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Report of the Comptroller and Auditor General of India

on

Ammunition Management in Army

Union Government (Defence Services)
Army and Ordnance Factories
No. PA 19 of 2015
(Performance Audit)

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Comptroller and Auditor General
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for the year ended March 2013

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Contents

Preface

This Report of the Comptroller and Auditor General of India contains the results of review of Ammunition Management in Army. The period covered in the audit was 2008-09 to 2012-13.

The instances mentioned in this Report are those, which came to notice in the course of test audit carried out in 2013-2014 as well as those which came to notice in earlier years, but could not be reported in the previous Audit Reports. Matter relating to the period subsequent to 2012-13 have also been included, wherever necessary.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India and the report has been prepared for submission to the President under Article 151 of the Constitution of India.

Executive Summary

Ready availability of ammunition plays a critical role in overall preparedness of the Army. Director General Ordnance Services (DGOS) at Army Headquarters (AHQ) is responsible for overall management of ammunition in the Army and carries out annual provisioning and procurement. Most of the ammunition for the Army is procured from Ordnance Factory Board (OFB). To meet this requirement, ten factories of Ammunition and Explosives Group under OFB are engaged in production of ammunition and explosives. Balance requirement of ammunition is met from trade and ex-import.

Why did we do this Review?

The review was undertaken to ascertain the effectiveness of procedures and practices and built-in controls relating to management of the ammunition in the Army in terms of operational preparedness and resource utilization.

In order to review the existing system, which included implementation of existing policies on ammunition management, stocking policies, implication of shortfalls in production/procurement and import, storage and distribution problems and disposal of unserviceable/obsolete ammunition. Review of related records at AHQ, Directorate General of Quality Assurance (DGQA), and OFB was carried out for the years 2008-2009 to 2012-13.

Key Findings

1. Shortage of ammunition

In disregard of the War Wastage Reserve scales of 40 (I) days, based on which Annual Provisioning of ammunition was carried out by DGOS, indent for procurement of ammunition by AHQ was placed on the basis of 'Bottom Line' or 'Minimum Acceptable Risk Level' (MARL) requirements which averaged to 20 (I) days. As a result, the policy for the size of national stockpile was not implemented by the agencies responsible, citing the reasons of budgetary constraints, and inadequate production capacity with OFB. Stocking of ammunition even at MARL was not ensured, as availability of ammunition as on March 2013 was below the MARL in respect of 125 out of a total of 170 types of ammunition (74 *per cent*). We found that availability has been dwindling over the years as types of critical ammunition (available for less than 10 days (I)) had increased from 15 *per cent* in March 2009 to 50 *per cent* in March 2013. The percentage of critical ammunition in High calibre ranged

up to 84 *per cent* during the five years period of audit. The critical shortages impacted the operational preparedness and training regimen of the Army.

(Chapter-II)

2. Non fructification of procurement orders placed on OFB

OFB is the main source for supply of ammunition to the Indian Army. In order to build up ammunition stock level up to MARL and to provide enough lead time to OFB for procurement of raw material and streamlining the production, Ministry of Defence (Ministry) placed a five year Roll on Indent on OFB in January 2010. Even though the ammunition requirements covered under Roll on Indent had been worked out in consultation with OFB and the corresponding annual budgetary requirements accepted, in principle, by the Ministry at the time of approval of the Roll on Indent, the projection of the requirement of fund by OFB was much lesser *vis-à-vis* the targets fixed. It was therefore, a foregone conclusion that the OFB would fail to supply the targeted quantity. Despite the acceptance of targets for supply of ammunition covered under the first Roll on Indent, the OFB failed to supply the targeted quantity, with shortfalls ranging up to 73 *per cent* of the total types of ammunition.

(Chapter-III & IV))

3. Delay in finalization of imports

Army imports ammunition through capital and revenue route. Import, as an alternate source of procurement, proved to be unreasonably slow as no procurement of ammunition took place against the nine items initiated for procurement through capital route during the period 2008-2013 due to single vendor situation, complexities in TOT, delay in finalization of GSQR, *etc.* In case of revenue procurements also, the success rate of fructification of contracts was as low as 20 *per cent.* Thus, due to delay in finalization of import contracts, the build-up of ammunition has been badly hampered.

(Chapter-III)

4. Deficiencies in Quality Control and Quality Assurance systems

During manufacturing process, the role of DGQA is to carry out Final Acceptance inspection for which limited tests on sampling basis are carried out by SQAE. The concerned Ordnance Factories are required to carry out 100

per cent checks for the quality of stores being manufactured by them, which include check of input material, inter-stage and final product. Ineffective quality controls by the Ordnance Factories led to rejections of finished products at Quality Assurance stage. QA was returning cases for rectification (RFR) which was not in its mandate. Even the products accepted by QA were not found up to the mark and due to persistent quality problems, ammunition worth ₹1,618 crore was lying as rejected in depots. Ammunition worth ₹814 crore was declared unserviceable within shelf life by the depots due to poor quality.

(Chapter-V)

5. Inadequacies in supply chain management and depot activities

When any ammunition meets an accident, Army impose ban on use of that particular lot of ammunition. Such ammunition is kept segregated till its further sentencing. We also observed that ammunition worth ₹3,578 crore were lying in Segregated condition awaiting sentencing and ammunition worth ₹2,109 crore was lying in Repairable Major condition awaiting repairs.

The movement of ammunition within various echelons in Army suffered from inadequacies such as delays in issue of ammunition, non-accountal of ammunition by depots, transportation of ammunition by other than specified explosive vans, *etc.* Further, the depots were functioning with risk of fire accident, as the fire fighting equipments were not held as per requirement / authorization.

Online connectivity among AHQ, depots and user units to enhance visibility of assets, speedy issue and receipt and effective overall ammunition management through computerization have eluded the Army as the computerization project was delayed by more than 10 years.

(Chapter-VI)

Chapter I: Introduction

1.1 Definition of Ammunition

Ammunition is an enclosed explosive substance designed to produce an explosive effect. Ammunition include bullets[1], bombs[2], missiles[3], warheads[4], landmines[5] *etc.* used in firearms.

1.2 Classification of Ammunition

Based on the Calibre which is the approximate internal diameter of the barrel, or the diameter of the projectile it fires and other features of a weapon, ammunition are broadly classified into five types as shown in **Table 1** below:

Table No. 1: Classification of ammunition

Type	Diameter range	Main weapons
Small Calibre	**5.56 to 12.7 millimeter (mm)**	**Carbine, Rifle, Light Machine Gun.**
Medium Calibre	**14.5 to 40 mm**	**Anti Material Rifle, Grenade Launcher.**
High Calibre	**73 to 155 mm**	**Rocket Launcher, Gun, Tank**
Mortar bombs	**---**	**Mortar**
Missiles	**---**	**Tank & Missile Launcher**

(Source: DGOS (OS-15) letter dated 12.12.2013)

1.3 Concept of ammunition management

Ammunition management in Army is the corner stone of operational success, necessitating stringent synergetic interface. Qualitative and quantitative aspects of ammunition management from its production and procurement to its final disposal calls for a system approach to include operational needs, provisioning, procurement, manufacturing, transportation, storage, forward delivery and disposal in a sequential manner to ensure an uninterrupted supply throughout the campaign period. Essentially ammunition management entails holding of adequate stocks of ammunition to last a pre designated campaign period, which is a critical factor for the success of any battle.

[1] A small metal object that is fired from a gun.
[2] A weapon designed to explode at a particular time or when it is dropped or thrown.
[3] A weapon that is sent through the air and that explodes when it hits the thing that it is aimed at.
[4] The explosive part of a missile.
[5] A bomb placed on or under the ground, which explodes when vehicles or people move over it.

1.4 Ammunition management agencies in Army and their responsibilities

The management of ammunition operates through a set of policy making bodies and regulatory authorities, who determine the type and quantum of ammunition to be held and specifies the parameters regarding their movement, placement, storage and discard. Effective coordination at the apex level is of paramount importance to ensure that new strategies and policies are executed well in time.

