Process for Deployed Operations	Never issued	Included in Volume 5 of the C-09-005 series.
36	Labels Applicable to Certification of Ammunition and Explosives	Nov 2012	To be included in Volume 4 of the C-09-005 series.
37	Safe Handling, Use and Employment of the Cap Blasting Electric M4 Assembly for use with the Defensive Command Detonated Weapon C19	Jun 2014	
38	Only Authorized Fresh Water Launch Procedure for Marker Location Marine C2A2	Apr 2012	

39	Miniature Magazine Concrete Earth-covered Three-Bay	Jul 2012	
40	Management Procedures for CRV-7 Rocket Motors Munition Scrap (MS) Potentially Containing Asbestos	Sep 2012	
41	Assessment and Confirmation of Level 1 Ammunition Technical Authorities	Oct 2013	
42	Approved Storage Procedures for FIXOR™ explosives	Never issued	No longer required.
43	Canadian Forces Maritime Experimental and Test Ranges Ammunition and Explosives Embarkation / Disembarkation Area	Nov 2012	
44	Pre-Fabricated Magazines	Jun 2014	
45	A&E Risk-based Storage Licensing and Waivers	Jul 2013	
46	Storage and Disposal of Fireworks and non-DND Ammunition and Explosives	Never issued	
47	RCAF A&E Maximum Credible Event Guidance	Jun 2014	
48	Barricade Geometry	Jan 2014	
49	Stack Emissions Limits for Demilitarization by Thermal Treatment	Jul 2014	To be included in Volume 4 of the C-09-005 series.
50	Review of Ammunition and Explosives Orders and Instructions	Oct 2013	Accompanied by Policy Publication Currency and Supersession Matrix.
51	Storage of A&E Excluded from Hazard Class 1	In development	
52	Approved Preparation of Fuse Blasting Time M700 (Safety Fuse)	Apr 2014	To be included in Volume 4 of the C-09-005 series.
53	A&E Policy Deviation Procedure	In development	
54	Application of A&E Risk Index	In development	Pending promulgation of DAOD 3002-7.
55	VICTORIA Class WSC	In development	RCN.
56	Requirement for UAR and UESO	In development	Pending training availability.
57	AERASC Technical Review Board	Jun 2015	

58	Packaging and Handling of Class 1 Dangerous Goods	May 2015	
59	Registered Unit A&E Storage Lock-Ups and Licensed Unit A&E Storage Lock-Ups	Feb 2016	
Unexploded Explosive Ordnance (UXO) – Policy			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
CANFORGEN 181/06 ADM(IE) 002 282157Z NOV 06	DND Legacy UXO and Contaminated Sites Program		Current. Office of Primary Interest (OPI) - ADM(IE) GPS.
B-GL-381-003/TS-000	Range Clearance and Unexploded Explosive Ordnance (UXO) Activities Manual	interim draft, 12 Apr 2011	OPI - C Army.
Explosive Ordnance Disposal (EOD)			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
CFJP 3.16	Explosive Ordnance Disposal	Dec 2012	Replaced B-GL-005-316/TS-XXX. OPI – CF EOD.
CFJP 3.16.1	Improvised Explosive Device Disposal		OPI – CF EOD.
C-09-008-001/FP-000	Destruction of Surplus, Obsolete and Deteriorated Ammunition	Oct 1993	To be replaced by Volume 4 of the C-09-005 series.
C-09-008-002/FP-000	Destruction of Dud and Misfired Ammunition on CF Ranges and Training Areas	Sep 2011	
C-09-008-003/FP-000	Explosive Ordnance Disposal – Disposal of Stray Ammunition	May 2003	To be replaced by Volume 4 of the C-09-005 series.
DAOD 8000-0	Explosive Ordnance Disposal	Dec 2013	OPI - CF EOD.
DAOD 8000-1	Conduct of Explosive Ordnance Disposal	Dec 2013	OPI - CF EOD.
DAOD 8000-2	Reporting and Investigation of Explosive Ordnance Disposal Incidents and Accidents	Dec 2013	OPI - CF EOD.
DAOD 8000-3	Explosive Ordnance Disposal Radiation Safety	Dec 2013	OPI - CF EOD.
Ammunition and Explosives Safety Policy Manuals			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
A-GG-040-006/AG-001	DND Explosives Safety Program (To be renamed "DND/CF Ammunition and Explosives Safety Program")	Change 3 – Published on 24 September 1994	Latest draft of the revised policy manual will be reviewed after publication of DAOD 1000-8
A-GG-040-006/AG-002	DND/CF Ammunition or Explosives Accident, Incident, Defect or Malfunction Reporting	Latest Original Edition – Published on 05 May 2008	Will be revised following implementation of the Safety Information Management System

International Policy Development			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
STANAG 2617 and Allied Logistics Publication (ALP) -16 – Explosives Safety and Munitions Risk Management (ESMRM) in NATO Planning, Training and Operations	Establishes requirements for the NATO ESMRM Process as well as roles and responsibilities applicable to the NATO operational planning process, operational stages, and consumer logistics process across the full range of NATO military operations, to include ammunition-related contracted support.	Promulgated Apr 2015	Implementation of STANAG 2617 will be through amendment to C-09 series for risk management and deployed operations as well as amendment to CF operational planning policy.
United Nations' International Ammunition Technical Guidelines (IATG)	Developed to improve safety, security and efficiency in conventional ammunitions stockpile management. They recommend an integrated risk and quality management system. Of growing importance, along the lines of the UN's Transportation of Dangerous Goods guidelines.	Version 2 published in 2015	DAER, through membership on the Technical Review Panel, provides review of, and input to, the IATG.
NATO Conference of National Armaments Directors (CNAD) Ammunition Safety Group (CASG) AC/326	Manages NATO guidelines for the life cycle of munitions.	Large number of STANAGs, AOPs, and AASTPs produced and continually maintained.	CAF/DND representation at Main Group meetings and participation at Sub-Group meetings and working groups ensures coordination of NATO and Canadian guidelines.
External Liaison			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
Avalanche Control	MOU between DND and Parks Canada Agency concerning the control of avalanches by artillery fire at Glacier National Park/ Rogers Pass, British Columbia.	Oct 2012 (next revision due in 2017)	CMSG manages the annual military tasks (OP PALACI) and DND input into the five-year MOU review cycle.
Natural Resources Canada/Explosives Regulatory Division	NR Can/ERD responsible for *Explosives Act*, which provides DND exemption for explosives under MND direction and control.	*Explosives Regulations, 2013* were promulgated in 2014.	DAER maintains close liaison with NR Can through semi-annual bilateral meetings. This is critical in DND's management of its exemption for all safety policy.
US Department of Defense Explosives Safety Board (DDESB)	The DDESB is the prime proponent of NATO's ammunition life cycle management safety policy and a significant number of DDESB documents are used in support of Canadian guidelines, either directly or through NATO work.	Technical Papers (TPs), Unified Facilities Criteria (UFC), DoD Ammunition and Explosives Safety Standards 6055.09, and tools such as SAFER, are the key documents. A Data Exchange Agreement for technical information is currently being updated.	DAER maintains close liaison with the US DDESB through on-going NATO and UN work but also a scheduled annual bilateral meeting.

