

**Headquarters Australian Defence Force**

**Australian Ordnance Council**

**THE AUDIT OF EXPLOSIVES STORAGE AND TRANSPORT WITHIN  
THE  
AUSTRALIAN DEFENCE FORCE**

**by**

**LW. Johnson  
&  
M.J. O'Reilly**

# Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>AUG 1994</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-1994 to 00-00-1994</b>			
4. TITLE AND SUBTITLE <b>The Audit of Explosives Storage and Transport Within the Australian Defence Force</b>		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Australian Ordnance Council, Ministry of Defence, Campbell Park Offices, Canberra, Act 2600, Australia,</b>		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADM000767. Proceedings of the Twenty-Sixth DoD Explosives Safety Seminar Held in Miami, FL on 16-18 August 1994.</b>					
14. ABSTRACT <b>see report</b>					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>8</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

## **THE AUDIT OF EXPLOSIVES STORAGE AND TRANSPORT WITHIN THE AUSTRALIAN DEFENCE FORCE - by R.W. Johnson and M.J. O'Reilly**

**Abstract.** A Government audit of Australian Defence Force (ADF) explosives storage and transport safety several years ago highlighted a number of deficiencies in the practices being employed and recommended that an independent audit group be established within the Australian Ordnance Council to monitor the ADF's compliance with explosives storage and transport safety principles.

This audit group (The Explosives Safety Audit Group (ESAG)) was established in 1990 and has been conducting audits of ADF facilities since then. This paper summarises the activity of the ESAG, presents its findings, and evaluates the usefulness of such a group. The findings of the ESAG may also stimulate some interest for others to follow a similar course.

### **Introduction/Overview**

In 1981, with the intent of ensuring that the highest possible safety standards were applied, the Australian Department of Defence adopted the United Nations publication STISG/AC.10.1 (Recommendations on the Transport of Dangerous Goods) for the Classification of Dangerous Goods, and introduced revised principles for the storage of ammunition and explosives similar to those in use within NATO. The Department set December 1983 as a target date for completion of implementation of the new safety principles.

Subsequent audit by the Australian National Audit Office (ANAO) commencing in December 1985, and reported to the Australian parliament by the Auditor-General in April 1988, found that the Department of Defence had not met its December 1983 target date for completion of implementation, and reported that even as late as early 1988 there were still many locations at which explosives-related operations did not comply with the new safety principles.

In 1989, the Australian Parliament's Joint Committee of Public Accounts reviewed the Auditor-General's Report and conducted a public inquiry into the findings of the report. The committee found that there were administrative weaknesses in the application of and compliance with Department of Defence safety principles for the storage of ammunition and explosives, and recommended that independent audits to check compliance with the safety principles be implemented.

Consequently, the Explosives Safety Audit Group (ESAG) was established within the Australian Ordnance Council in 1990 to conduct independent audits and report on the application of and compliance to the Australian Department of Defence safety principles for the storage of ammunition and explosives.

### **Pre-ESAG**

Before discussion of ESAG activities and the subsequent value provided to the enhancement of explosives safety within the Australian Department of Defence, it is necessary to look briefly at the modus operandi that existed pre-ESAG.

Prior to the adoption of the new safety principles for ammunition and explosives storage, each element of the Department of Defence (Navy, Army, Air Force and the Defence Science and Technology Organisation), had independent responsibility for the determination, implementation, and verification of safety for its explosives storage.

Although adoption of the new safety principles was a Department imperative, responsibility for implementation and verification was left to the independent elements of Defence. Unfortunately this situation was like having rabbits guard the carrots, and despite an unquestionable commitment by the individual elements to comply with the new safety principles, implementation and verification became enmeshed in the exigencies of the individual elements, and subjected to the eternal battle of requirements versus available resources and priorities.

In addition, the lack of centralised control and/or recording of operations or activities prevented accurate assessment and reporting of the level of safety standard compliance existing not only across the whole department, but in each element of Defence as well. Therefore, following from the Joint Parliamentary Committee's Review and Inquiry, a central Defence Authority (at 2 Star level) was designated to be responsible for overseeing compliance with safety principles for the storage of ammunition and explosives within the Department

### **Australian Department of Defence Policy**

Resulting from the Joint Parliamentary Committee review and public inquiry, the Department issued a new and more comprehensive policy document setting out the requirements for the safe storage of ammunition and explosives. This document defines "storage" as including manufacturing, laboratory, processing, and handling activities such as occur at RAAF ordnance loading areas". Following advice from the Federal Attorney-General this policy document was cleared by the Minister for Defence (on behalf of the Australian Government) before promulgation.

The basic tenet of Australian Department of Defence policy for safe storage of ammunition and explosives is that storage will only occur at sites specifically licensed for storage activity. The safety principles adopted do not prescribe measures which guarantee immunity from the effects of an explosion, instead the risks inherent in them are a balance between absolute safety and the practical considerations of cost and efficiency. Authorities responsible for licensing storage sites are charged with issuing licences only where in their considered judgement the associated hazard to people or property is no greater than the hazard level detailed in the safety principles.