The list of various agencies within the Ministry of Defence (Ministry) involved in the management of ammunition inventory in the Army, along with their responsibilities is given in **Table 2** below:

Table No. 2: Agencies and their responsibilities

Sl. No.	Authority	Responsibility
1.	General Staff (GS) Branch	Policy makers and regulatory authorities in respect of induction and de-induction of equipment and ammunition; imports, stocking, movement and placement.
2.	Master General of Ordnance (MGO)	General monitoring of policies, budget and funds allocation and inter face with procurement agencies.
3.	Ammunition Planning Group (APG)	Apex body under MGO to consider all aspects of ammunition management.
4.	Director General Ordnance Services (DGOS)	Provision, procurement, storage, maintenance and disposal.
5.	Ordnance Factory Board (OFB)	Major supplier of ammunition, manufactured by different Ordnance Factories.
6.	Director General Quality Assurance (DGQA)	Authority Holding Sealed Particulars, proof and inspection, quality assurance and indigenisation.
7.	Ministry of Defence (Finance)	Budgetary and financial control.
8.	Central Ammunition Depot (CAD) Pulgaon, Maharashtra	It is responsible for the All India supply of Ammunition, explosives and NES items after receiving the items from different procurement agencies like Ordnance Factories, trade sources etc and issuing the items to Ammunition Depots/Field Ammunition Depots for replenishing their stock.
9.	Ammunition depots(ADs)	Ammunition Depots are meant to hold stocks of ammunition and explosives for supply to units/formations within the area of supply allotted to it.

(Source: DGOS (OS 6A) letter dated 21.11.2013)

The organization structure for ammunition management in Army is given in **Annexure I.**

1.5 Audit objectives

The Review was conducted to obtain assurance that:

- The existing procedures of need analysis and the system of indenting and provisioning are effective.
- The provision of funds for procurement of ammunition was adequate.
- Sound practices existed for ensuring timely procurement of the required quantity of quality ammunition.
- The Ordnance Factories manufactured and supplied ammunition as per assigned schedule.
- The Ordnance Factories supplied ammunition to Army conforming to the requisite quality as per the DGQA specification.
- An efficient, effective and economical supply chain management is in place.

1.6 Audit Criteria

The performance was assessed against the criteria drawn from the following:

- Army Orders/Army Instructions and DGOS Technical instructions issued from time to time in respect of provisioning of ammunition and scales of ammunition authorised to units including training needs. Government policy of War Wastage Reserve[6] (WWR).
- Five years Roll on Indent, Annual Provision Review (APR) and indents placed during the period 2008-2009 to 2012-2013.
- Purchase procedures contained in Defence Procurement Procedures (DPP), Defence Procurement Manual (DPM), Standard Operating Procedures (SOPs) formulated by Ministry.
- Departmental manuals of the DGQA and DGOF.
- Capacity available with OFB, year wise outstanding orders of Army, target of production fixed by OFB and issue of complete rounds of ammunition to the Army.
- Targets and Achievement reports/Quarterly Production Progress/Review reports prepared by OFB.
- Specification of Authority Holding Sealed Particulars (AHSP) or General Staff Qualitative Requirements (GSQRs) of the Army, details of proof rejection, details of abnormal rejection during manufacturing process and details of ammunition rejected by users, number of rejection of end products at the consignee end.
- Ministry's policy on transportation of ammunition items from Ordnance Factories to Central Ammunition Depot (CAD), CAD to Ammunition Depots (ADs)/Field Ammunition Depots (FADs) and ADs/FADs to units and contracts/agreements signed for transportation.

[6] War Wastage Reserve (WWR) rates are on the concept of 30 days intense (I) and 30 days normal (N) period of conflict, which translates to 40 (I), taking one day intense rate being equivalent to three days normal rate.

- Total area of accommodation (Permanent and Temporary) authorised in depots for storage of ammunition.
- Ammunition Maintenance Instructions regarding disposal.

1.7 Scope of Audit and sample audited

The review covering the period 2008-09 to 2012-13 was carried out from May 2013 to August 2013 at DGOS, DGQA (Armament), CAD Pulgaon, seven[7] out of 14 ADs/FADs, all six[8] filling factories, eight[9] out of 17 components manufacturing factories, CQA (A) Kirkee and Ordnance Factory Board. Matter relating to the period subsequent to 2012-13 has also been included, wherever necessary.

As on March 2013, Army was holding 170 types of ammunition. Out of this we selected 69 types **(Annexure-II)** for the review. The selection was based on the following twin criteria:

(i) Entire range of High calibre ammunition of Armoured Fighting Vehicles (AFV) and Artillery (49 types of ammunition).

(ii) Ammunition other than of AFV and Artillery having the availability of stock less than or equal to 20 (I) *i.e.* 50 *per cent* of WWR level, which the Army proposed to achieve by 2015 (20 types of ammunition).

The category wise sample selected for examination is indicated in **Table 3** below:

Table No. 3: Details of population and sample

Category of Ammunition	Total type of Ammunition as on March 2013	Total type of Ammunition Selected for Audit
Armoured Fighting Vehicle (AFV)	22	15
Artillery (Arty)	69	34
Air Defence Artillery (AD Arty)	16	1
Demolition and Explosives (Demo & Exp)	22	6
Small Arms Ammunition & Infantry (SAA & Inf)	28	11
New Generation (New Gen)	7	2
Army Aviation (AVN)	6	0
Total	**170**	**69**

(Source: All India Availability Report as on 31March 2013)

[7] AD Bathinda, AD Dappar, AD Bharatpur, 19 FAD, 24 FAD, 18 FAD & 15 FAD

[8] Ordnance Factory Chanda (OFCh), Ordnance Factory Badmal (OFBL), Ordnance Factory Khamaria (OFK), Ordnance Factory Dehu Road (OFDR), Ammunition Factory Kirkee (AFK), Ordnance Factory Varangaon (OFV).

[9] Ordnance Factory Ambajhari (OFAJ), Ordnance Factory Kanpur (OFC), Gun & Shell Factory Cossipore (GSF), Ordnance Factory Itarsi (OFI), Cordite Factory Aruvankadu (CFA), Ordnance Factory Bhandara (OFBa), Ordnance Factory Katni (OFKat) & Heavy Alloy Penetrator Project (HAPP).

Out of 69 types of ammunition selected for audit, 48 types of ammunition (Sl.No.1 to 48 of **Annexure-II**) were in production line of Ordnance Factories during 2008-13. Therefore, these 48 types of ammunition were selected for detailed examination in Ordnance Factories during the review.

1.8 Audit methodology

After collection of information and a preliminary study at the Army Headquarters (AHQ) and CAD Pulgaon, an entry conference with the Ministry was held on 17 May 2013 wherein the scope, objectives and methodology of audit were discussed and criteria were agreed upon. Detailed audit scrutiny was conducted in the units selected for sample coverage as indicated in Para 1.7 above, during the period May 2013 to August 2013, to evaluate the performance against the audit criteria. Field audit included examination of records, collection of information through issue of audit memos and questionnaires. Audit also analysed data extracted from the computerized packages used in the AHQ and Depots.

Replies to the audit observations were given in the course of audit and the draft report was issued to the Ministry on 20 February 2014 after incorporating those replies. Despite the stipulated time frame of six weeks for the reply, the same was awaited (April 2015). Exit conference on the review was held on 6 August 2014 and the deliberations during the Exit conference have been taken into account while finalizing this report. Recommendations in the draft report were also accepted by the Ministry during Exit Conference.

1.9 Acknowledgement

We gratefully acknowledge the co-operation of officers and staff of the Ministry, AHQ, OFB, DGQA and Field Depots.