RCN A&E Policy			
Document, Subject or Theme	**Title**	**Date Current Document Published**	**Comment**
Maritime Command Order (MARCORD) 46-8	Ammunition and Explosives Safety	Nov 08	Defines the organizational structure and the requirements of the Maritime AESP.
MARCORD CS-06	Transportation of Explosives and Ammunition by Motor Transport, Ammunition Lighter, and Military Aircraft Within Maritime Command	Not Known	Contains outdated reference to C-09-153-001/TS-000 for road transport.
Naval Order (NAVORD) 2130-6	Security of Small Arms and Small Arms Ammunition (SA/SAA)	Jun 2014	
NAVORD 3470-3	Damage or Loss of Torpedoes and Torpedo Targets	Jun 2015	
NAVORD 8000-0	Maritime Explosive Ordnance Disposal Policy	May 2014	
NAVORD 8000-1	Maritime Explosive Ordnance Disposal Instruction	May 2014	
CA A&E Policy			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
Land Force Command Order (LFCO) 22-12	Operational EOD	Dec 1995	
LFCO 24-07	Explosive Ordnance Disposal (EOD) Training	1985	To be replaced by Canadian Army Order (CAO) 24-07, currently nearing finalization
Canadian Army Order (CAO) 22-11	Range Clearance Operations	Mar 2015	
RCAF A&E Policy			
Document, Subject or Theme	**Brief Description**	**Date Current Document Published**	**Comment**
B-GA-297-001/TS-000	Safety Orders For Canadian Forces Air Weapons Systems	Jun 2010	Under review. OPI – 1 Cdn Air Div / A4 Maint

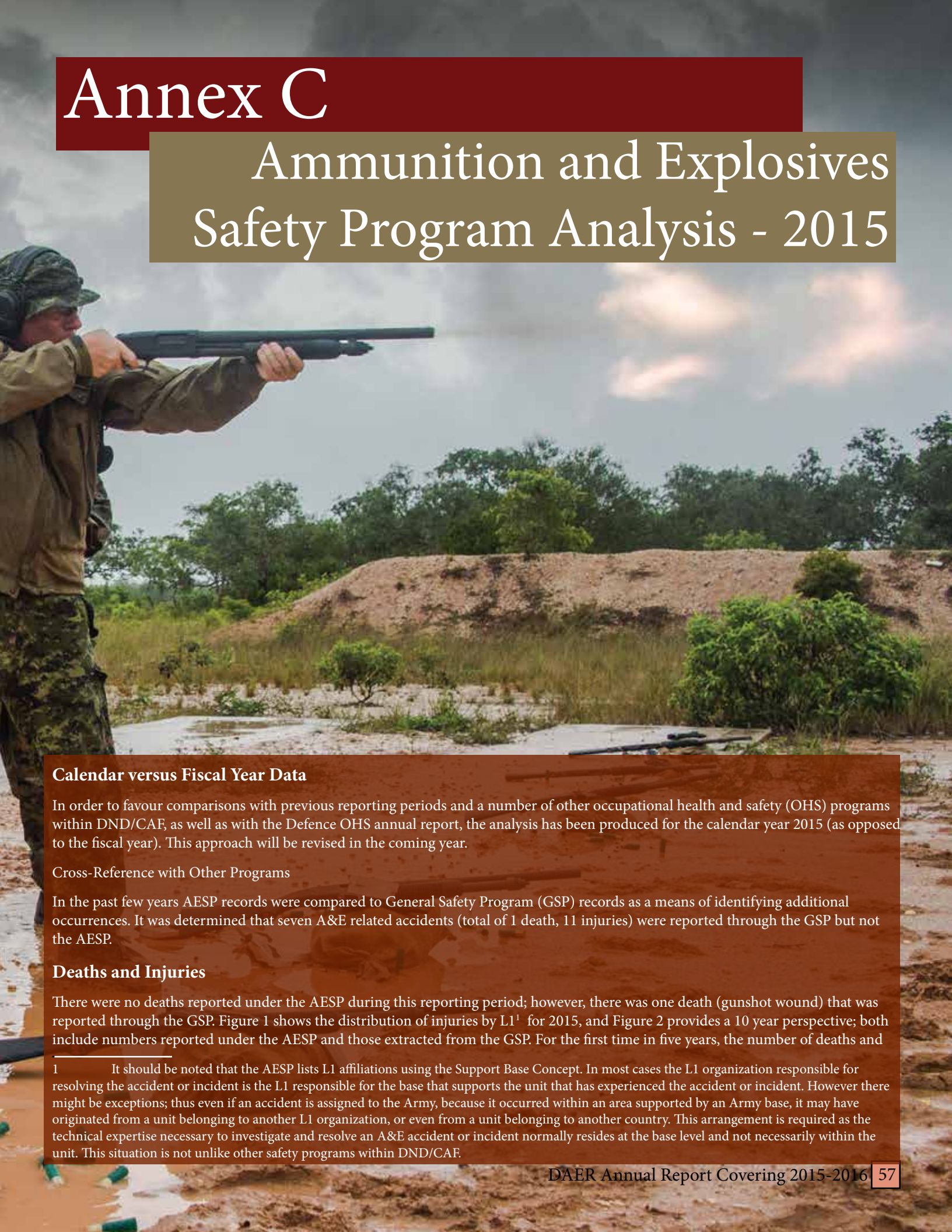
A Boatswain on board Her Majesty's Canadian Ship FREDERICTON fires a gun line to French supply ship FS MARNE during a liquid replenishment at sea during Operation REASSURANCE on March 28, 2015.

DAER Annual Report Covering 2015-2016

Warrant Officer Jocelyn Roy from the Royal 22e Regiment, provides a shotgun demonstration for the soldiers from the Belize Defence Force and members of the United States Marine Corps participating in marksmanship shotgun training during phase II of Exercise TRADEWINDS 15 in Belize on June 18, 2015.

Annex C

Ammunition and Explosives Safety Program Analysis - 2015



Calendar versus Fiscal Year Data

In order to favour comparisons with previous reporting periods and a number of other occupational health and safety (OHS) programs within DND/CAF, as well as with the Defence OHS annual report, the analysis has been produced for the calendar year 2015 (as opposed to the fiscal year). This approach will be revised in the coming year.

Cross-Reference with Other Programs

In the past few years AESP records were compared to General Safety Program (GSP) records as a means of identifying additional occurrences. It was determined that seven A&E related accidents (total of 1 death, 11 injuries) were reported through the GSP but not the AESP.

Deaths and Injuries

There were no deaths reported under the AESP during this reporting period; however, there was one death (gunshot wound) that was reported through the GSP. Figure 1 shows the distribution of injuries by L1[1] for 2015, and Figure 2 provides a 10 year perspective; both include numbers reported under the AESP and those extracted from the GSP. For the first time in five years, the number of deaths and

1 It should be noted that the AESP lists L1 affiliations using the Support Base Concept. In most cases the L1 organization responsible for resolving the accident or incident is the L1 responsible for the base that supports the unit that has experienced the accident or incident. However there might be exceptions; thus even if an accident is assigned to the Army, because it occurred within an area supported by an Army base, it may have originated from a unit belonging to another L1 organization, or even from a unit belonging to another country. This arrangement is required as the technical expertise necessary to investigate and resolve an A&E accident or incident normally resides at the base level and not necessarily within the unit. This situation is not unlike other safety programs within DND/CAF.

injuries is above the 10 year average. As seen in Figure 1, there were 25 A&E related injuries (23 military personnel and 2 civilian employees) spread over 17 accidents in 2015. The number of accidents is consistent with 2014 (17); however, there were a number of accidents involving injury to multiple individuals. One occurrence consisted of an artillery simulator thrown just outside a tent, injuring five members. Two accidents involved foreign military (two separate nations, two separate occurrences) controlling training of their military in Canada; each receiving a gunshot wound as a result of range miscommunications. A CAF member received a gunshot wound during a night live attack exercise and a CAF member was injured when struck by a paraflare. All other injuries were minor. One injury (training related) was reported from a theatre of operations.

Number of Occurrences

General. A total of 235 ammunition accidents and incidents, inclusive of ammunition-related flight safety occurrences[2], were

2 The AESP's definitions for accident and incident do not correspond to those used within the Flight Safety Program; as a result Flight Safety Occurrence Management System (FSOMS) entries are reviewed and selected individually by DAER staff.