Each element of the Department of Defence has been made responsible to ensure that compliance with the safety principles is independently monitored by technically competent persons who are independent of day-to-day management and licensing of storage activities. In addition, ESAG is

required to independently conduct audits on application of the safety principles within the Department.

### **Audit Method**

There are some 350 establishments within the Australian Department of Defence where ammunition and explosives in varying quantities are stored. The method employed by the ESAG for auditing compliance to the Defence safety principles is to visit all these locations to conduct an examination of the practices and procedures that are applied. Each audit visit has the same two aims:

- a. assess compliance with safety principles for storage of ammunition and explosives, and
- b. assess effectiveness of controls and procedures in use to ensure that the required standard of explosives safety is being met.

At the completion of each audit visit, the ESAG advises the audited establishment of its findings and recommendations. A subsequent written report of the audit findings and recommendations is provided to the Defence Competent Authority, and Senior Management of the applicable Defence element

### **ESAG Findings**

The findings and subsequent recommendations of the ESAG fall into four broad groupings. These groupings are:

- a. the audited establishment has not published local working and management instructions or they are inadequate and corrective action by the audited establishment is required,
- b. Defence element instructions and guidelines are not being followed and corrective action is required by the audited establishment,
- c. individual Defence element instructions do not accord with Department policy requirements (or the safety principles) and review by responsible staff is required, and
- d. Departmental policy requirements require review (or additional guidance on a specific aspect of the safety principles is required) by the Competent Authority.

Whilst the first two groupings should account for most ESAG audit findings, review of the reports of the early audits show that findings in the latter two groupings accounted for almost half of the total findings. Some of the more significant of the ESAG findings are discussed in the following paragraphs.

**Licensing.** The ESAG found that each of the Defence elements had developed different methodology and attitude in the licensing of ammunition and explosives storage sites, and that

additional guidance should be provided.

Different methodologies for licensing explosives storage found by the ESAG, designated A, B and C, are:

**Method A.** The quantity of explosives that may be authorised for storage at a particular site by a Licensing Authority (LA) is computed solely on the basis of available separation distances between the Potential Explosion Site (PES) and any Exposed Sites (ES) using the applicable prescriptive Quantity Distance (QD) Tables.

**Method B.** Having applied Method A, consideration is then given by the LA to physical storage limitations at the storage site, reducing the quantity of explosives licensed accordingly.

**Method C.** In addition to Method B, the LA further reduces the quantity of explosives licensed by applying localised constraints such as time period usage rates, or more stringent individual defence element requirements (for example no HD 1.1 storage permitted if the site is untraversed).

Although the basic responsibility to ensure that the tolerable risk level is not exceeded would be satisfied through the common step applied at Method A, the extra control of risk attempted by the use of Methods B and C, with consequent self imposed constraints could result in unnecessary administrative and financial penalties (for example under-utilisation of storage facilities, unnecessary waivers, and unnecessary purchases of additional land for safety buffers).

As each element of Defence is independently responsible for implementation of the safety principles, there is a very strong tendency not to seek external guidance with interpretation of the safety principles or assistance in resolving any problems encountered during implementation. Consequently there are many cases of self inflicted administrative and financial penalties occurring, and deficiencies in requirements laid down by the Department's policy are not reported. In specific cases the ESAG has found that a problem can and has been allowed to linger without any visible conscientious activity to resolve because it was beyond the authority of an individual Defence element, and should have been reported to the central Defence Authority for investigation and resolution.

**Joint User Airfields.** Military air training operations in Australia are conducted from airfields that are jointly used by Royal Australian Air Force and civilian (passenger) aircraft. whilst international safety standards provide guidance on Quantity-Distance principles for Airfields used only by Military Aircraft, there is no international consensus or guidance available for joint-user airfields. Having been allowed to linger for a number of years, this sensitive issue, is finally being investigated by the central Defence Authority to determine Departmental guidance to resolve the matter.

**Training.** One of the first inferences to be drawn by the ESAG concerned the level of training and

knowledge of those personnel performing, and those supervising, ammunition and explosives storage tasks. The level of training and knowledge varied from specialist level (in logistic supply depots) to no training in ammunition and explosives storage (at user units). Whilst specific training requirements had not previously been stated, the Department accepted that training levels needed to be determined and enforced.

[**Note:** Training of employees to levels commensurate with their employment later became a mandatory requirement set by the Australian Federal Government in the Commonwealth Occupational Health and Safety Act 1991.

**Small Quantities.** Probably the largest area of concern found by the ESAG is the treatment of ammunition and explosives storage in the category of up to 50 kg net explosive quantity (NEQ). Approximately two-thirds of the establishments licensed to store ammunition and explosives in the Department fall into this category.

