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DSTO

Maritime Platforms Division Explosives Handling, Storage and Transport Policies

Paul Elischer and Phillip Box

DSTO-GD-0234

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Maritime Platforms Division
Aeronautical and Maritime Research Laboratory

DSTO-GD-0234

ABSTRACT

MPD Explosives Policies are issued to MPD personnel involved with explosives operations. This document outlines the responsibilitites of nominated staff, safety aspects, and approval procedures.

RELEASE LIMITATION

Approved for public release

DEPARTMENT OF DEFENCE
DEFENCE SCIENCE & TECHNOLOGY ORGANISATION
DSTO

Published by

DSTO Aeronautical and Maritime Research Laboratory
PO Box 4331
Melbourne Victoria 3001 Australia

Telephone: (03) 9626 7000
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AR-011-187
January 2000

APPROVED FOR PUBLIC RELEASE

Maritime Platforms Division
Explosives Handling, Storage and Transport Policies

Executive Summary

MPD Explosives Policies are issued as a guide to MPD personnel involved with explosives operations. The report outlines general safety and security procedures for explosives operations. Personnel responsibilities are detailed and the documentation and reporting requirements are discussed.

Authors

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Maritime Platforms Division

Paul Elischer graduated from Footscray Institute of Technology with a Diploma of Applied Science (Chemistry) in 1974. Since joining AMRL he has worked in explosive research and development, the military application of explosives in a range of specialised devices and the study of air and underwater blast parameters. He was a principal in establishing an Australian capability for shock testing naval vessels and currently leads a team undertaking shock studies of naval platforms and shock testing naval vessels.

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Phillip Box has worked with explosives for 19 years in many aspects of evaluating explosives and the interaction of explosives with platforms, structures and components. Phillip is the most senior high explosive practitioner in Maritime Platforms Division. Phillip manages the divisions high explosives experimental infrastructure and instrumentation.

Contents

1. Introduction

Maritime Platforms Division (MPD) of the Aeronautical and Maritime Research Laboratory (AMRL) occupies sites at Maribyrnong and Fishermans Bend in Victoria and HMAS Stirling in Western Australia. Elements of research conducted in MPD require the use of explosive materials. In compliance with Departmental and organisational instructions this document lays down policies that shall be complied with by all MPD personnel working with explosives.

All MPD explosives facilities, operations and processes shall comply with the Commonwealth Explosives Regulations [1], Defence Instructions DI (G) LOG 07-1 [2] and DI (G) LOG 01-4 [3], Departmental Science Instruction No 2/97 [4] and the Defence Explosives Safety Manual, OPSMAN 3 [5]. Where this policy is inconsistent with any of the above regulations, instructions or OPSMAN 3 then the relevant regulation, instruction or OPSMAN 3 supplants this policy.

The hierarchy of these documents is shown in Figure 1. The upper level is the Commonwealth and Departmental Regulations and Instructions. Subordinate to these is the Departmental Science Instruction for the Defence Science and Technology Organisation (DSTO) and subordinate to that is this policy. The lower level comprises the MPD working documents.

This policy supersedes the AMRL Explosives Regulations [6].

Copies of this document and any future amendments shall be forwarded to the Explosives Safety Audit Group (ESAG), Australian Ordnance Council.