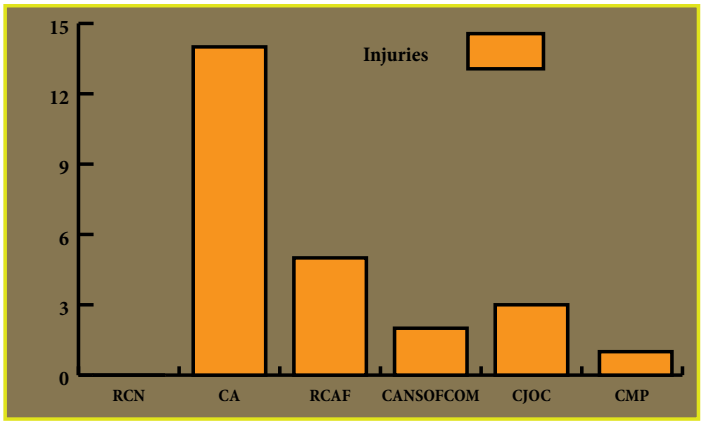


Figure 1 Injuries by L1 for 2015

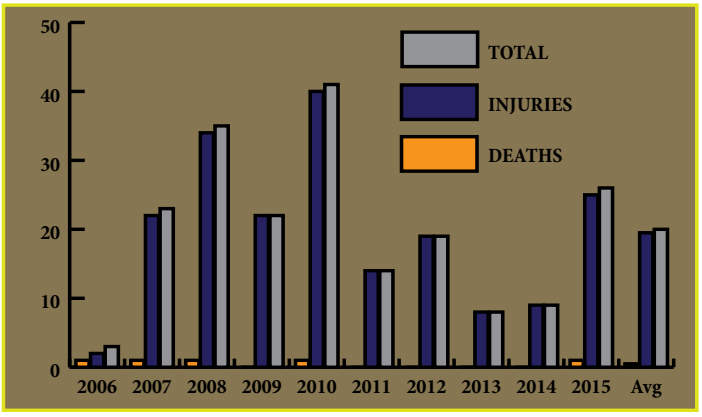


Figure 2 Deaths and Injuries 2006-2015

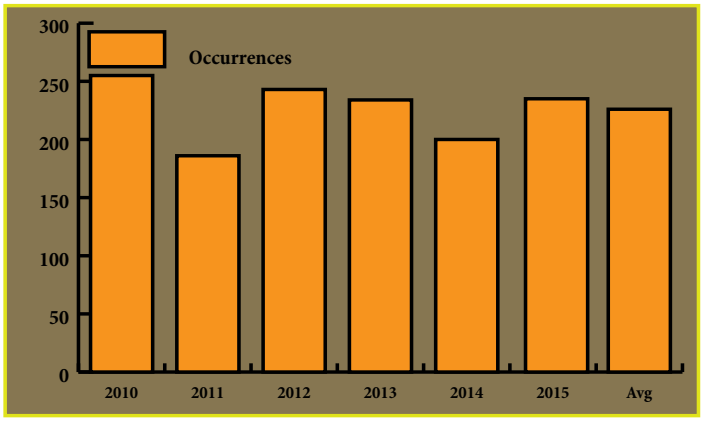


Figure 3 Reported Occurrences 2010-2015

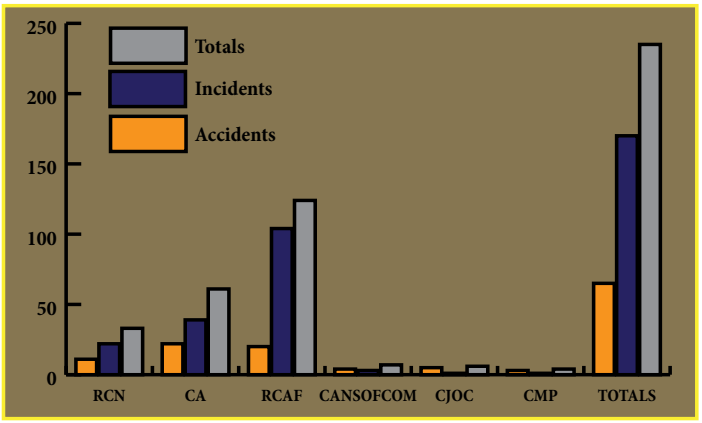


Figure 4 Occurrences by L1 for 2015

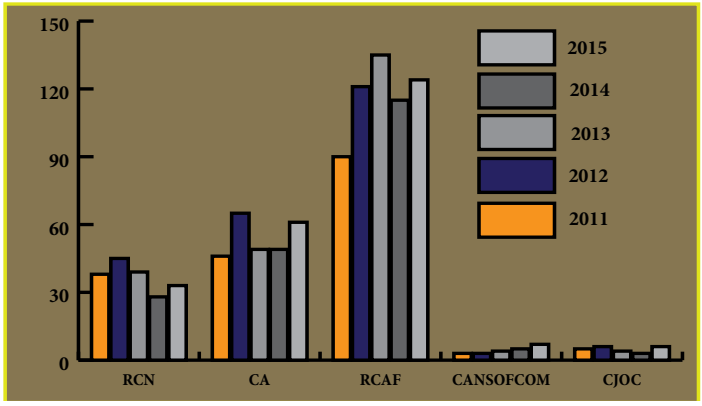


Figure 5 Occurrences by L1 2011-2015

recorded during the reporting period: 64 accidents and 171 incidents. As shown in Figure 3, the 2015 total of 235 occurrences is slightly above the six year average for 2010 – 2015 of 224 occurrences.

Figure 4 provides a breakout of accidents and incidents by L1 for 2015. In order to better understand trends, Figure 5 shows a 5 year perspective, again by L1. The occurrences reported for CJOC mainly relate to CFAD operations; although one accident occurred in theatre.

RCAF. There was a slight increase in the number of occurrences reported by the RCAF in 2015: the majority resulting from human error. Case-neck separation of 20mm and uncommanded release of chaff/flare continued to be an issue, but at reduced levels. Problems due to a manufacturing fault with flares carried on into 2015, also at reduced levels. Accidental discharges were less frequent but varied: one ejection of external fuel tanks, three discharges of fire extinguisher squibs/bottles, one unintended discharge of flares and one involving smoke markers. There were more instances of aircraft being armed too early, skipping de-arm and flare checks or being armed by unauthorized individuals. Occurrences involving incorrectly placed safety pins/handles/ switches increased from 11 in 2014 to 20 in 2015. Errors in serialized item accounting/control, mixing of incompatible items, improper storage, and accidents during trailering and forklift operations continue to occur. However, it is expected that these occurrences will decrease as the Air Occupations Enhancement Program (AOEP) matures and qualified Air Weapons Systems Technicians progress through the ranks.

Of particular note: improperly documented items not certified safe to handle, or the older "free from explosives" (FFE), were discovered in a unit museum; a VIP tour was conducted on/in an aircraft loaded with live weapons; and Simunition FX® marking ammunition was used without proper training and protective equipment. All point to a requirement for increased explosives safety education and awareness. However, overall, the RCAF is assessed as having a good culture of reporting.

RCN. After two consecutive years of decreased reporting, RCN reporting was up 14% during the reporting period. A procedural deficiency in the accounting and control of commercially procured safety of life at sea (SOLAS) stores was identified. Slow reporting of potentially serious incidents (close-in splashdown of Evolved Sea Sparrow Missile (ESSM) and multiple prematurely functioning of 57 mm projectiles) points to a need for a better understanding of reporting requirements policy. Overall, the RCN is assessed as having a good culture of reporting.

CA. Last year DAER reported "There was no change in reporting level for the CA from 2013 to 2014. CFB Suffield continues to contribute a disproportionately large percentage (35%) of CA reports and CFB Suffield should be commended for their diligence. This very visible impact of a change in reporting practices at a single base illustrates the importance of working towards a more uniform reporting culture across the L1." In 2015, CA reporting increased 15%; however, most of the increase is due to CFB Suffield[3] which accounted for 53% of all CA reports during the reporting period. Six of the seven unreported occurrences gleaned from GSP records, including one death and 10 injuries, occurred in CA units.

The largest category of CA occurrences involved ammunition salvage (returned from firing points) and munition scrap returns (collected downrange during post-firing sweeps or range clearances). Errors and deliberate deviations pose risk to personnel and the public: five smoke grenades with hung strikers were returned as ammunition salvage, one functioning in an inspector's hand. Inappropriate disposal of ammunition (abandonment, tossing in garbage, etc.) also poses risks to personnel and the public, and is an indicator of poor control measures. Smoke grenades were discovered in a Leopard tank during maintenance and parachute flares were returned at the end of an exercise, despite the lot having been specifically recalled. Finally there were two cases of tampering where either items were opened and components removed, or were modified to be used in an unapproved manner. Overall, there is a continued requirement to improve the ammunition and explosives safety program within the CA.

CANSOFCOM. The timeliness of CANSOFCOM's reporting has improved measurably during the reporting period. Nonetheless, there remains an opportunity for improvement with respect to the requirement/frequency of reporting.

CMP. Responsible for CFB Borden, CMP is a major training centre supporting much of southern Ontario. Despite the high volume of on-base training, and the large number of Reserve units supported by the base, no occurrences were reported in 2013 or 2014. In 2015 there was a marked improvement as three accidents and one incident were reported through CFB Borden. There is a requirement to resolve Meaford's[4] reporting structure.