A list of abbreviations used in this report is given in **Appendix-I.**

Chapter II: Provisioning and Financial Management

Audit Objective

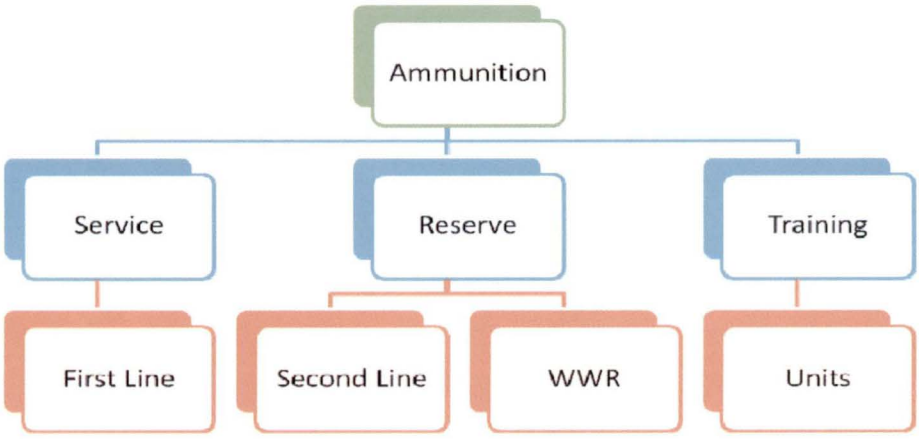
To ascertain whether:

- **The existing procedures of need analysis and the system of provisioning and indenting are effective.**
- **The provision of funds for procurement of ammunition was adequate.**

2.1 Ammunition Management

Ammunition in Army is held in three echelons *viz.* service ammunition, reserves and training ammunition, as shown in **Chart-1** below. Service ammunition is held as First line ammunition by the units, whereas Reserve constitutes Second line and War Wastage Reserve (WWR). Training ammunition is authorized to each unit to maintain proficiency of the troops and formations.

Chart No. 1



First Line ammunition

It is the Service ammunition, which is authorized at given scales to a unit on its War/Peace Establishment (WE/PE) for the weapons authorized. It is held with respective units. It is the scale of ammunition required for two intense engagements.

Second Line ammunition

It is the immediate reserve with a formation, authorized at given scales for all units in the formation. It is the scale of ammunition required for one intense

engagement. It is held in formation ammunition dumps under formation arrangement.

War Wastage Reserve (WWR) ammunition

It is the reserve intended to meet the requirements for the expected duration of operations or until the indigenous production can get into its stride or other arrangements is made for procurement of ammunition. WWR level is shown in "days" and indicates the quantum of stock to be maintained to cater for the duration of war. WWR forms the basis for working out the requirements of ammunition during the provisioning review.

In April 1979 the Government approved authorization of WWR on the concept of 30 days of intense period and another 30 days at the Normal rate. This authorization was reviewed and Ministry revised the WWR rates in October 2010 to 40 days of intense period *i.e.* 40 (I). The revision was done by referring WWR rates of April 1979 and taking one day intense rate being equivalent to three days normal rate.

Training Ammunition

Training ammunition is authorized to each unit to maintain proficiency of the troops and formations to ensure that Army is in a fit state of war.

2.2 Provisioning procedure

Ammunition is categorized as Class 'A' stores and its provisioning is governed by DGOS Technical Instruction (TI) issued in 1970 with the concurrence of Ministry. The aim of an Annual Provision Review (APR) is to assess liabilities and assets for the provision period and to place new/supplementary/reduction demands, as necessary, on the various supplying agencies. This exercise is carried out in the month of July of the preceding year of the provision period by DGOS and is based on inputs from the ammunition stocking Depots. Provisioning of Ammunition items is undertaken on the basis of Unit Entitlement (UEs) (if these are likely to be made up during the provisioning period in question), otherwise on Unit Holding (UHs) of weapons. The TI further states that once the net requirement is worked out, the demands are to be placed by DGOS to cover the full liability on DGOF, without taking into consideration the production capacity of OFB or shortfall in supplies against previous demands.

2.3 Audit findings

2.3.1 Truncated demands against requirement

During audit we observed that instead of placing indent for full liability worked out in the APR, as stipulated in the TI, the indents were being placed by DGOS only for the part quantities which were worked out on the concept

of 'Minimum Acceptable Risk Level' (MARL)[10]. This bottom line requirement introduced in 1999 by AHQ was considered as the minimum inescapable requirement of ammunition to be maintained at all times to meet operational preparedness. Placing of indents for only part quantities of the demands generated in the APR by DGOS was in contravention of its own instructions, issued with the concurrence of the Ministry of Defence. We found that the AHQ had not obtained any approval of the Ministry of Defence before adapting to the concept of MARL.

In view of the persistent deficiency in holding of ammunition, shortage in storage accommodation, constraints in production capacity of OFB and paucity of sufficient time to OFB for procuring raw material to meet the production target, Ministry decided in January 2010 to consolidate the five years liability and to place a Roll-on-Indent for the period of five years. The approval for First Five year Roll on Indent (2009-2014) was accorded by the Ministry in January 2010, consequent to which provisioning of ammunition, was done by AHQ for five years. Authorization of 40 (I) WWR formed the basis for working out the requirement. Notwithstanding the net liabilities worked out for 2009-14 on 40 (I) WWR, we observed that AHQ continued to place indent on OFB, on the concept of MARL *i.e.* 20 (I) days (average) which was 50 *per cent* of the authorized WWR. This scaling down in procurement was done on the pretext that once stock holding was made up to MARL, the ammunition holding upto WWR would be made up later.

2.3.2 Excessive shortage of Ammunition

An examination of the provisioning procedure of Ammunition revealed that the All India Availability[11] (AIA) of all types of ammunition during the period 2008-09 to 2012-13 was far below the authorized 40 (I) WWR. We found that even the reduced scales of MARL 20 (I) were not achieved as far as stock availability of ammunition is concerned.

Shortage of the stock of the ammunition held in the months of March between 2009 and 2013 is depicted in **Table 4** below:

Table No. 4: Shortage in stock holding *vis-à-vis* WWR

(As on 31 March of the year)

Range of Days(I)	Number of types of Ammunition available				
	2009	2010	2011	2012	2013
<10	15	57	62	77	85
>=10 to <15	15	22	12	14	21
>=15 to <20	17	14	17	22	19
>=20 to <25	14	15	16	8	9

[10] MARL-Minimum inescapable requirement of ammunition is to be maintained at all times to meet operational preparedness. MARL for different category of Ammunition ranged from 15 days (I) to 26 days (I).

[11] All India Availability is defined as the total availability of ammunition stock within the country in number of days for WWR ammunition.

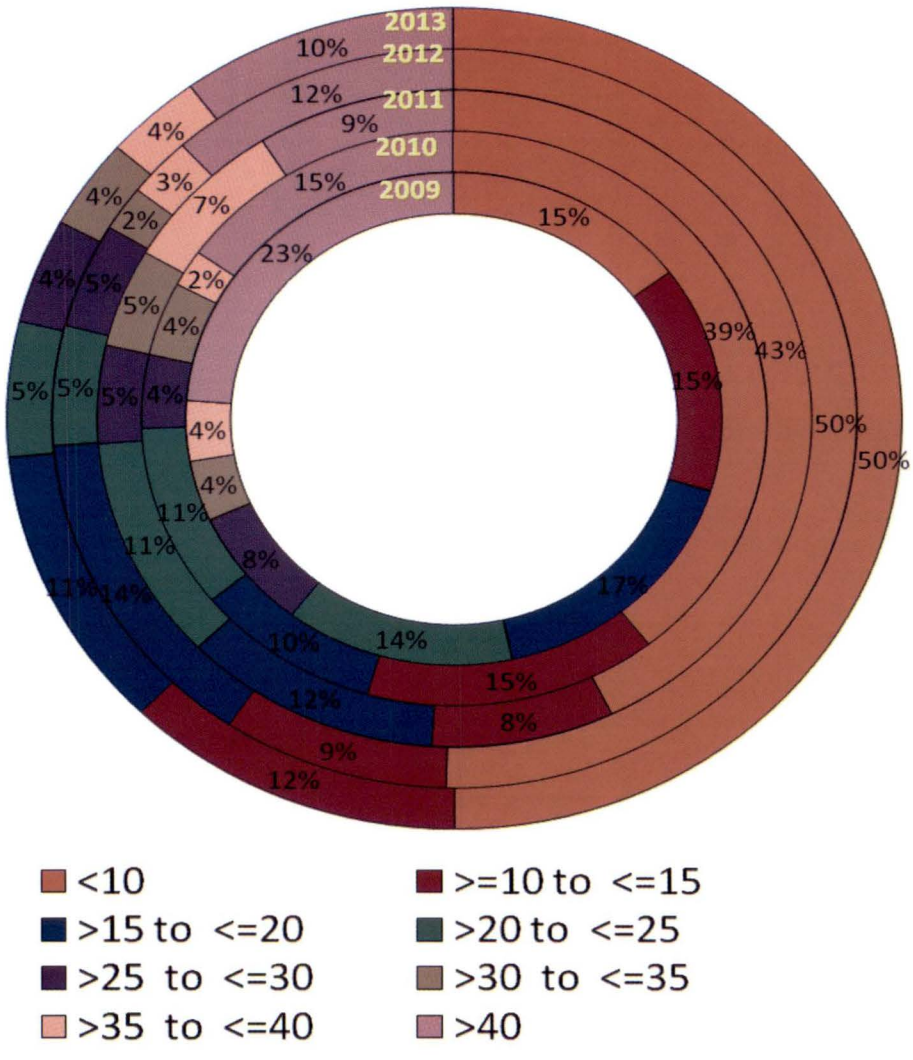
Range of Days(I)	Number of types of Ammunition available				
	2009	**2010**	**2011**	**2012**	**2013**
>=25 to <30	8	6	7	7	7
>=30 to <35	4	6	7	3	6
>=35 to <40	4	3	11	4	6
>=40	24	22	13	18	17
Total	**101**	**145**	**145**	**153**	**170**