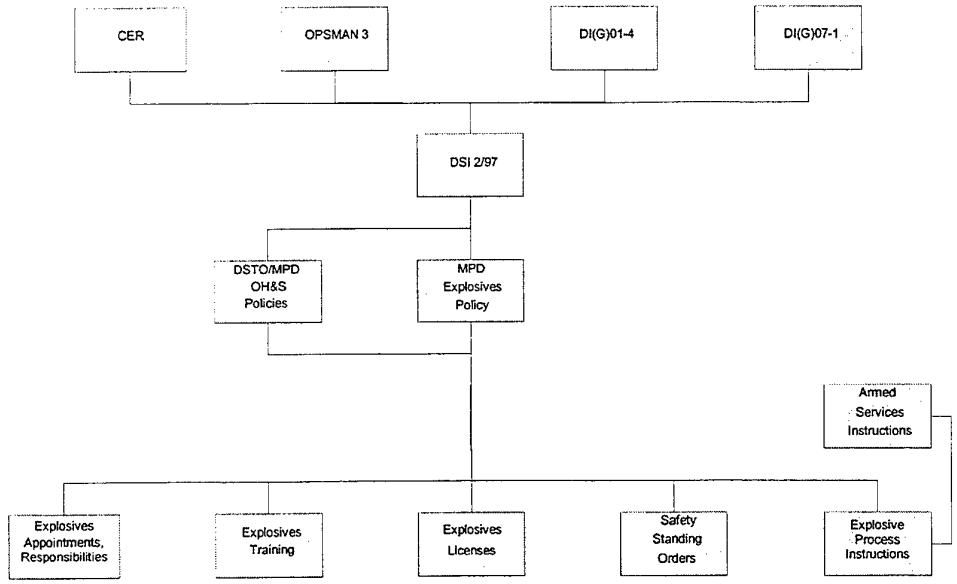

Figure 1: Hierarchy of explosives regulation documents

2. MPD Documentation

2.1 Explosives Licences

All facilities used for storing or handling explosives must be licensed. The Explosives Licence (EL) details the Laboratory/Facility Manager/Officer-in-Charge (OIC), and Deputy, the approved processes and maximum quantity and hazard classification of explosives permitted. The EL shall be clearly displayed near the entrance of the facility. ELs must be sent to the DSTO Licensing Authority Chief, Weapons System Division (CWSD) via the MPD Explosives Management Group for approval. The EL must be signed by the OIC, reviewed by MPD Explosives Management Group, endorsed by Chair, Explosives Safety Advisory Panel (ExSAP) and approved by CWSD or his delegate.
All ELs shall expire at the end of each calendar year. The EL shall be complemented by Safety Standing Orders (SSO).

2.2 Safety Standing Orders

All facilities used for storing or handling explosives shall have Safety Standing Orders (SSO). The SSO details the Laboratory/Facility Manager/(OIC), and Deputy, the processes and maximum quantity and hazard classification of explosives permitted and also lists specific instructions for the facility. It may direct personnel to follow explosives instructions.
The SSO shall comply with DSTO Policy on SSOs and shall be prominently displayed near the entrance to the facility. All SSOs shall expire at the end of each calendar year.
All SSOs must be signed by the OIC, reviewed by the MPD Explosives Management Group (member of ExSAP) and approved by the Research Leader (RL). Copies of the SSO are to be sent to ExSAP for archiving.

2.3 Temporary SSO

A temporary SSO shall be sought if the work requirements dictate a change to the annual SSO. The approval of a temporary SSO will only be valid for the time needed to meet the temporary requirement, up to a maximum of four weeks.

2.4 MPD Explosives Instructions (EIs)

MPD Explosives Instructions (EIs) are issued to cover the conduct of MPD explosives operations within and outside DSTO facilities. All EIs must be endorsed by the OIC and approved by Chair MPD Explosives Management Group.

2.4.1 Technical Instructions

Technical Instructions shall be prepared when conducting explosives work at facilities that are not under DSTO control. The instructions must be commensurate with the local rules and regulations for that facility and shall cover the conduct of the activity, transport and storage of explosives, areas of responsibility, safety and firing. Technical

Instructions will nominate appropriate personnel to be the AMRL Officer-in-Charge, and the AMRL Firing Officer. Technical Instructions shall be distributed to all staff involved in the work activity.

2.4.2 Firing Instructions

Firing Instructions shall be prepared for the initiation of all explosives and for the firing of munitions. These instructions shall detail the procedures to be adhered to, the equipment to be used and the actions to be taken in the case of a misfire. A copy shall be clearly posted at the workplace.

2.4.3 Waste Disposal Instructions

Instructions for the disposal of explosives or waste contaminated with explosives shall be prepared and posted in the relevant work areas.

3. Responsibilities and Appointments

3.1 Director, AMRL

The Director, AMRL (DAMRL) is responsible for the safety and security of AMRL establishments.

3.2 Chief, WSD

CWSD is the DSTO Licensing Authority for all DSTO explosives storage, processing and handling facilities and is responsible for the appointment of DSTO personnel to undertake explosives transport operations.