A&E Types. The most commonly used items of A&E (SAA, smoke grenades, pyrotechnics, CADs/PADs, marine location markers (MLM), etc.) were involved in 166 of the 235 occurrences (70%). This is comparable to previous years. Out of a total of 64 accidents, 50 were associated with common user natures, causing 22 of the 25 injuries and one death.

Cause Categories

General. Of the 235 occurrences that took place in 2015, those with completed investigations were attributed a cause and have been summarized at Table 1.

3 14 of the 29 occurrences reported by CFB Suffield have not been included in the detailed listings at Appendices 1 and 2 on the basis that they were "internal" to British forces and did not impinge on Canada.

4 Meaford is reported against the CA since annual inspections and occurrence reporting is done by the latter. However, Meaford falls under CFB Borden under the Human Resources Management System (HRMS); this discrepancy should be addressed through a Service Level Agreement or similar agreement.

CAUSE CATEGORY	NUMBER	PERSONNEL RELATED
Human Error (error in drill, mistake, poor judgement)	140	161
Deliberate Deviation	21	
System or Weapon-related	23	
Other Causes / Undetermined	21	
Unassigned (investigation on-going)	7	
Ammunition-related (defect, malfunction, design error)	23	
TOTAL	235	

Table 1 - Cause Categories

Personnel-Related. Personnel were responsible for 69% of all accidents and incidents. Since 2008, personnel cause factors have made up 75-80% of all occurrences and pointed to a need for A&E Safety Program strengthening. Carelessness, poor judgement, and errors in drill, sometimes compounded by lack of supervision, were typical causes. Nonetheless, the percentage decrease during the reporting period is attributed to an increase in "Other" and "Ammunition Fault" categories and not to an improvement in the human component. There is a continuing need for strengthening of the A&E Safety Program.

There were 21 deliberate deviations reported in 2015[5]. They caused four accidents, two resulting in seven injuries (both involved pyrotechnics thrown in close proximity to personnel). The other two involved weather seals (no touch area) on two missiles being defaced, and unauthorized use of pyrotechnics (grenade, hand, smoke and paraflare) that caused a grassfire in a rural area. Of the 21 deliberate deviations, one occurred in the RCN, eight in the RCAF, one in MILPERSCOM and the remaining 11 occurred within CA units.

The 2014 Annual Report cited specific concerns with respect to deliberate deviations linked to amnesty boxes. There was a marked improvement for 2015, as no reports concerning deliberate deviations in relation to amnesty boxes were submitted.

There is a need for continued vigilance concerning the management of display ammunition. During recertification/verification, display items were removed from a unit museum and from a base ammunition display as the items had not been certified as safe to handle (former designation: free from explosives).

System or Weapon-Related. System or weapon-related occurrences held at 10%. Of the 23 occurrences, there were two RCN, eight CA (four involving foreign troops training in Canada) and thirteen RCAF (many attributed to undetected progressive breakdown or uncommanded release of chaff/flare). There were four accidents, none with injuries.

5 Accidents and incidents related to deliberate deviations are indicated in the 2015 Accident and Incident Summaries with a grey background within the supporting Appendixes to Annex C.

Other / Undetermined. Approximately 9% were categorized as "other / undetermined". Many were related to environmental conditions – for example marine markers activated or swept overboard by heavy seas – or, in the case of internal-to-BATUS occurrences, a full report was not pursued. In some cases, investigation could not attribute a cause. One undetermined case involved an instructor and passenger onboard a helicopter slightly injured by belt fragments from a GAU-21 machine gun.

Unassigned. A further seven (3%) have not been assigned to a cause category as investigations were still underway at close of the reporting period[6].

Ammunition-Related. Five accidents were attributed to a fault in the ammunition: one involved injury to one CAF member who received minor burns on one hand while igniting a smoke pot; two involved a manufacturing defect in aircraft flares which caused scorching and charring; and two occurrences resulted in damaged C7A2 weapons due to a manufacturing defect in 5.56 mm ammunition. There were 17 incidents related to ammunition defects: five concerning aircraft flares as previously described; two reported instances of case-neck separation of 20 mm; and two MLM missing crimps. As a result of a manufacturing defect, an ESSM missile splashed down 100 m from the launching ship.

Reporting

Improper Reporting Procedures. In 2015 there were a number of potentially serious occurrences reported strictly through a CF 410 – Ammunition and Explosives Defect and Malfunction Report[7]. AESP managers were informed of the occurrences through the life cycle materiel managers (LCMM) or L1 ATAs. If a defect or malfunction causes an accident or an incident, both the procedure for the CF 410 and the procedure for reporting accidents or incidents must be adhered to[8]. Failure to report accidents and incidents using the proper procedure may result in unsafe practices, and may directly impact personnel safety and represent a potential departmental liability.

Number of Reporting Channels. As indicated at the beginning of the annex, in 2015 seven occurrences, causing one death and 11 injuries, were reported through the GSP, but not the AESP. Current policy, which requires reporting under multiple safety systems, is inefficient and represents an issue that requires corporate attention. When weapons and ammunition are involved in an occurrence, generally the investigation involves both ammunition and weapons specialists, but separate reports are submitted and staffed independently. Consideration should be given to integrating the weapons reports into AESIMS. However and until current policies are amended, the requirement to report under the GSP, the AESP and other applicable programs is not optional; failing to do so exposes personnel and the department to potential risks.

6 The data analysis for the report dates from the 13th of May 2016.

7 Splashdown of an ESSM close to the launching ship, and initiation of a 40 mm grenade in a weapon.

8 Report content, timelines, chain of command, and intent differ between reports.

Low Ratios of Incidents versus Accidents. The lack of reporting continues to be a major concern. Historically, the AESP receives a number of accident reports, i.e. those reports related to damages, injuries or deaths. For each accident report, we should expect to see a larger number of incident reports, also called near-misses. When displayed graphically, we obtain what is called the "safety triangle" or the "safety pyramid". Ratios within the triangle vary based on what study one looks at[9].

The ratio of incidents to accidents for the AESP is as follows: 2.67 in 2015, 3.17 in 2014, 3.50 in 2013, 2.98 in 2012 and 3.44 for the year 2011. It is believed that these low ratios are the result of a lack of incident reporting within the CAF/DND. This trend severely impedes DAER's ability to perform trend analysis. As a result, the department's ability to bring about positive change through corrective measures, potentially avoiding accidents or reducing their severity, is adversely impacted

9 For example, some of the most cited numbers result from the research of Frank E. Bird published in 1974: for each major injury (fatality, disability, lost time or medical treatment) there were 9.8 minor injuries (requiring only first aid). Also, for each major injury, there were 30.2 property damage accidents. Finally, for every major injury reported there were approximately 600 incidents. The resulting layers of the triangle are 1-10-30-600, which represents a ratio of 15 incidents for each accident (600 to 40). See Bird F. (1974), Management Guide to Loss Control, Atlanta, GA: Institute Press, as cited by Kevin Nichol on his blog on Wednesday July 18, 2012: http://crsp-safety101.blogspot.ca/2012/07/the-safety-triangle-explained.html

An Air Weapons Systems technician secures a precision guided munition onto the bomb rack of a CF-188 Hornet in preparation for the next mission during Operation IMPACT on January 13, 2015 near Camp Patrice Vincent, Kuwait.

Appendix 1 to Annex C

Summary of Accidents for the Year 2015

The following table summarizes accidents that occurred in 2015. Greyed out cells indicate a deliberate deviation.