Ample guidance is available on Quantity-Distance principles for ammunition and explosives storage in the categories of over 500 kg NEQ and 50-500 kg NEQ, derived from international safety standards and confirmed by explosive tests conducted within Australia and overseas. However, there is very little guidance available anywhere for the less than 50 kg NEQ category. Licensing Authorities are issuing licences for the storage of ammunition and explosives of up to 50 kg NEQ, based on mathematical formulae for Blast, Fragmentation, Thermal Radiation and Seismic Shock and with little or no guidance on which to base considered judgement to ensure that the associated hazard to people or property from the licence is no greater than the tolerable risk level. The lack of available guidance also inhibits the ESAG in the safety audit of licences for small NEQ.

### **Transport of Explosives**

The Explosives Safety Audit Group is also responsible to audit the safety of the Transport of Ammunition and Explosives within the Australian Department of Defence. This aspect of the ESAG's responsibilities has deliberately been kept separate from the storage of ammunition and explosives for a number of reasons.

Whilst provision exists under the Commonwealth of Australia Explosives Act 1961 to regulate the storage of Commonwealth ammunition and explosives, the Federal Government of Australia has been silent and appropriate regulations have not been promulgated. Consequently, the Department of Defence determined the applicable safety principles which were to be applied (for which it was subsequently severely criticised for not having sought Federal Government assent).

For the transport of Commonwealth ammunition and explosives within Australia, the Federal Government imposes control over road and rail transport through regulations made under the provisions of the Explosives Act 1961 (known as the Commonwealth Explosives Regulations or CERs for short). Industry specific regulations provide for control of commercial aviation and maritime carriage of explosives, but the control of the carriage of ammunition and explosives in Defence owned aircraft and ships has been left silent, with the Federal Government accepting controls applied by either the RAAF for air transport, or the RAN for sea transport

The Department of Defence has the largest requirement for the transport of Commonwealth ammunition and explosives by road and rail within Australia, but it is not the National Authority or the Federal Government Department responsible for determining regulations or imposing controls for road and rail transport. For this reason, the transport of ammunition and explosives by the Department was not included in the Joint Parliamentary Committee's deliberations. This was unfortunate because it would have revealed that the National Authority and responsible Federal Government Department (Commonwealth Department of Transport) was not providing adequate leadership in this area. In fact CERs which accorded with the UN Committee of Experts Recommendations on the Transport of Dangerous Goods were not published until 1991.

Prior to the publication of the updated CERs in 1991, the Department of Transport published a number of Codes of Practice for the road and rail transport of Dangerous Goods (which included explosives) as interim measures. Advice provided in these Codes of Practice conflicted with the requirements subsequently published in the new CERs for the transport of explosives, and whilst corrective action has and is still being taken, some confusion remains.

### **Benefits Stemming from the ESAG**

What has not been made clear so far is that the ESAG has no executive authority over the establishments that it audits or over individual Defence elements. The individual Defence elements are not forced to accept ESAG findings and recommendations out of hand, and have recourse to a Conflict Resolution Committee established by the central Defence Authority to adjudicate where there is disagreement. The Resolution Committee has not been required to adjudicate in the four years that the ESAG has been in existence and no ESAG recommendation has been rejected so far.

The more visible benefits derived from having the ESAG are:

- a. a consistent and uniform interpretation of the safety principles is promoted across the whole Department,
- b. a central repository of corporate knowledge and a ready source of accurate information on the level of compliance concerning safety standards applicable to the storage of ammunition and explosives within the Department, and
- c. by observing and recording from the broader centralised perspective, the ESAG provides a forum for:
  - (1) discussion and exchange of ideas thus increasing expertise for implementing the safety principles by the individual Defence elements, and
  - (2) investigating broader based solutions to problems encountered in implementing the safety principles.

A supplementary benefit gained is that the independent status of the ESAG allows a 'fresh eyes' approach to validate safety of long standing practices within the Department and



individual Defence elements (that usually have become taken for granted and overlooked because of familiarity).

### **Future Directions**

Although the ESAG has been in existence for four years, a full audit cycle (where every establishment in the Department licensed to store ammunition and explosives has been audited by the ESAG) has not yet been completed. The ESAG has slowly been evolving as knowledge and expertise have been acquired. Similarly, the Australian Department of Defence's policy for the safe storage of ammunition and explosives has been developing. The next step for the ESAG is seen as evaluating for implementation the International Standard 150 10011 (AS 3911) "Guidelines for Auditing Quality Systems" for the safety auditing of ammunition and explosives storage and transport in the Australian Department of Defence.

### **Conclusion**

In consequence to a Joint Parliamentary Committee recommendation, an Explosives Safety Audit Group was established within the Australian Department of Defence to conduct independent audits and report on the application of and compliance to Departmental policy applicable to the safe storage and transport of ammunition and explosives. The group identified a considerable number of problems in the implementation of Defence policy bringing them to the attention of the appropriate Defence Authorities for further investigation and resolution. The activities of the ESAG are considered to be of considerable benefit and continue to enhance the level of safety in ammunition and explosives storage and transport within the Australian Department of Defence.