3.3 Chief, MPD

The Chief, Maritime Platforms Division (CMPD) is responsible for the safe handling, storage and transport of explosives required for MPD activities. CMPD is also responsible for the appointment of MPD personnel to undertake explosives firings and storage operations.

3.4 Research Leaders (RL)

The Research Leader is responsible for authorising explosives activities and for ensuring that operations within their jurisdiction are carried out in accordance with Defence policy and this MPD Policy.

3.5 Explosives Safety Advisory Panel (ExSAP)

ExSAP advises DAMRL, CWSD and the MPD Explosives Management Group on explosives safety and operations and the conduct of reviews and audits. It is a signatory to ELs. The Terms of Reference of the ExSAP are shown at Annex A.

3.6 MPD Explosives Management Group

The MPD Explosives Management Group is composed of MPD staff, appointed by CMPD, experienced in a range of explosives operations. It maintains representation on the AMRL Explosives Safety Advisory Panel (ExSAP) and advises CMPD and MPD personnel on explosives safety and operations.
The Group is responsible for explosives safety, training, conducting and reporting on internal audits and documentation within MPD. It is a signatory to ELs and SSOs. The Terms of Reference of the MPD Explosive Management Group are shown at Annex B.

3.7 Officers in Charge

Research Leaders will appoint Officers-in-Charge of explosives facilities. They shall be experienced staff who have demonstrated a responsible attitude to safety and good operational practice. They shall have in-depth knowledge of the equipment and materials to be used at their facility and be able to develop safe practices and procedures commensurate with the experimental requirements. They shall be responsible for promulgating ELs, SSOs and EIs and ensure that all operations carried out comply with all the relevant regulations and documentation. The OIC shall have the authority to halt any work or proposed work in the facility if not satisfied that all criteria have been met.

3.8 Senior Firing Officers

A MPD staff member shall be appointed as a Senior Firing Officer (SFO). The SFO shall be nominated by MPD Explosives Management Group, endorsed by ExSAP, and approved, in writing, by CMPD.
The SFO shall have an in depth knowledge of the materials and equipment with which they work and be able to develop safe practices and procedures. The SFO will be responsible for selection and training of MPD staff as Firing Officers.

3.9 Firing Officers

MPD staff members shall be appointed as Firing Officers (FO). The FO shall be nominated by the SFO, endorsed by MPD Explosives Management Group and approved, in writing, by CMPD.
The FO shall have a good knowledge of the materials and equipment with which they work and be able to develop safe practices and procedures. The FO will be responsible for the safe initiation of energetic materials using the systems and procedures for which they have been trained.

3.10 Explosives Transport Officers

CMPD shall nominate, and seek formal approval in writing from CWSD, MPD staff to be appointed in the following positions:

- Supervisor;
- Persons qualified to certify Shipper's Declarations (Shipping Officer); and
- Persons to certify that containers (including packaging) that have contained explosives are free from explosives.

4. Explosives Training

MPD staff working with explosives shall receive comprehensive instruction and training in MPD explosives safety requirements and shall attend an annual Explosives Safety Refresher Course. All personnel shall undertake an Explosives Safety Awareness Course before commencing work on explosives.

These courses shall be conducted by WSD, coordinated through the MPD Explosives Management Group and ExSAP. The MPD Explosives Management Group and WSD Explosive Safety Officer (ESO) shall maintain a register of the courses and staff attendance.

Personnel shall have comprehensive training in explosives activities, to the satisaction of the OIC, prior to carrying out such activities.

It is the responsibility of all personnel working with explosives to ensure they have received adequate training.

5. MPD Explosives Facilities

MPD's explosive operations are conducted in Building 682 at Maribyrnong, at the AMRL Underwater Test Facility at Epping, at the Proof and Experimental Establishment, Graytown (P & EE(G)), Victoria and on occasions at other locations. These activities are to be documented as per 2.4.

5.1 Building 682

Activities in Building 682 study the ballistic performance of munitions and armour packages. The work involves unloading and reloading cartridges with varying propellant charge weights and the firing of rounds in a small ballistic range. The building is shared with other non-explosive related activities. The explosives work is limited to a number of bays, a magazine and an armoury. Access to the building is controlled to ensure that conflicting operations do not occur.