L1 or Command Responsible for Reporting	2015 Accident Summary	Date
RCN	Magazine fell from pocket of ship's sentry onto deck, causing rounds to spill over deck. 1 round lost overboard.	14 Jan 15
RCN	During transit to Norfolk, ship lost three markers man overboard (MMOs) due to heavy sea state and high winds	16 Feb 15
RCN	Ship lost one MMO due to sea state 7 and high winds.	16 Feb 15
RCN	Sentry did not properly verify the retention of the magazine in his rifle. Magazine fell to the icy deck and slid into the sea.	13 Mar 15
RCN	MMO was discovered activated and hanging from its lanyard.	13 Mar 15
RCN	While sheeting in the gennaker, strong winds caused the sheet to make contact with a MMO, knocking it into the sea.	24 Jun 15
RCN	During firing trials, 3 rounds 57 mm, practice were damaged due to a jam in the lateral feed mechanism.	27 Jul 15
RCN	During a change of line, a MMO was inadvertently functioned.	1 Oct 15
RCN	MMO was lost at sea due to heavy sea state and high winds.	17 Oct 15
RCN	Lifebuoy sentry accidentally dropped signal, distress, day and night overboard during a mobility exercise (MOBEX). Lost to sea.	8 Dec 15
RCN	Following a force protection exercise two separate C8 rifles experienced the cook-off of a round. One round slightly damaged the deck surface.	29 Dec 15
CA	While acting as assistant range safety officer (ARSO) and following a shooter, the member was injured when a projectile ricocheted off a metal plate target.	31 Mar 15
CA	During firing of C16 grenade launcher the weapon fired with the breech partially opened due to debris in the chamber.	8 Apr 15
CA	One round 40 mm practice exploded in the weapon, throwing plastic debris that did not injure the crew, and damaging the weapon.	8 Apr 15
CA	Grenade, hand, smoke and paraflare remains were recovered from the scene of grass fire in a rural area near Renfrew ON. Grass fire was not related to military training.	9 Jun 15
CA	When igniting a smoke pot, it ignited immediately, causing minor burns to member's hand.	18 Jun 15
CA	Gunshot wound to the head – fatality.	10 Aug 15
CA	Unit repackaged projectile inappropriately and during transportation the projectile came loose, crushing the nose cap of the fuze.	12 Aug 15
CA	12 gauge shotgun muzzle attachment was damaged during training.	13 Aug 15
CA	Member suffered hearing loss and ringing in the ears subsequent to firing an 84 mm round. His hearing protection had slipped just before firing.	19 Aug 15
CA	During compound clearance training, safety staff member received gunshot wounds to both legs.	5 Sep 15
CA	Weak tube retaining clip allowed a 105 mm cartridge to fall between the turret and hull, where it became damaged.	2 Oct 15
CA	During an exercise attack a thunderflash was thrown at a member, bursting in his face and causing temporary blindness and disorientation. Another member suffered disorientation and buzzing in an ear.	18 Oct 15
CA	Soldier sustained a gunshot wound to the back during a night live fire attack exercise.	19 Oct 15
CA	During an exercise attack an artillery simulator was thrown just outside a tent, causing five members to become disoriented and suffer ringing in the ears.	25 Oct 15

L1 or Command Responsible for Reporting	2015 Accident Summary	Date
CA	After a parachute flare failed to fire on two attempts, a member lowered the angle at which it was being held, at which time it functioned, hitting another member.	14 Nov 15
CA	While calling fire orders to his section, member's ear buds fell out and he suffered temporary hearing loss and ringing in one ear from the subsequent firing.	17 Nov 15
RCAF	Foreign trainee injured by 7.62 mm round while transiting a live fire area.	6 Feb 15
RCAF	At the de-arm point it was discovered that a flare burned in the bucket, causing scorching of main landing gear (MLG) door. Note 1	18 Feb 15
RCAF	A flare burned in the bucket, causing burn marks on the MLG door. Note 1	18 Feb 15
RCAF	Shielded mild detonating cord (SMDC) line damaged during installation of a life raft. Note 1	19 Feb 15
RCAF	Advanced medium-range air-to-air missile (AMRAAM) lost forward fin in flight while still attached to the airplane. Attributed to ingress of fine sand into the locking mechanism. Note 1	24 Mar 15
RCAF	During a functional check an external fuel tank was mistakenly jettisoned. Note 1	1 Apr 15
RCAF	When canopy was closed on a flashlight, the flashlight caused the SMDC line to be bent. Note 1	10 Apr 15
RCAF	During firing of Aircraft Gun Unit 21 (GAU-21), the firer, an instructor and a passenger were slightly injured by particles from the ammunition belt. Note 1	21 May 15
RCAF	Unbalanced aircraft pallet fell from forklift as it was being moved. Note 1	3 Jun 15
RCAF	During armament convoy, a modular practice bomb (MPB) fell to the ground. Note 1	16 Jun 15
RCAF	Simunition FX® rounds were employed without the appropriate personal protective equipment (PPE)	7 Jul 15
RCAF	Uncommanded functioning of squib caused crash position indicator (CPI) to deploy. Cause unattributed, but suspect bonding/grounding issues of aircraft made squib susceptible to high frequency (HF) transmissions. Note 1	9 Jul 15
RCAF	As a result of failing to inspect the condition of missiles, an air intercept missile 9 (AIM-9) was damaged during convoy operations. Note 1	21 Jul 15
RCAF	While waiting to depart the aircraft, jumper inadvertently activated a smoke canister. Note 1	29 Jul 15
RCAF	Two AIM-9 missiles were discovered on which the weather seals had been damaged by scribbling. Note 1	10 Aug 15
RCAF	During a crew proficiency flight a C2A2 marine location marker (MLM) was inadvertently released. Note 1	11 Aug 15
RCAF	During loading operations, sonobuoy fell from loading tool through the release chute and into the water. Attributed to operator error and also procedural inconsistencies. Note 1	1 Oct 15
RCAF	MPB fell out of trailer en route back to the explosives storage area. Several other MPBs were close to falling out. Note 1	9 Oct 15
RCAF	While unloading an aircraft a box of 10 MLMs was dropped approximately one metre to the tarmac. Note 1	17 Nov 15
RCAF	During unloading, a laser guided training round (LGTR) fell to the ground, damaging the seeker head nose. Note 1	19 Nov 15
CJOC	Two members, wearing personal protective clothing, were sprayed by OTTO fuel when a hose disconnected.	29 Jan 15
CJOC	Burst pipes in a magazine caused flooding, which damaged ammunition packaging.	23 Feb 15
CJOC	While attempting to extinguish a range fire, member was injured when a foreign military device exploded.	23 Mar 15
CJOC	During range practice, two C7A2 weapons were damaged by breech ruptures. There was also a similar incident with another weapon that did not sustain damage.	27 Oct 15
CJOC	An ammunition transfer trailer tipped - two pallets were thrown onto their sides.	9 Nov 15
CANSOFCOM	During firing, as the operator tried to clear a stoppage, the gun fired out of battery, injuring one member and damaging the weapon.	29 Jan 15
CANSOFCOM	Two projectiles wedged into C8 carbine barrel caused heavy damage to the weapon.	24 Feb 15
CANSOFCOM	Loose lid on vehicle battery compartment allowed a 12.7 mm round to enter. Short circuit caused round to initiate.	28 Jul 15
CANSOFCOM	During training member failed to connect the skin pack to a charge, receiving minor injuries.	29 Oct 15
CMP	An artillery simulator was employed 2 metres from a student in the prone position, causing concussive trauma.	24 Jul 15
CMP	Partial bore obstruction (sand) caused overpressure in the breech, leading to rearward venting (cartridge case failed under the extractor), splitting the bolt carrier and venting down through the magazine.	23 Sep 15
CMP	During static range practice, two C7A2 weapons were damaged - one catastrophically - by breech ruptures.	13 Oct 15

NOTE 1: Originally reported in FSOMS

Appendix 2 to Annex C

Summary of Incidents for the Year 2015

The following table summarizes incidents that occurred in 2015. Greyed out cells indicate a deliberate deviation.