(Source: DGOS (OS 6A) letter dated January 2013 and June 2013)

The depleting availability of ammunition during the period 2008-09 to 2012-13 is also shown in the **Chart-2** below: (The category-wise stock position is given in the **Annexure-III**).

Chart No. 2

Percentage of Ammunition available in number of days as on 31 March of the years 2009 to 2013



It can be seen from the table and chart above that:-

- With reference to the authorization of 40 (I) WWR, the availability of ammunition, as on March 2013, was full only in 17 out of 170 types of ammunition (10 *per cent*) as against in 24 out of 101 types of ammunition (24 *per cent*) as on March 2009. This holding indicates that the availability against the WWR has been decreasing over the years. As of March 2013, the shortage against WWR was in 90 *per cent* of total types of ammunition held. Out of 69 types of ammunition selected for the review we observed that as of March 2013, the holding was below 40 (I) WWR, in respect of all the 69 types.

- Despite the concept of attaining MARL first, the availability of ammunition as on March 2013 was below MARL, in respect of 125 out of 170 types of ammunition (74 *per cent*). The stock position had diminished since March 2009, when the stock availability, below MARL was in 46 out of 101 types of ammunition (46 *per cent*). The diminishing stock availability pattern indicates that even the threshold of MARL introduced in 1999 by the AHQ did not lead to any improvement. The position, as regards holding against MARL was in fact deteriorating.

- Ammunition with availability of less than 10 days (I) is considered 'critical' and any increase in the population of such ammunition should be an area of high concern. Notwithstanding the significance of minimum critical holdings, it can be seen from the Table and Chart above that as of March 2013, the number of types of ammunition available for less than 10 days (I) was 85 against total 170 types of ammunition held *i.e.* 50 *per cent*. This population of critical ammunition had increased from 15 types in 2008-09 (15 *per cent* of total) to 85 types in 2012-13 (50 *per cent* of total).

2.3.2.1 Status of holding of High Calibre Ammunition

Ammunition for Artillery Guns (Arty) and Armoured Fighting Vehicles (Tanks) for sustaining superior fire power is of high calibre. We observed that the Stock level for most of the high calibre ammunition was below critical level. The types of critical ammunition of high calibre variety in Arty and AFV during the period 2008-09 to 2012-13 are as shown in **Table-5** below:

130 mm HE

Table No. 5: Shortage in High calibre ammunition

(as on 31March)

Year	Total types of high calibre ammunition of Arty & Armoured Fighting Vehicle(AFV)	Total types of high calibre ammunition of Arty & AFV having critical availability (<10(I))	Percentage of high calibre ammunition of Arty & AFV having critical availability
1	2	3	4
2009	36	12	33
2010	46	18	39
2011	45	29	64
2012	43	36	84
2013	49	32	65

(Source: AIA Reports)

It can be seen from Table-5 above that during 2009 to 2013, 33 *per cent* to 84 *per cent* of the high calibre ammunition of Artillery (Arty) and Armoured Fighting Vehicle (AFV) category were in critical zone *i.e.*, less than 10 (I) holding, suggesting the seriousness of acute shortage in ammunition for sustaining superior fire power.

The matter of shortage of ammunition was brought to the notice of the Ministry and AHQ in June 2013, and their response solicited. While Ministry did not offer any reply (April 2015), AHQ stated (September 2013) that deficiency of ammunition had been time and again intimated to Ministry verbally and recently a copy of AIA was also being given to Ministry. It was further stated that non-availability of ammunition was not due to deficiencies in provisioning but due to (i) slippages in the targets by OFB, (ii) inadequate budgeting for OFB and (iii) delay in procurement cases through import at various levels. It was also added that till such time the targets accepted by OFB are met in total by OFB and adequate budget provided, WWR stocks of ammunition would keep on depleting.

The justification given by the AHQ for non-availability of ammunition was not acceptable in Audit due to the following reasons;

- AHQ had taken up the serious issue of acute shortage in holding of ammunition with the Ministry only in verbal communications, indicated the absence of seriousness and the lack of priority accorded to the matter by the AHQ.

- The slippages by OFB, during 2009 to 2013, were between 28 to 37 *per cent* only (**Table 8** refers) as against overall deficiency of 90 *per cent* against WWR as on 31 March 2013. Hence the shortage cannot be fully ascribed to OFB.

- Budget allotted during the period covered in audit was more than the demands placed by the OFB, which suggests that budgeting for OFB was adequate. Table-8 and paragraph 2.4 of the report explain the same in detail.

- The average import component was less than eight *per cent* of the total supply of ammunition during 2009 to 2013 and therefore the delay in import had only a limited bearing on the overall shortages.

An audit query on similar lines was also issued to the OFB to solicit their response (August 2013). OFB stated (August 2013) that though Roll on Indent was placed by Army on MARL requirements but OFB capacity at that time was not adequate to meet the MARL requirement. The contention of OFB was not plausible as the roll on indent was arrived at by the AHQ only after detailed consultation with OFB duly considering the capacity of OFB and production plan upto March 2014.

2.3.2.2 Impact of deficiency on Training

We observed that keeping in view the overall shortages of ammunition, AHQ imposed restrictions on training ammunition, applicable to the all categories. Summary of the restrictions on training ammunition giving, year wise details, during the training years 2008-09 to 2012-13 is given in **Table 6** below:

Table No. 6: Year wise restriction details at the end of the year

Year	Total Types of Ammunition authorized for Training	Total Types of Ammunition authorized for Training with restriction	Types of Ammunition with <50 *per cent* restriction	Types of Ammunition with 50 *per cent* restriction	Types of Ammunition with 75 *per cent* restriction	Types of Ammunition with 100 *per cent* restriction
2008-09	101	18	00	06	01	11
2009-10	145	31	09	11	06	05
2010-11	145	66	02	04	35	25
2011-12	153	93	07	20	39	27
2012-13	170	136	16	17	47	56

(Source: DGOS Reports on All India Availability of Ammunition as on 31March 2009-13)

It could be seen from the above table that the total number of ammunition under restriction was on increasing trend from 2008-09 to 2012-13.We further observed that 16 types of ammunition (out of which 10 were of High calibre) were having 100 *per cent* restriction for three consecutive years (2010-11 to 2012-13). The details of such Ammunition are given in **Table 7** below:

Table No. 7: Ammunition having 100 *per cent* restriction on training consecutively during 2010-11 to 2012-13

Sl. No.	Ammunition	Type of Calibre
1	125 mm FSAPDS (Soft, USSR)	High
2	125 mm FSAPDS	High
3	122 mm HEAT	High
4	BMCS(LZ)	High
5	BMCS(HZ)	High
6	300mm 9m 55K	High
7	300mm 9m 55S	High
8	300mm 9m 55F	High
9	300mm 9m 528	High
10	Rkt 214 mm HE PF	High
11	23 mm HE/T	Medium
12	20mm SAP HEI(SA)	Medium
13	Round 40mm HE AP(SA)	Medium
14	Round 40mm HE RP(SA)	Medium
15	Round 40mm HE DP(SA)	Medium
16	40mm VOG-25 (UBGL)	Medium

In response to the Audit Memo issued during the Review regarding deteriorating stock position of ammunition, which also included training ammunition, AHQ stated in September 2013 that the total training requirement from OFB was ₹5,900 crore. Budget allotted over the years had been to the tune of ₹4,000 crore at the maximum, thereby eating into the WWR stocks and reduction in availability of ammunition. AHQ further stated that it had also hampered the training of the Army as training restrictions were perforce imposed to save ammunition for operational requirement.