The explosives limits for these facilities is confined to small quantities of Hazard Division 1.2, 1.3 and 1.4 explosives and is commensurate with the requirements of the AMRL research and development program. The Explosives Licences, Safety Standing Orders and Explosives Instructions control operations in this facility.

5.2 AMRL Underwater Test Facility

This facility is a permanently flooded quarry hole situated in a large disused rock quarry. It is approximately 100m x 80m with a water depth ranging between 16-20m. AMRL has a licence agreement with the owner for use of the flooded quarry and a small compound surrounded by a cyclone wire fence. Access is via a locked gate. There are various portable buildings in the compound comprising a charge preparation room, an explosive magazine and a number of non-explosive storage, instrumentation and amenity buildings. Research conducted at this facility studies the underwater shock associated with the detonation of high explosives underwater, and the interaction of the shock wave with structures. Explosive activities are restricted to the initiation of uncased high explosive charges using exploding bridgewire (EBW) detonators.
The explosive limits for this facility are confined to small quantities of Hazard Classification Code (HCC) 1.1D explosives and EBW detonators (HCC 1.4S). The limits are commensurate with the requirements of the AMRL research and development programs. The Explosives Licences, Safety Standing Orders and Explosives Instructions control operations in this facility.

5.3 Proof and Experimental Establishment (Graytown)

P & EE (G) is an Army test and evaluation facility supporting the Army ordnance and explosive procurement program. Access and use is approved by the Army Engineering Agency (AEA) on receipt of a formal request together with AMRL Technical Instructions (TI) detailing the activities to be undertaken. Research conducted at this facility studies the shock parameters associated with the detonation of high explosives in air and the interaction of the shock wave with structures and equipment. Explosive activities are restricted to the initiation of the high explosive charges using exploding bridgewire detonators in compliance with Firing Instructions. Overall explosives safety at this facility is covered by the appropriate Army explosives regulations.

6. Access To Explosives Facilities

Staff issued with keys shall be responsible for their safe keeping, ensuring that each building or facility is secured at the close of business each day and that the keys are returned to the OIC or delegate at the completion of the work activity.

6.1 Building 682

Entry to Building 682 and use of the facilities shall be controlled and monitored by the OIC via AMRL Security. AMRL Security shall be given a list, to be reviewed on an annual basis, of personnel approved to access the building and can issue keys as required. If the activities do not involve explosives then personnel wishing to enter or use the facility shall obtain permission from the OIC. If the operations involve explosives then a formal authority to conduct the work shall be approved by the

relevant RL and Chair MPD Explosives Management Group prior to any operations being carried out.

6.2 AMRL Underwater Explosive Test Facility, Epping.

Entry to or use of the AMRL Underwater Test Facility shall be controlled and monitored. The OIC or his delegate shall be the issuing authority for keys to that facility. If the activities do not involve explosives personnel wishing to enter or use the facility shall obtain permission from the OIC. If the operations involve explosives then a formal authority to conduct the work shall be approved by the relevant RL and Chair MPD Explosives Management Group prior to any operations being carried out.

6.3 Facilities not under MPD control

Access to and use of facilities not directly under MPD control, such as P & EE (G), must be commensurate with the local rules and regulations for that facility. Final arrangements for their use shall only be made after written approval to conduct explosive activities has been obtained from the relevant RL and the Chair MPD Explosives Management Group. MPD Technical Instructions detailing the work activities and responsibilities must be appended to the approval request.

7. Storage and Transport

MPD Explosives Management Group shall overview the storage and transport of explosives for MPD and provide advice to OICs to enable them to comply with their obligations.

7.1 Off-site Storage

The bulk of MPD explosives shall be stored at the Royal Australian Navy Armament Depot, Somerton [RANAD (S)] under the existing MPD/RANAD (S) Memorandum of Understanding and at ADI Explosives Factory (Mulwala). The Shipping Officer (SO) shall control the movement of MPD explosives. Explosives items stored at RANAD (S) must be issued with a DEOCL and Defence Stock Number (DSN). If no DEOCL or DSN is available the Shipping Officer (SO) shall apply for a DEOCL number from the DSTO representative on the Explosives Storage and Transport Committee and a DSN from Logistics Supply Manager for RANAD (S).