L1 or Command Responsible for Reporting	2015 Incident Summary	Date
RCN	Helicopter returned to ship with hung flare. Cause was undetermined. Report accepted for tracking purposes.	4 Jan 15
RCN	250 rounds cartridge 9mm Simunition FX® were reported missing from ship's inventory. Undetermined cause.	8 Jan 15
RCN	.50 cal blank rounds returned with ship's salvage.	28 Jan 15
RCN	Damage control incident was initiated in a ship's compartment using a thunderflash. The thunderflash failed to operate. This is not an approved use for a thunderflash.	19 Feb 15
RCN	Misfired Simunition® rounds and casings placed in normal waste containers.	19 Feb 15
RCN	During MOBEX a signal, distress, day and night was lost from a rescue swimmer's pocket.	8 Apr 15
RCN	Multiple instances of 57 mm projectiles exploding prematurely.	23 Apr 15
RCN	Boat pack was lost during launch of rigid-hull inflatable boat (RHIB).	2 May 15
RCN	During high speed transit, boarding party member lost magazine from his C8 weapon	8 May 15
RCN	Observing rust on 16 rounds 5.56 mm ammunition, crew member inappropriately jettisoned them into the sea.	27 May 15
RCN	Signal, distress, day and night was lost during man overboard exercise rescue swimmer deployment.	4 Jun 15
RCN	Ship staff failed to carry out mandated weekly inspections of ammunition lockers and magazine.	15 Jul 15
RCN	One signal, distress, day and night No1 Mk4 was discovered atop a locker in the diving gear stores, presumably embarked with diving gear as none were embarked during ammunition embarkation.	2 Sep 15
RCN	During a pyrotechnic demonstration one parachute flare failed to fire and was jettisoned; however, ship was anchored in shallow water in a populated harbour area and flare was not weighted prior to jettison.	28 Sep 15
RCN	During a lengthy exercise at sea, ready use SAA was improperly stored.	5 Oct 15
RCN	During a gun shoot, a 57 mm round became jammed in the gun magazine.	3 Nov 15
RCN	As a result of a manufacturing error, an Evolved Sea Sparrow Missile (ESSM) splashed into the sea approximately 100 m from the ship.	6 Nov 15
RCN	Inadvertent activation of magazine spray in torpedo magazine.	20 Nov 15
RCN	During ammunitioning at CFAD jetty, a member of the ship's crew used his cell phone while handling ammunition.	27 Nov 15
RCN	Ship ordered in error and took delivery of commercial (non-DND) W3C smoke candles, which were stored in a pyrotechnics locker. On attempting to return stores, return to seller was refused and CFAD refused stores as non-DND.	8 Dec 15
RCN	Procedural/accounting issue. Commercially procured life raft kits contain SOLAS stores which are not being entered into the CFSS and are not being tracked for end of life cycle.	18 Dec 15
RCN	During manipulation on bridge wings, the light on a smoke marker was activated when it was dislodged from the marker harness.	26 Dec 15
CA	A potential range incursion was prevented when a member of the ops team noted a discrepancy between the Danger Trace and Hazards to Flight.	4 Feb 15
CA	Live rounds were discovered in a load bearing vest undergoing repair.	25 Feb 15
CA	7.62 mm round cooked-off immediately after being ejected due to lengthy stoppage of machine gun.	18 Mar 15

L1 or Command Responsible for Reporting	2015 Incident Summary	Date
CA	Subsequent to an artillery shoot, the unit neglected to turn in surplus propellant, instead returning with it to their armoury. Transportation and storage violations involved.	20 Mar 15
CA	A grenade, hand, fragmentation L109 A2 was found in the grass during small arms training.	21 Apr 15
CA	Explosive residue was discovered in display ammunition during recertification.	12 May 15
CA	5.56 mm ammunition returned from theatre and inspected and repacked prior to re-issue was discovered to have count and inspection errors.	23 May 15
CA	One round 155 mm howitzer M777 fell short approximately 1500 m.	27 May 15
CA	One round 155 mm howitzer M777 fell short approximately 1650 m.	29 May 15
CA	Contractor conducting post-firing range clearance delivered 2 dud rockets as part of a salvage return.	8 Jun 15
CA	Tampering of ammunition: during inspection three rocket, hand fired, parachute, illuminating launch tubes were discovered with live percussion caps.	9 Jul 2015
CA	Ammunition salvage and live ammunition (quantity 14 x 5.56 mm blank) were recovered from general waste sacks at a municipal recycling centre.	10 Jul 15
CA	366 rounds 5.56 mm ball were recovered from a solid waste site, having previously been thrown into a base dumpster.	16 Jul 15
CA	During a range sweep, a dud shaped charge warhead safety and arming assembly from an ADATS missile was mistakenly recovered and transported to the salvage processing point.	22 Jul 15
CA	During range sweep, quantity 15 bodies, aircraft bomb, chemical 115 lbs M70 were mistakenly recovered and transported to the salvage area	23 Jul 15
CA	Commissionaires witnessed three flares descend into the ammunition storage area.	6 Aug 15
CA	27 ammunition items were recovered from an excavation site.	7 Aug 15
CA	During an artillery exercise five rounds were observed to land approximately 700-1000 m long.	1 Sep 15
CA	During inspection of a level 1 screened unit salvage return, a complete 155 mm M3A1 propelling charge was discovered.	1 Sep 15
CA	Unauthorized modification of ammunition: grenade, hand, smoke L83A1 was wrapped in nylon cord to act as a makeshift trip flare. Unsafe due to high fire index.	2 Sep 15
CA	Driver transported 120 mm ammunition in tubes without lids, securing the ammunition with the vehicle tarp.	24 Sep 15
CA	A 155 mm shell was discovered at a base scrap metal compound after a tilt bin was emptied.	30 Sep 15
CA	During sorting of salvage, eight plastic tubes for 120 mm TK L11 propelling charges were found to contain loose propellant grains. Tubes had been Level 1 screened.	2 Oct 15
CA	Two rounds of 5.56 mm ammunition were discovered in the hot air vent of a high heat drier at a contractor facility	6 Oct 15
CA	Contractors conducting UXO clearance of a drainage ditch recovered a grenade, hand, smoke L83A2, small arms ammunition and some ammunition salvage.	7 Oct 15
CA	Ammunition salvage returned to salvage building included a dud remotely piloted vehicle (RPV) target smoke	19 Oct 15
CA	During an inspection of ammunition salvage returned by a unit, a grenade, hand, smoke functioned in the inspector's hand. No injuries or damage. Four further grenades with hung strikers were discovered in the return.	20 Oct 15
CA	A pallet containing dummy demolition charges, dummy detonating cord, dummy breaching charges and ammunition salvage was discovered at a waste collection point.	21 Oct 15
CA	During maintenance on a Leopard tank, three grenades, hand, smoke were discovered inside an ammunition storage bin. Vehicle had not been properly cleared subsequent to Operation MAPLE RESOLVE.	4 Nov 15
CA	During range maintenance a high explosive hand grenade was found on the ground. The safety pin, safety clip and plastic protective cover were all attached.	9 Nov 15
CA	Subsequent to an accident, all parachute flares of a specific lot were recalled. Two weeks later quantity 4 flares of that lot were returned at the end of an exercise, indicating that the recall had not been properly actioned.	4 Dec 15
RCAF	Prior to unloading, a technician discovered the LAU-116 launcher was in the unsafe position. Note 1	6 Jan 15
RCAF	At third line contractor facility it was discovered that, while robbing the crash position indicator (CPI) in order to conduct a repair, the technician failed to remove the cartridge. Note 1	8 Jan 15
RCAF	Cartridge left on aircraft: aircraft was transported by road to contractor with cartridge still installed. Note 1	8 Jan 15
RCAF	Unexpected results of delivery of armament (unspecified). Note 1	8 Jan 15