2.4 Financial Management

Prior to January 2010 (when the first Roll on Indent was not introduced), Army placed annual target on the OFB before the commencement of the financial year. However, post January 2010, with the approval of Ministry a consolidated indent was placed on OFB for five years (2009-10 to 2013-14) for the quantities of ammunition to be supplied to the Army during this period.

Based on the Roll on Indent, OFB was to work out its budgetary requirement and communicate to Finance Division of the Ministry at the time of Budget Estimates/Revised Estimates (BE/RE) after consulting AHQ (FP Dte & MGO Branch). The requirement of funds against the Roll on Indent communicated through BE by the OFB, actual allotment of funds by the Ministry and total value of ammunition supplied by OFB are as shown in **Table 8** below:

Table No. 8: Target, allotment of funds and supplies by OFB

(₹ *in crore*)

Year	Target accepted under Roll on Indent	BE projected by OFB	Actual allotment by Ministry	OFB supply value	Percentage of BE to Target	Percentage of supplies to Target	Percentage of slippage {(Col. 2- Col. 5)/ Col. 2 }X 100
1	2	3	4	5	6	7	8
2009-10	4,278.75	2,734.83	2,796.78	2,746.00	64	64	36
2010-11	5,141.87	3,557.94	3,696.67	3,688.00	69	72	28
2011-12	5,631.02	3,858.00	4,109.08	3,720.00	69	66	34
2012-13	5,873.06	3,773.00	3,948.44	3,677.00	64	63	37

(Source: DGOS (Ammunition Proc) letter dated 30 September 2013)

We observed that even though the ammunition requirements covered under Roll on Indent had been worked out in consultation with OFB and the corresponding yearly budgetary requirements accepted by the Ministry at the time of approval of the Roll on Indent, the projection of the requirement of fund by OFB was not commensurate with the quantities targeted. Despite the acceptance of targets, OFB projected lesser budget requirement by 31 to 36 *per cent* against the accepted target. OFB attributed the same to the fact that BE projection was done in consultation with the AHQ and stated that the decision was based on overall fund availability and after considering the actual stock position of various ammunition items.

AHQ however had a different stand on the issue and stated in September 2013 that the budgetary requirement was projected by OFB based on their capacity. Until such time the capacities of OFB are not increased, their projection will be limited in terms of budget, as well.

Notwithstanding the reply, the fact remains that in view of the wide variation in the value of targets and BE projections by the OFB, it was imperative that the same should have been analyzed at proper forum both at the level of Ministry and AHQ to take effective measures to mitigate the deficiency beforehand, as slippages in supply was a foregone conclusion. However, no effective and timely measures were taken, except drawing an Ammunition Road Map in July 2013. The failure in achieving the milestones drawn in the Road Map is discussed in the following paragraph.

2.5 Ammunition Road Map

Ammunition is one of the most important facets to build up any war waging capability. The war endurance and effectiveness of any kind of weapon system is largely dependent on the timely availability and quality of the ammunition. However, during the mid course evaluation of the Five Year Roll on Indent of

ammunition (July 2012), it was observed by Additional Directorate General (TS) that due to slippages/OFB's inability to meet the approved quantities, the deficiency levels plummeted to alarmingly low levels.

AHQ proposed Ministry (July 2012) for a progressive plan (Ammunition Road Map) so as to build up the stock levels up to 50 *per cent* of the Government approved scales by March 2015 and the balance deficiency to be made up subsequently by March 2019. The proposal was to mitigate the existing low levels in ammunition holdings which had a decisive effect on the operational preparedness of the Army.

In July 2013 Ministry approved the Ammunition Road Map and also approved procurement of ammunition for ₹963 crore from OFB and ₹16,593.91 crore through import. The indent on OFB was placed on 19 July 2013.

We examined the implementation of the Ammunition Road Map and noticed that in 17 import cases of ammunition for which Acceptance of Necessity (AON) was accorded in July 2013, no contract could be concluded as of December 2014. The status of the cases is given in **Table 9** below:

Table No.9: Status of Import cases

Sl. No.	No. of cases	Status
1.	7	RFP stage
2.	6	TEC stage
3.	3	CNC stage
4.	1	To be procured through Capital Route

(DGOS letter)

Imports of Ammunition of the Road Map are to be procured through revenue route and should have been completed within 20 to 23 weeks as per DPM. However, the same was already delayed by 40 weeks (as of November 2014).

The impact of non finalization of import contract in time is given in **Table 10** under:

Table No.10: Stock Availability of ammunition

Sl. No.	Name of Ammunition	Stock Availability in Days (I) as on 30.09.2014
1.	30mm VOG-17	5
2.	125mm FSAPDS/T	(-)6
3.	125mm HE	**17**
4.	125mm HEAT	13
5.	Round 122mm HOW HE FC	**0.12**
6.	Round 122mm HOW HE RC	(-)0.17
7.	Round 122mm HOW FC SMK WP	3
8.	Round 122mm HOW RC Smk WP	0
9.	Round 122mm HOW Illg FC	0
10.	40mm MGL HE TM	0
11.	40 mm MGL HE AP M848	(-)4(I)
12.	40mm MGL HE DP M9115	0

Sl. No.	Name of Ammunition	Stock Availability in Days (@) as on 30.09.2014
13.	40mm MGL HE RP M8931	0
14.	7.62mm PKT (SC)	0
15.	7.62mm PKT (B-32)	0
16.	7.62mm PKT (T-46)	0
17.	RKT 122mm GRAD BM-21 HE (ER)	0

(Source: DGOS Report on All India Availability of Ammunition)

It could be seen from table above that availability in all the 17 types of ammunition was below MARL, out of which the availability was critical in 15 types. The table also indicates that in 12 of those 15 cases the stock availability was either 'nil' or 'negative'[12]. Thus due to delay in finalization of the contract, the acute shortage in the availability of ammunition could not be addressed.

Regarding OFB supply of ₹963 crore, we observed that 82 items had been incorporated in Roll on Indent for the period 2014-19. Ministry had accorded sanction for the second Roll on Indent in October 2013. The impact of the same could be known at least after the completion of the first year of second Roll on Indent *i.e.* 2014-15.

AHQ stated in September 2013 that total requirement for the period 2014-15 to 2018-19 had been worked out to ₹40,771 crore. At the initial stage itself OFB expressed inability to meet that requirement and accepted to supply only 50 *per cent* of the requirement. Hence the second Roll on Indent was prepared for ₹20,381 crore. The slippage of the previous Roll on Indent worth ₹5,998 crore was also included. OFB had accepted total target of ₹26,378 crore for the period 2014-15 to 2018-19.

We observed that to build up the stock levels upto 50 *per cent* of the Government approved scales by March 2015 and the balance deficiency by March 2019 to mitigate the existing low levels in ammunition holdings is unlikely to be achieved as per Road Map.

[12] (-) Stock due to dues out at depot level

Chapter-III: Procurement

Audit Objective

To ascertain whether:

- **Sound practices existed for ensuring timely procurement of the required quantity of quality ammunition.**

3.1 Source of Procurement

Requirements of ammunition for the Army are met by the OFB and through import and trade. Major share of supply comes from OFB. Data showing share of various supply sources during the period 2008-09 to 2012-13 are shown in **Table-11** below:

Table No.11: Share of various supply sources of Ammunition

(₹in crore)

Year	OFB	Import	Trade[13]	Total	Percentage of OFB's supply	Percentage of Import	Percentage of Trade supply
2008-09	2,451.00	13.16	91.84	2,556.00	95.89	0.51	3.59
2009-10	2,746.00	5.46	172.49	2,923.95	93.91	0.19	5.90
2010-11	3,688.00	313.19	87.09	4,088.28	90.21	7.66	2.13
2011-12	3,720.00	660.13	28.57	4,408.70	84.38	14.97	0.65
2012-13	3,677.00	360.58	102.80	4,140.38	88.81	8.71	2.48
Total	**16,282.00**	**1,352.52**	**482.79**	**18,117.31**			

(Source: DGOS (OS Amn Proc) letter dated 12 June 2013 and 19 June 2013)

As seen from the table above, OFB is the main source of supply of ammunition to the Army which has catered for 84 to 96 *per cent* of ammunition requirement during the year 2008-09 to 2012-13. Balance requirement is largely met by import and local trade.