7.2 On-site Storage

The OIC shall approve any explosives movement in and out of their facility and ensure that the explosives are stored in accordance with the EL, SSO and the relevant Regulations and Instructions. The OIC of each facility shall be responsible for the safe custody and correct issue/return of the magazine key and for ensuring that each magazine is secured at the close of business each day.

7.3 Explosives Contents Board (ECB)

Each facility licensed for explosives shall have an Explosives Contents Board (ECB), summarising the Net Explosives Quantity (NEQ) of each Hazard Division present, including waste. It shall be mounted outside near the entrance to the facility. The OIC is responsible for ensuring that the ECB accurately states the explosive contents within the facility at all times.

7.4 Transport of MPD Explosives

The MPD Shipping Officer (SO) shall ensure that the transport of MPD explosives complies with relevant regulations.
Every movement of explosives shall be traceable via documents signed by the issuing officer, the transport officer or contractor, and the receiving officer. These documents shall be stored for auditing purposes.
The SO shall complete Form AB 788 "Shippers Declaration for Dangerous Goods - Surface Mode" and the MPD Explosive Movement/Use Advice for all MPD explosives being transported by third parties.
The SO shall complete the MPD Explosive Movement/Use Advice for all MPD explosives being transported by MPD personnel.

7.5 Use of MPD Explosives

The Firing Officer shall ensure that the use of explosives is documented using the relevant proforma for that firing facility. The Firing Officer shall forward the proforma to the MPD Shipping Officer for archiving and updating the explosives database.

7.6 Explosives Database

The MPD Shipping Officer shall maintain a MPD explosives database detailing MPD explosives holdings and use. The database shall provide a full history of MPD explosive movement.
The database shall be readily accessible for monitoring and auditing purposes.

7.7 Explosives Stocktake

MPD Explosives Management Group shall ensure that an annual 100% stock-take and a quarterly spot check of 10% of MPD explosives are conducted.

7.8 Monitoring and Audits

MPD Explosives Management Group shall liaise with the Monitoring Authority for DSTO to conduct an internal audit and report on MPD explosives facilities and operations at least once a year. The Manager Scientific and Engineering Services (MSES) is the action officer for arranging and conducting these audits. A MPD status report detailing actions taken on audit recommendations shall be submitted to the Monitoring Authority via CMPD within 6 months from receipt of the audit report.

MPD Explosives Management Group shall liaise with the Explosive Safety Audit Group (ESAG), of the Australian Ordnance Council, to conduct an external audit. The frequency of this audit shall be determined by ESAG. A MPD status report detailing actions taken on ESAG audit recommendations shall be submitted to the Australian Ordnance Council via CMPD within 6 months from the receipt of the ESAG audit report.

7.9 Armoury

MPD weapons used for ballistic studies shall be stored in the Armoury which complies with the requirements stipulated in SECMAN 4 (7). Control of access, issue and management of weapons are the responsibility of the OIC. Firing bolts must be separated from their weapons and stored in a Class B safe. No ammunition is to be stored in the armoury.

7.10 Empty Explosives Containers

Containers (including packaging) that have contained explosives shall be certified "free from explosives" by appointed officers before they can be transported as non explosive.

7.11 Explosive Waste

All explosive waste shall be placed in clearly labelled containers specified on the SSO and shall be recorded on the ECB. The Officer-in-Charge shall arrange for explosive waste to be forwarded to SATO Southern Region for disposal.

8. General Policy

8.1 General

Explosives shall be handled with care and in compliance with all regulations, instructions, licences, SSOs and explosives instructions.
Type-tested and certified safety shields shall be used where practical. Personal protective equipment as specified on the SSO shall be worn.
Only those tools approved by the OIC shall be used when working with explosives.
Work places shall be kept clean commensurate with safe working practices.
Articles such as smoking materials, matches, etc are prohibited in any explosives facility and must be stored in the designated areas.
A list of prohibited articles shall be displayed at each facility.
The OIC shall be responsible for ensuring that appropriate signs are displayed to alert personnel that explosives operations are in progress.
Personnel working with explosives shall not work in a situation where immediate assistance in the event of an emergency is not available.
Foodstuffs shall only be stored and consumed in designated areas.