L1 or Command Responsible for Reporting	2015 Incident Summary	Date
RCAF	Improper pin procedure - incorrect canopy miniature detonating cord (MDC) pin pulled and stored. Note 1	12 Jan 15
RCAF	Fire bottle was found depleted, subsequent to which the switch in the cockpit was found unguarded. Note 1	13 Jan 15
RCAF	VIP tour conducted on an aircraft that was armed (live weapons). Note 1	26 Jan 15
RCAF	A Paul Bunyan containing search stores was stored in a hangar without appropriate storage approval. Note 1	4 Feb 15
RCAF	During annual verification of museum A&E holdings, several items were discovered to be improperly documented and were removed for further investigation.	17 Feb 15
RCAF	During removal of a life raft the SMDC line was damaged when a technician used it as a point of contact. Note 1	19 Feb 15
RCAF	Aircraft returning with flares did not go through the required hung flare check prior to parking. Note 1	21 Feb 15
RCAF	AIM-7 missile waveguide and electrical connector were contaminated with fuel. Note 1	21 Feb 15
RCAF	Flare burned in bucket - no damage caused. Note 1	27 Feb 15
RCAF	Flare burned in bucket, without causing damage. Technician missed fact during de-arm process. Note 1	3 Mar 15
RCAF	Pilot vacated front seat for back seat without first safety pinning the front seat.	3 Mar 15
RCAF	The MDC pin was not installed after a student flight and was discovered by ground crew.	3 Mar 15
RCAF	Download crew missed a burned flare in the bucket - caught by load crew chief. Note 1	10 Mar 15
RCAF	After operational mission, pilot omitted to replace canopy and ejection safety pins and ground crew failed to note the omission. Omission was only discovered when next pilot took over aircraft. Note 1	11 Mar 15
RCAF	Student pilot neglected to replace safety pin for canopy fracturing system and this fact was missed by the technicians. Omission was noted by next pilot on subsequent day. Note 1	12 Mar 15
RCAF	Time expired aviation life support equipment (ALSE) (including radaflares and mini flares) were discovered during receipt of a life raft. Note 1	16 Mar 15
RCAF	Technician failed to mount cartridges in pylon, later loaded with external tank. Note 1	17 Mar 15
RCAF	Pilot took off without removing canopy and seat safety pins. Note 1	17 Mar 15
RCAF	Aircraft flew through what was supposed to be an "inactive" area through which artillery shells were passing. No damages. Note 1	23 Mar 15
RCAF	While excavating to install a security fence, a probable dump site was discovered. Contract to clear area to be let.	25 Mar 15
RCAF	During unload of weapons, technicians placed the missiles backwards on the trailer, and failed to properly secure the load prior to transportation to the explosives area. Note 1	26 Mar 15
RCAF	Uncommanded dispense of 4 chaff and 4 flares two hours into flight. Note 1	30 Mar 15
RCAF	As a result of undetected progressive breakdown, a Guided Bomb Unit 49 (GBU-49) aircraft bomb failed to drop on command. Note 1	10 Apr 15
RCAF	Gun jam resulted from case-neck separation. Note 1	10 Apr 15
RCAF	Gun jam due to case-neck separation. Note 1	10 Apr 15
RCAF	During an upload of dummy rounds (ballast), live rounds became mixed in with dummy rounds. Note 1	10 Apr 15
RCAF	Uncommanded dispense of chaff: during air combat manoeuvres aircraft dispensed 4 chaff without command from pilot. Note 1	10 Apr 15
RCAF	The canopy fracturing system safety pin was not installed post-flight. Error was only noted when next pilot conducted pre-flight check. Note 1	13 Apr 15
RCAF	Brake burn taxi test was carried out with the canopy fracturing system safety pin in place. Note 1	16 Apr 15
RCAF	During aircraft arming at the arming point, the gun safety switch was found to already be in the armed position. Note 1	18 Apr 15
RCAF	As a result of technicians failing to restore parts after cleaning, a bomb failed to release on command.	20 Apr 15
RCAF	As a marine location marker was pulled from the rack for deployment, the inner and outer shells separated. During a later check, a second marker was found to be missing a crimp. Note 1	21 Apr 15
RCAF	Due to misreading of message extending shelf life of rotary actuator cartridges, installed life records were erroneously altered, resulting in aircraft flying with time expired cartridges. Note 1	21 Apr 15
RCAF	Load crew error when downloading an LGTR resulted in the internal battery firing, thus rendering the weapon a dud. Note 1	22 Apr 15

L1 or Command Responsible for Reporting	2015 Incident Summary	Date
RCAF	As a result of technicians failing to restore parts after cleaning, a bomb failed to release on command. Note 1	26 Apr 15
RCAF	Three aircraft flares failed to depart launcher on being fired. Note 1	28 Apr 15
RCAF	While being prepared for deployment, a C8 smoke canister top separated from the bottom, spilling the parachute and ignition assembly. A subsequent check discovered one more in similar condition in the Paul Bunyan. Note 1	29 Apr 15
RCAF	Subsequent to clearing a C6 weapon and preparing for inspection, the belt of blank ammunition departed the aircraft. Note 1	3 May 15
RCAF	As a result of technician assuming already loaded stores were not time expired, aircraft flew with time expired cartridge actuated devices (CADs). Note 1	6 May 15
RCAF	As a result of technicians failing to restore parts after cleaning, a bomb failed to release on command. Note 1	6 May 15
RCAF	Dangerous cargo aircraft was unloaded without the presence of an ammunition advisor. Note 1	7 May 15
RCAF	Fire bottle discharge occurred during air conditioning system test. Note 1	12 May 15
RCAF	As a result of undetected progressive breakdown, an aircraft bomb failed to drop on command. Note 1	13 May 15
RCAF	During quarterly inspection it was discovered that detonating cord was being stored inappropriately due to an improper interpretation of direction.	15 May 15
RCAF	SMDC line removed from aircraft was not being properly repackaged prior to storage.	15 May 15
RCAF	As a result of poor communications, helicopters performed a fire evacuation of civilian personnel in proximity to a live fire exercise. Note 1	15 May 15
RCAF	Flotation bag switch was left in armed position subsequent to aircraft shutdown. Note 1	26 May 15
RCAF	During gunnery training, C6 weapon failed to cease firing on trigger release. Note 1	28 May 15
RCAF	Classified occurrence.	29 May 15
RCAF	Inadvertent flare dispense. Note 1	4 Jun 15
RCAF	Unqualified technician removed an armament “remove before flight” flag and weapon safety device. Note 1	9 Jun 15
RCAF	Member travelling to airport realized he was carrying eight 16 mm flares and returned these via civilian bus driver. Note 1	10 Jun 15
RCAF	Student pilot discovered canopy fracturing system (CFS) safety pin stowed in storage box during walk around. Note 1	11 Jun 15
RCAF	After landing, pilot forgot to safe his ejection seat with the safety pin. Note 1	12 Jun 15
RCAF	Unsafe ejection seat discovered by technician - missed by pilot during shut-down. Note 1	12 Jun 15
RCAF	Fuel contaminated live weapon on aircraft. Subsequent actions revealed errors in handling/control of contaminated missile. Note 1	14 Jun 15
RCAF	Technician incorrectly safetied LGTR, rendering it unserviceable. Another technician noted the error and affixed a warning label, but failed to sign name or advise load crew, leading to confusion and lengthy period of resolution. Note 1	15 Jun 15
RCAF	MPB failed to release on command due to technician’s failure to properly torque the firing pin electrical connection. Note 1	15 Jun 15
RCAF	MPB failed to fall on command due to undetected progressive breakdown of a firing pin. Note 1	15 Jun 15
RCAF	Pilot exited aircraft without disarming ejection seat. Note 1	6 Jul 15
RCAF	Auxiliary power unit (APU) fire bottle was discharged during fire suppression checks. Note 1	7 Jul 15
RCAF	During loading, passengers utilized the loaded self-defence system bucket as a step. Note 1	10 Jul 15
RCAF	During night self-defence suite (SDS) training, the crew noticed a potential hung flare. On returning to ship several hung flares were discovered. Note 1	11 Jul 15
RCAF	Rear cockpit was discovered to be unsafe - missing canopy jettison and ejection seat safety pins. Note 1	17 Jul 15
RCAF	Uncommanded flare release during test flight. Note 1	23 Jul 15
RCAF	An automatic inflation device (AID) FLU-8A/P was placed on an intrinsically safe mat and left overnight, pending re-installation to a bladder assembly. The next morning it was discovered that it had discharged. Attributed to an ammunition defect, the probable cause being a faulty or sensitive cartridge in the AID, exacerbated by inappropriate storage. Note 1	28 Jul 15
RCAF	Aircraft was jacked with jettison cartridges still installed. Note 1	28 Jul 15
RCAF	Approximately 10 minutes after take-off a door gunner noticed the belt of ammunition was missing. Note 1	29 Jul 15
RCAF	During a check of a search and rescue (SAR) aircraft, a damaged LUU-2C/B parachute flare was found. Damaged flare had not been labelled as such. Note 1	29 Jul 15