[13] As trade accounted for only 3 *per cent* of the total supply, the same was not scrutinized in the Performance Audit.

3.2 Procurement from OFB

A consolidated Roll-on-Indent for five years (2009-10 to 2013-14) for the quantities of ammunition to be supplied to the Army by the OFB was approved in January 2010 by the Ministry. It was mentioned in the Ministry's approval that this was a firm consolidated indent for five years which will not be revised downwards and that Annual Provision Review (APR) should be held independently as per laid down schedule. All APRs will be carried out in MGO Branch with the concurrence of Principal IFA (O). Further, any shortfall in OFB production in achieving these indents as revealed by APR was to be met from other sources for which timely action would be initiated by MGO for obtaining necessary approval of the Ministry.

Though the indents were placed on OFB by Army on the basis of its production capacity, the OFB failed to supply the targeted quantity. The slippage in types of ammunition ranged from 54 to 73 *per cent* (Refer **Table-16**) and in terms of money value ranged from 28 to 37 *per cent* during 2009-10 to 2012-13 (Refer **Table-8**). Ammunition wise details of slippages in respect of the sampled ammunition for review are given in **Annexure-VI**. Illustrative cases of high slippage in high calibre ammunition are shown in **Table 12** below:

Table 12: Illustrations showing slippages in supply of High Calibre ammunition during 2008 to 2013

Sl. No.	Name of the Ammunition	Year 2008-09		Year 2009-10		Year 2010-11		Year 2011-12		Year 2012-13	
		Target (In nos.)	Issue (nos)/ Shortfall percentage	Target (In nos.)	Issue (nos)/ shortfall percentage	Target (In nos)	Issue (nos)/ shortfall percentage	Target (In nos)	Issue (nos)/ shortfall percentage	Target In nos	Issue (nos)/ shortfall percentage
1	155mm ERFB ILLG.	1900	Nil /100	1000	105/90	1000	0/100	1000	0/100	1000	0/100
2	125mm FSAPDS/T	45000	1018/98	15000	1280/91	30000	9000/70	30000	429/99	30000	0/100
3	120mm Mor. ILLG	3000	1011/66	-	-	2000	1005/50	-	-	-	-
4	105mm SMK Orange	8000	1181/85	-	-	-	-	-	-	-	-
5	125mm HEAT	-	-	16000	2004/87	20000	1997/90	30000	0/100	30000	18702/38
6	120mm SMK PWP	-	-	10000	1969/80	5000	0/100	5000	2000/60	5000	0/100
7	105mm SMK Red	-	-	-	-	1000	0/100	-	-	-	-
8	Fuze DA 117	-	-	304403	1978/99	300000	139884/53	160000	121797/24	150000	56470/62
9	81mm SMK PWP	-	-	75000	47836/36	100000	23967/76	150000	15950/89	150000	43941/71

(Source: Annexure-VI)

Repeated slippages in supply of high calibre ammunition mentioned above had a direct bearing on the stock availability which has been explained in para 2.3.2.1.

OFB while furnishing their views regarding reasons for failure to meet the targets under Roll on Indent stated on 1 July 2014 that though OFB capacity at

that time was not adequate to meet the targets fixed in the demands, yet it accepted certain higher targets than the available capacity considering product support from trade/import, which eventually did not materialize.

We observed that while the OFB was mandated to meet almost the entire requirement of ammunition for the Army, yet it could not meet the targets accepted by it. Despite inadequate manufacturing capacity, the acceptance of higher targets led to slippage ranging from 43 to 71 *per cent* (in terms of types of ammunition) during 2009-13, which in turn resulted in shortages in ammunition availability (Refer **Table-4**).

3.3 Procurement from Import and Trade

3.3.1 Capital Procurement

The expenditure on procurement is classified as 'Capital' for all items valuing ₹10 lakh each or more with a life of seven years or more and as 'Revenue' when these conditions are not satisfied. In Army, capital procurements are made as per the provisions contained in the Defence Procurement Procedure (DPP). The objective of DPP is to ensure expeditious procurement of stores against the approved requirements of the Armed Forces, in terms of capabilities sought and timeframe prescribed, by optimally utilising the allocated budgetary resources. DPP-2008 stipulated time frame of 20-34 months for finalization of contract. DPP-2011 stipulated time frame of 80-137 weeks for finalization of a contract after acceptance of necessity.

We observed that nine items were initiated for procurement under the 'Capital category' during the period 2008-2013 (2008-09: 01, 2009-10: 01 and 2011-12: 07). These include six items from import and three from local trade. We, however, observed that against these nine cases, no procurement of ammunition in 'Capital category' had taken place (March 2013). This was despite the fact that stock availability in all the cases except Electronic Fuzes for 155mm Gun, was below critical level. Details of these cases awaiting conclusion of contract against total sanctioned amount ₹10,992 crore is summarized in **Table-13** below:

Table No. 13: Pending cases of Capital Procurement

Sl. No.	Name of Ammunition	Date of AON@	Date of Issue of RFP @@	Date of TEC#	Reasons for delay attributed by Army
					Current Status
1.	New Gen Amm for 84 mm RL Mk III	Feb 2009	Dec 2011	March 2013	Single vendor case and ToT
					CNC progress
2.	125mm FSAPDS rds AMK 339 for T-90 Tks	Dec 2010	May 11	Feb 2012	Single vendor case and ToT
					Contract concluded on 27/03/2014
3.	High Zone modules of BMCS 155 mm Guns	April 2011	Nov 2011	Jul 2012	Delay in finalisation of GSQR.
					CNC on 30/01/2014 and awaiting CFA approval.
4	Amn for 300 mm Smerch MBRLS Smerch Rkts	Sept 2011	Feb 2012	Not Available	Single vendor case and GSQR changes
					Contract concluded on 18/11/2014

5.	TGTSM	Sept 2011	Yet to be issued	--	Single vendor case and GSQR changes.
					TEC in progress.
6.	Up gradation of BMP-2 to BMP 2M	July 2011	Yet to be issued	--	Single vendor case, ToT and GSQR changes.
					Case foreclosed
7.	Electronic Fuzes for 105 mm Gun	Oct. 2011	Aug 2012	Apr 2013	GSQR changes, delay in receipt of bids
					CNC being constituted
8.	Electronic Fuzes for 130 mm Gun	Oct. 2011	Aug 2012	Apr 2013	Trial evaluation in progress
9.	Electronic Fuzes for 155 mm Gun	Oct. 2011	Aug 2012	Apr 2013	Confirmatory trials to be conducted

@Acceptance of Necessity, @@Request for Proposal, #Technical Evaluation Committee.

(Source: WE Directorate (WE-8) letter dated 8 June 2013 & AIA Report for Stock)

Out of the nine cases only two cases *viz.*, 125 mm FSAPDS and ammunition for 300 mm Smerch MBRLS, reached the CNC stage. The delay in issue of RFP was ranging from three months to 32 months against the stipulated time frame of two months. The delay in completion of TEC was upto eight months against the stipulated time frame of nine months. The reasons for delays in the above mentioned cases were (one or multiple) as given in **Table 14** below:

Table No. 14: Reasons for delays in Capital Procurement

Sl.No.	Reason for delay	Number of Cases
1.	Single vendor situation	5
2.	Complexities in Transfer of Technology	3
3.	Delay in finalization of GSQRs	5
4.	Delay in receipt of bids	1

The failure to comply with the stipulated period of 80-137 weeks adversely affected the ready availability of above mentioned ammunition in the Army as shown in the **Table-13**.

3.3.2 Revenue Procurement

Revenue expenditure is the expenditure incurred on items, which are scaled and procured as per Annual Provisioning Review (APR) to make up for their deficiency, following the provisions of Defence Procurement Manual (DPM).