8.2 Static Electricity and Rad Haz

The OIC of those facilities incorporating antistatic grids shall be ensure that they are conformance tested annually.
Radiation emissions from electrically operated devices, such as hearing aids, mobile phones, pagers, handheld radios etc may constitute a safety hazard. Their use or presence within an explosives facility or building must be carefully controlled and approved by Chair MPD Explosives Management Group.

8.3 Action on Approach of a Thunderstorm

If the OIC considers that an approaching thunderstorm might constitute a risk to personnel they shall immediately close down explosives operations and evacuate personnel. Any firing circuits are to be disarmed and the facility is to be made safe, secured and evacuated until the thunderstorm has passed.

8.4 Clearance Procedures

Maintenance or renovations to buildings or equipment in a licensed facility shall not be undertaken without the approval of the OIC. Work shall not commence until a Work Permit has been issued and signed by the OIC. This document shall certify that the facility or equipment is free from explosives and that work can proceed safely and after completion of the work that the facility and equipment is safe for explosives operations.

8.5 Persons under the Influence of Intoxicants or Drugs

Persons under or appearing to be under the influence of intoxicants or drugs are not permitted to work with explosives or within the facility where explosive work is being undertaken. Anyone found in, or reasonably suspected of being in, such condition shall be removed from that facility and not allowed to return without the written permission of CMPD.

8.6 Visitors

The OIC shall be responsible for all non-MPD personnel such as contractor's etc, requiring access to the MPD explosives facilities for non-explosive operations. The OIC shall fully brief them on the terms of entry and safety aspects to which they must adhere.
All other visitors to MPD explosives facilities shall be escorted at all times.

9. Emergency Procedures

The OIC shall be responsible for an emergency response plan (ERP) for each explosives facility. All staff working at MPD explosives facilities shall be briefed on the emergency

evacuation procedures and assembly areas. The MPD Explosives Management Group and the OH & S representative can provide advice to the OIC on emergency planning.

9.1 Reporting of Incidents and Accidents

Personnel shall immediately report any unusual or hazardous occurrence to the OIC of that facility and the MPD Explosives Management Group. In experimental/ development and fieldwork it may be necessary to deal with any shortcomings in equipment, procedures or operations on site. In these instances a competent assessment of the associated hazards shall be conducted and a decision made by the OIC on the way to proceed.

Unexpected incidents or accidents involving explosives are to be reported immediately to the OIC, MPD Explosives Management Group and CMPD. CMPD via the MPD Explosives Management Group and in conjunction with ExSAP shall decide the next course of action.

In the event of an incident or accident all operations shall cease and the area shall be made safe and secured. Evidence of the accident shall be preserved pending further action.

10. References

1. Commonwealth Explosives Regulations: Statutory Rules 1991 No. 329
2. LOG 07-1, Safety Principles for the Storage and Handling of Ammunition and Explosives, 3 January 1997, and as amended
3. LOG 01-4, Safety Policy for the Transport of Dangerous Goods United Nations Class 1, 13 December 1996, and as amended
4. Departmental Science Instruction (DSI) 2/97, Implementation in the DSTO of Defence Policy for the Storage, Handling and Transport of Ammunition and Explosives, 27 November 1997, and as amended.
5. OPSMAN 3, Defence Explosives Safety Manual, November 1994, and as amended.
6. AMRL Explosives Regulations, B.W. Thorpe, DSTO General Document DSTO-GD-0098, July 1996.
7. SECMAN 4, Defence Protective Security Manual, Edition 3, 1998

Appendix A: AMRL ExSAP TERMS OF REFERENCE

The AMRL Explosives Safety Advisory Panel (ExSAP) will operate under the cognisance of Chief, Weapons Systems Division (CWSD) and will have the following composition and terms of reference.

A.1. Composition

A.1.1 Representatives drawn from a broad cross section of WSD explosives staff and a representative of each of the other divisions involved in explosives activities. This will normally include representatives from each WSD work area involved in explosives activities.

A.1.2 A representative of the DSTO Occupational Health and Safety organisation.