L1 or Command Responsible for Reporting	2015 Incident Summary	Date
RCAF	During a fuel stop an ejection seat remained armed. Note 1	29 Jul 15
RCAF	During preparation for aircraft start, technician removed the circuit disconnect safety spring device from a loaded SUU-5003. This action should have occurred at the arming point. Note 1	1 Aug 15
RCAF	Pilot failed to ensure returning aircraft underwent chaff/flare inspection before parking. Note 1	4 Aug 15
RCAF	Uncommanded dispense of aircraft flares. Note 1	7 Aug 15
RCAF	Pilot failed to stop at de-arm point for post-flight chaff/flare inspection. Note 1	10 Aug 15
RCAF	During post-start check, pilot noticed that seat pins had been incorrectly installed (backwards, preventing removal prior to taxiing). Note 1	2 Sep 15
RCAF	Griffon helicopter overflew ammunition storage area while landing. Note 1	10 Sep 15
RCAF	Post recovery from an accident site, an aircraft was placed in a hangar prior to ensuring all energetics had been removed or rendered safe. Note 1	15 Sep 15
RCAF	Dummy/display ammunition was discovered packaged on the same pallet as live ammunition. Note 1	28 Sep 15
RCAF	While conducting close combat attack (CCA) training, a helicopter flew under a gun-to-target line of 81 mm mortars. Note 1	29 Sep 15
RCAF	During loading of an exercise torpedo (EXTORP), the TACCO unexpectedly left the aircraft, armed the torpedo and returned to the aircraft. Note 1	1 Oct 15
RCAF	Unauthorized technician safetied armed aircraft gun. Note 1	6 Oct 15
RCAF	Arming of aircraft was conducted without clearance from tower, resulting in wildlife control vehicle and crew being placed at risk. Note 1	9 Oct 15
RCAF	An improperly installed MDC pin was discovered during a pre-flight inspection. Note 1	20 Oct 15
RCAF	During a de-arm check, it was discovered that 7 flares had failed to fire. Note 1	27 Oct 15
RCAF	Warshot and HOTTORP were loaded on the same aircraft at the same time. Note 1	28 Oct 15
RCAF	Technician tasked to verify existence of linked ammunition misunderstood task and proceeded to de-link ammunition, using an unapproved method in inappropriate location (magazine). Note 1	29 Oct 15
RCAF	Prior to strap-in, the rear seat crew member discovered the ejection seat had not been properly pinned. Note 1	30 Oct 15
RCAF	APU fire bottle discharged as a result of a broken detection unit. Note 1	2 Nov 15
RCAF	During routine maintenance, technicians failed to return serialized components (squibs) to the correct locations. Note 1	4 Nov 15
RCAF	When a CPI was removed from an aircraft, removal was conducted without pulling the circuit breaker and with the explosives cartridge still installed. Note 1	5 Nov 15
RCAF	No clearance received on gun attack. Note 1	12 Nov 15
RCAF	SMDC booster tip was discovered to be bent out of spec. Note 1	13 Nov 15
RCAF	On a close support mission, pilot selected two MPBs for drop and the system indicated two dropped. At the de-arm area, all MPBs were still loaded. Note 1	13 Nov 15
RCAF	Hung flare. Note 1	14 Nov 15
RCAF	During removal of SMDC lines, the tips were found to be damaged. Note 1	16 Nov 15
RCAF	Early initiation of aircraft flare denoted by discolouration and soot. Note 1	19 Nov 15
RCAF	During a pre-flight inspection the front seat pin was found to be improperly seated. Note 1	26 Nov 15
RCAF	Uncommanded flare dispense on two occasions during one flight. Note 1	7 Dec 15
RCAF	Ejection control handle was found improperly locked – handle housing had been installed backwards. Note 1	8 Dec 15
RCAF	Booster tip on SMDC line found bent during routine replacement. Note 1	16 Dec 15
CJOC	During placement of torpedo into a shipping container, the container slipped off the dollies and rolled 90 degrees. The torpedo rolled out of the container and fell to the floor.	5 Mar 15
CANSOFCOM	9 mm ball Luger was fired using Sig Sauer P225 pistols, contrary to published ammunition restriction.	27 Mar 15
CANSOFCOM	Belt of 7.62 mm blank ammunition fell from aircraft and was lost into woods as a result of gunner error.	13 May 15
CANSOFCOM	Member transported personally owned black powder in DND transport along with other dangerous cargo. Vehicle was not equipped with a lockable compartment.	5 Jun 15
CMP	Two SRAAW(M) sub-calibre adapters were shipped to a school where it was discovered that one contained a live cartridge and the other a fired cartridge.	10 Aug 15

NOTE 1: Originally reported in FSOMS

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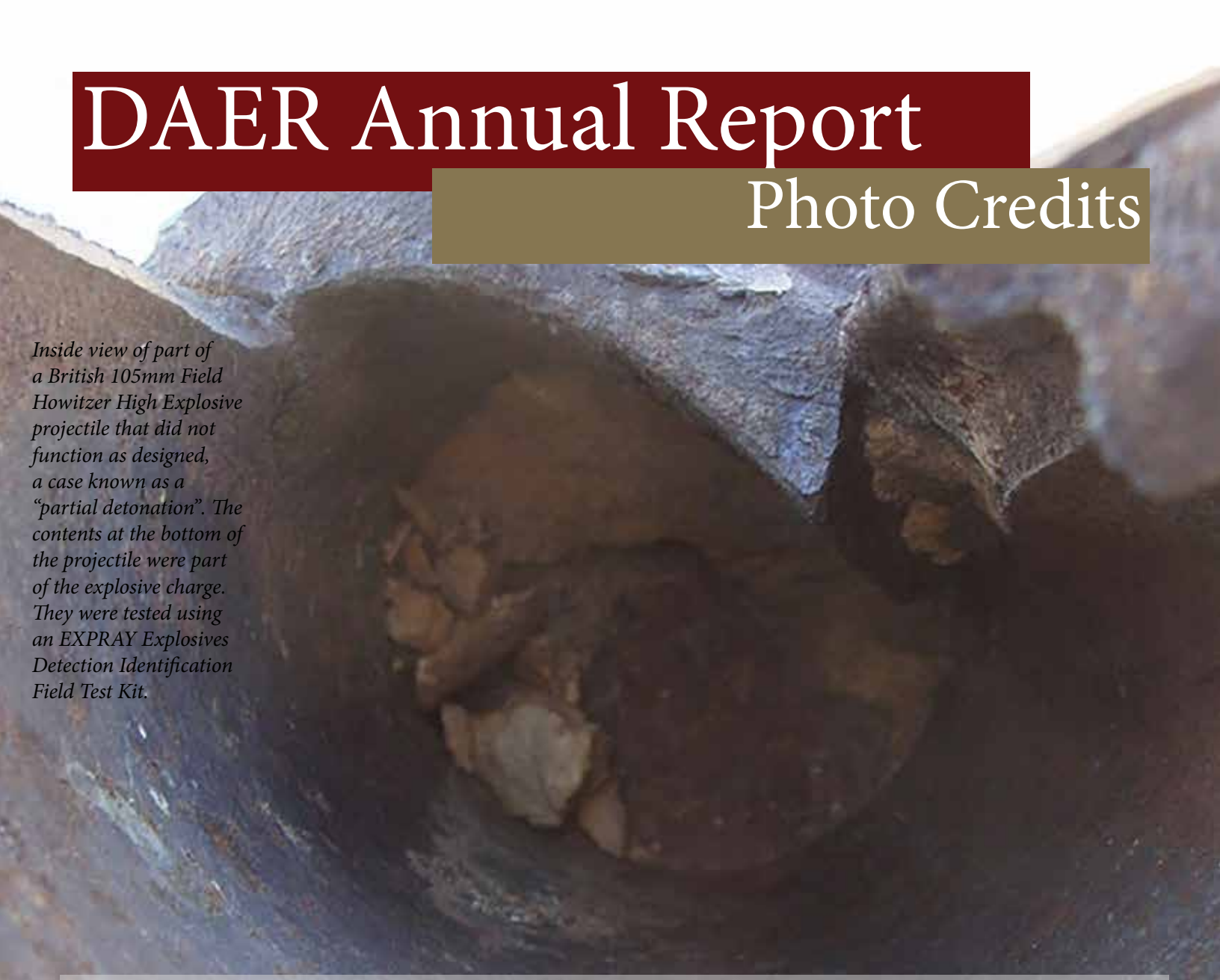

Inside view of part of a British 105mm Field Howitzer High Explosive projectile that did not function as designed, a case known as a "partial detonation". The contents at the bottom of the projectile were part of the explosive charge. They were tested using an EXPRAY Explosives Detection Identification Field Test Kit.

Cover: Picture provided with the ammunition accident detailed report filed by Captain Derek Vanstone, Ammunition Technical Officer, 8 Wing Trenton

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