While most of the procurement through revenue route is made by AHQ from OFB (as discussed in para 3.1), there were 35 cases of procurement, initiated during the five year period of audit, where the purchase was to be made ex-import. We observed during the review that seven import contracts for 15 items valuing ₹1,364.30 crore were finalized during the year 2008-09 to 2012-13. The details are provided in the **Annexure-IV.** The imports in most of the cases were necessitated due to non-availability through indigenous sources including from the OFB.

3.3.2.1 Delay in finalization of contracts ex-import

The details of ongoing procurement of 28 cases of revenue procurement ex-import during the years 2008-09 to 2012-13 are given in **Annexure-V.**

The year wise initiation of 28 cases during 2008-09 to 2012-13 is given in **Table-15** below:

Table No. 15: Year wise initiation of import cases

Year	No. of Cases
2008-09	**06**
2009-10	**01**
2010-11	**05**
2011-12	**08**
2012-13	**08**

As per the provision contained in DPM 2009, time frame for finalization of contract for procurement under two bid system is 20 to 23 weeks from the date of initiation of case.

We observed that delay in finalization of contracts (March 2013) ranged between 13 weeks and 337 weeks in respect of cases initiated during the period 2008-09 to 2012-13. These cases are held-up at different stages as shown in **Annexure-V.**

3.3.2.2 Revenue procurement of Fuzes-Case study

Fuze is the brain of the Artillery ammunition. Fuze is fitted to the shell just before assembly/firing and is mainly required for Artillery ammunition *i.e.* 105mm, 120mm, 130mm and 155mm Calibre. Its main function is to ignite the explosive filled in the shell. The deficiency of fuzes renders the ammunition unusable in case of operational requirements. The Standing Committee on Defence in their report of 2012 observed the serious problem of fuzes required for Artillery ammunition. We also observed during the course of the PA that the stock position of Fuzes required for different types of ammunition was most critical. As per the AIA as of 31 March 2013 there was 89 *per cent* deficiencies in respect of fuzes, as mentioned below:

- Availability of ammunition = 67.78 lakh rounds
- Actual holding of fuzes = 7.76 lakh numbers
- Deficiency in holding of fuzes = 89 *per cent*

We analyzed the reasons for deficiencies in the procurement which resulted in the critical shortage of the item and its impact on operational preparedness. The case is summarized as under:

In 1993, decision was taken to shift from mechanical fuze to electronic fuze. After formulation of requisite GSQR, electronic fuzes for 105mm, 130mm and 155mm ammunition were procured from M/s Electronics Corporation of India Limited (ECIL) from 1999 onwards.

In 2008, ECIL expressed their inability to supply electric fuze and the deficiencies of all types of fuze reached an alarming proportion. In the meantime, Artillery Directorate had declared mechanical fuze as obsolescent (OBT) (March/April 2009) and procurement from OFB had therefore ceased, thereby resulting in a huge crisis in availability of fuze. Thus, though a decision to shift from mechanical fuze to electronic fuze was taken in 1993, no source development had taken place except ECIL.

Without ensuring the sources of supply of electronic fuze, the decision to declare mechanical fuze as obsolescent resulted in discontinuance of supply of mechanical fuze from OFB which in turn aggravated the deficiency of fuze. To overcome the deficiency, Artillery Directorate approached Weapons and Equipment Directorate (WE Dte) to revert back the status of Fuzes from OBT to Current. Accordingly, the DGQA changed the status from OBT to current in May/June 2011. OFB, on re-establishing the infrastructure to manufacture the mechanical fuze, started production and 59,306 numbers of mechanical fuze had been supplied in 2012- 2013.

Chapter IV: Manufacturing

Audit Objectives

To ascertain whether:

- **The Ordnance Factories manufactured and supplied ammunition as per assigned schedule.**

4.1 General

Ordnance Factories (OFs) functioning under the control of OFB manufacture ammunition to cater the need of the Army. Ordnance Factories, 39 in number, are classified under five products-based Operating Groups[14]. Ammunition and Explosives (A&E) Group of Factories is engaged in production of ammunition for small arms, anti-aircraft, anti-tank and artillery guns, mortars, rockets, mines, demolition stores, missiles, pyrotechnics as well as propellants and explosives through a network of 10 ordnance factories[15].

4.2 Production Planning

4.2.1 Deficient capacity in OFB

The production capacities in Ordnance Factories are created exclusively to cater the war time requirement projected by the Defence Forces. Capacity utilization in Ordnance Factories primarily depends on the actual annual demand from the Defence Forces. Prior to January 2010 when the first Roll on Indent was not introduced, OFB and Army fixed mutually agreed targets before the commencement of the financial year. As mentioned in Para 3.2, Roll on Indent was introduced for better planning and utilization of capacities of Ordnance Factories. However we observed that the capacity in OFB both in filling factories as well as feeder factories was clearly not commensurate with

[14] Operating Groups and their major principal items of production:-
(i) Material & Component Division-Cartridge Cases, Brass Cups, Barrel Forgings etc.
(ii) Weapon, Vehicle & Equipment Division-Shell Body, Barrel, Ordnance, Mortar etc.
(iii) Ammunition & Explosives Division-Ammunition, Explosives, Filling of Cartridge, Shell, Bomb etc.
(iv) Armoured Vehicles Unit-Assembly of Tanks, Optical equipments
(v) Ordnance Equipment Group-Clothing, Parachutes and miscellaneous items.

[15] Ordnance Factory Chanda (OFCh), Ordnance Factory Badmal (OFBL), Ordnance Factory Khamaria (OFK), Ordnance Factory Dehu Road (OFDR), Ammunition Factory Kirkee (AFK), Ordnance Factory Varangaon (OFV), Ordnance Factory Bhandara (OFBA), Ordnance Factory Itarsi (OFI) Cordite Factory Aruvankadu (CFA) and High Explosive Factory Kirkee (HEF)

the MARL requirements of Army. No concrete efforts were made so far (December 2014) either at AHQ or at OFB levels, to augment the existing capacities of OFs as discussed below:

- After introduction of Army's five year Roll-on-Indent in January 2010, Army's demands for 16 types of ammunition[16] increased by 50 to 100 *per cent* which would not be met by the Ordnance Factories with the existing capacities.

- A seven-member Committee[17], constituted (April 2010) by the OFB to review the existing capacities for both ammunition and explosive factories, recommended (December 2010) for augmentation/new creation of capacities for 30 ammunition items of the feeder factories with reference to Army's MARL requirement. The Chairman/OFB approved (March 2011) the report with certain modifications. However, the same was neither placed before the Ordnance Factory Board nor was any action taken to augment the capacities of the factories as recommended by the Committee.

- Subsequently, based on a detailed analysis of deficiencies of ammunition, DGOS requested (July 2013) OFB to create capacity for fresh requirement relating to 76 types of ammunition (including 22 of 30 types of ammunition considered earlier by the Committee in December 2010) for next five to 10 years perspective. Accordingly, OFB approached DGOS in September 2013 for confirmation of requirements of the same 76 ammunition before enhancing capacity in OFs, which was not yet confirmed by DGOS (December 2014).

In response to the audit query regarding delay in augmentation of capacities in the OFs, OFB stated (September 2013) that once the long term requirement was received, feasibility of enhancing capacity would be explored. However, no further progress in capacity augmentation was noticed as of December 2014.

We observed that the Ministry in consultation with OFB had decided a five-year Roll-on-Indent to place long-term demand on the OFB. But the long-term requirement of Army of 76 types of ammunition was not finalized so as to augment the capacity of Ordnance Factories due to lack of coordinated decision between the OFB and Army. Inadequate capacity in the Factories was clearly an important factor that impacted OFB's ability to meet the demands of the Army on ammunition.

4.3 Production performance

Based on the targets mutually agreed in the target fixation meeting with the Army (2008-09)/Roll-on-Indent (January 2010) of the Army for 2009-14,

[16] 155mm M-107, 130mm FVC &RVC, 125mm HE & HEAT, 120mm HESH, FSAPDS, MOR HE, SMK PWP, 84mm HEAT, 81mm MOR HE, SMK PWP, 30mm AP/T & HE/I, Charge Demolition No. 1 & Bangalore Torpedo

[17] headed by Shri B.N. Singh, Sr. GM, Ammunition Factory Kirkee.