A.1.3 The WSD Explosives Safety Officer (ESO).

A.1.4 Membership of the panel will be reviewed biennially.

A.2. Terms of Reference

A.2.1 To advise the respective Director and Chief of Division, through CWSD, on all explosives safety matters for DSTO laboratories.

A.2.2 To examine and advise on the safety aspects, including training, of proposed new explosives operations within DSTO laboratories.

A.2.3 To conduct an annual review of DSTO laboratories explosives operations and their associated Safety Standing Orders.

A.2.4 To form sub-committees, that may include non-ExSAP members, to examine specific explosives safety issues as required.

A.2.5 To conduct at least one annual explosives safety audit of an explosives operation at DSTO laboratories, checking compliance with AMRL policies and regulations.

A.2.6 At the direction of CWSD, to provide representatives to investigate accidents or unusual occurrences attributed to explosive causes.

A.2.7 In conjunction with the ESO, to provide an annual report to CWSD.

Appendix B: MPD Explosives Management Group TERMS OF REFERENCE

The MPD Explosives Management Group shall operate under the cognisance of the Chief, Maritime Platform Division (CMPD) and will have the following composition and terms of reference.

B.1. Composition

B1.1 The MPD Explosives Management Group shall have representation from every area of MPD where explosives are used directly by MPD personnel.

B1.2 The Chair of the Explosives Management Group shall have extensive experience and understanding in the use of explosives to aid research.

B.2. Terms of Reference

The Explosives Management Group shall:

B.2.1 Ensure all MPD explosives operations, processes, storage and transport complies with all Commonwealth legislation, regulation, instruction and policies.

B.2.2 Advise CMPD on all explosives matters in MPD.

B.2.3 Advise CWSD, through the Explosives Safety Advisory Panel (ExSAP) of MPD's explosives facilities, operations, processes and appointments.

B.2.4 Maintain membership on the ExSAP.

B.2.5 Provide the conduit for the communication of MPD explosives matters to ExSAP and information on explosives matters from ExSAP to the relevant MPD personnel.

B.2.6 Examine and advise on the safety aspects of MPD explosives operations and processes.

B.2.7 Provide advice for Officers-In-Charge of explosives facilities and operations to assist the OIC in complying with all Commonwealth, departmental, laboratory and divisional regulations, instructions and policies.

B.2.8 Provide an annual report of MPD explosives operations to CMPD and CWSD, through ExSAP.

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Total number of copies: **60**

DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION DOCUMENT CONTROL DATA	1. PRIVACY MARKING/CAVEAT (OF DOCUMENT)

2. TITLE	3. SECURITY CLASSIFICATION (FOR UNCLASSIFIED REPORTS THAT ARE LIMITED RELEASE USE (L) NEXT TO DOCUMENT CLASSIFICATION)
Maritime Platforms Division Explosives Handling, Storage and Transport Policies	Document (U) Title (U) Abstract (U)

4. AUTHOR(S)	5. CORPORATE AUTHOR
Paul Elischer and Phillip Box	Aeronautical and Maritime Research Laboratory PO Box 4331 Melbourne Vic 3001 Australia

6a. DSTO NUMBER	6b. AR NUMBER	6c. TYPE OF REPORT	7. DOCUMENT DATE
DSTO-GD-0234	AR-011-187	General Document	January 2000

8. FILE NUMBER	9. TASK NUMBER	10. TASK SPONSOR	11. NO. OF PAGES	12. NO. OF REFERENCES
510/207/1111	RDI 99/77	DSTO	17	6

13. URL of pdf version	14. RELEASE AUTHORITY
http://www.dsto.defence.gov.au/corporate/reports/DSTO-GD-0234.pdf	Chief, Maritime Platforms Division

15. SECONDARY RELEASE STATEMENT OF THIS DOCUMENT

Approved for public release

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No Limitations

17. CASUAL ANNOUNCEMENT Yes

18. DEFTEST DESCRIPTORS

Explosives
Transportation
Hazardous Materials
Safe handling
Munitions storage
Materials handling

19. ABSTRACT

MPD Explosives Policies are issued to MPD personnel involved with explosives operations. This document outlines the responsibilitites of nominated staff, safety aspects, and approval procedures.