OFB allocated annual target to the filling factories for manufacture of complete ammunition. Based on these targets fixed for filling factories, OFB assigned the targets to the component making factories for the required components. The filling factories are required to accomplish the production targets and issue the requisite ammunition to the Army within the financial year itself.

We reviewed the production targets allotted by the Army for selected 48 types of ammunition and found that no target was given by the Army for 10 to 20 types of ammunition during 2008-09 to 2013-14 which included high calibre ammunition[18].

In response to audit query about non-fixation of targets, AHQ stated (September 2013) that the targets for these items were not given for a particular year as the requirement did not exist. This was despite the fact that the number of types of ammunition available for less than 10 days was 85 against 170 types of ammunition held *i.e.* 50 *per cent* (March 2013) as discussed in Paragraph 2.3.2.

We examined the issue of ammunition to the Army for the balance (28 to 38) types of ammunition against the production targets and found that there was an annual shortfall in issue for 15 to 27 types of ammunition **(Annexure-VI)**. Year-wise slippages in issue of the ammunition are summarized in **Table-16**.

Table No. 16: Analysis of shortfall in production/issue of selected ammunition

Year	Number of ammunition				
	Analysed	For which target allotted by Army	For which Army's demand not met	Percentage of slippage) {(Col.4/3}*100	With more than 50 *per cent* shortfall
(1)	(2)	(3)	(4)	(5)	(6)
2008-09	48	28	15	**54**	4
2009-10	48	34	20	**59**	9
2010-11	48	37	27	**73**	11
2011-12	48	37	25	**68**	8
2012-13	48	38	26	**69**	10

(Source: Roll-on-indent, Production Performance Reports and Annual Accounts)

It can be seen from the table that the Army's demands were not met in respect of 54 to 73 *per cent* types of ammunition during 2008-2013. Further, shortfall of more than 50 *per cent* which extended even upto 100 *per cent* was observed for four to 11 types of ammunition.

[18]High calibre ammunition like 130mm FVC, 125mm HEAT, 120mm HESH, FSAPDS, Mor HE, Smoke PWP, 105mm TK FSAPDS/T, IFG HESH, Smoke (Red), IFG S/Charge, 81mm Smoke PWP, etc.

4.4 Factors leading to slippages

❖ ***Non achievement of targets fixed more than capacity***

We observed that OFB accepted targets for 21 types of ammunition in excess of the capacities during 2008-13. Ordnance Factories however did not meet the demands of the Army for 18 types of ammunition in 37 instances during the same period.

❖ ***Failure in purchase from trade sources***

The OFB stated in August 2013 that it accepted higher targets in certain ammunition items expecting product support from trade sources (indigenous and imported), the same did not however materialize due to following reasons given by the OFB:

- Ban on certain foreign firms by the Ministry;
- Late receipt of material from foreign vendors;
- Delay in finalisation/non-finalisation of procurement decisions in the Ministry;
- Non-finalisation of procurement by factories and OFB due to price hike and single vendor situation; and
- Delay in finalisation of certain development items by DRDO.

❖ ***Short supply from feeder factories***

We found that slippages in production in respect of 15 to 27 kinds of ammunition (refer **Table 17**) were mainly due to short supply of components by the feeder factories. In case of nine ammunition[19], the feeder factories did not have the matching capacity either for empty shell, fuze, and propellant or cartridge case to meet the requirement of filling factories. The details are given in **Table 17** below based on **Annexure -VII**:

Table No. 17: Mismatch in capacities between filling and component making factories

Type of Ammunition	Filling Capacity (Nos.)	Component manufacturing capacity (Nos.)			
		Empty Shell	Fuze	Propellant	Cartridge case
155mm M107	40,000	20,000	No capacity identified	40,000	Not required
130mm FVC & RVC	1,00,000	1,20,000	50,000	1,00,000	1,68,000
125mm HE	50,000	70,000	80,000	NIL	45,000
125mm HEAT	30,000	20,000	20,000	NIL	20,000
125mm FSAPDS	50,000	30,000	Not required	Not required	30,000

[19] 155mm M-107, 130mm FVC & RVC, 125mm HE, HEAT & FSAPDS, 84mm HEAT, 81mm MOR HE & SMK PWP

Type of Ammunition	Filling Capacity (Nos.)	Component manufacturing capacity (Nos.)			
		Empty Shell	Fuze	Propellant	Cartridge case
81mm MOR HE	5,50,000	3,90,000	4,20,000	Nil	Not required
81 mm SMK PWP	1,00,000	75,000	1,00,000	NA	Not required
84 mm HEAT	30,000	NIL	30,000	NIL	77,000

(Source: Annexure VII)

4.5 Monitoring

Efficient production of ammunition and components largely depends on monitoring at the factory and OFB level. OFB has put in place a system to hold weekly/monthly production review meetings at factory level to monitor the production activities. OFB also reviews the monthly production performance reports sent by the factories at the level of Members of the operating groups.

We observed deficiencies like mismatch in component making and filling capacities, shortfalls in supply of components and complete ammunition with reference to production targets, were not properly addressed in the production review meetings at the factory and OFB level. Further, in none of the 60 meetings of the Board held during 2008-13, augmentation of capacities of filling and component making factories was discussed or remedial action recommended setting right the deficiencies in supply of ammunition to the Army as per their demand.

Chapter V: Quality Control and Quality Assurance

Audit Objective

To ascertain whether:

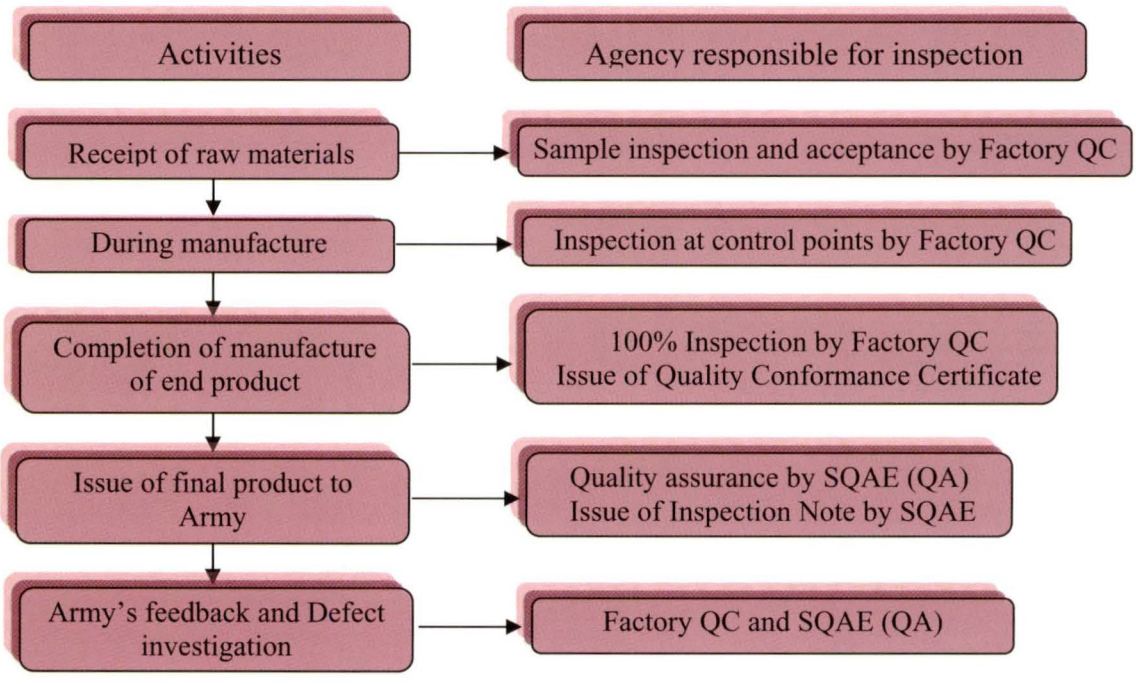
- **The ordnance factories supplied various ammunition to Army conforming to the requisite quality as per DGOA specifications.**

5.1 Quality Control and Assurance framework

The Quality assurance on ammunition is provided in a multi-tiered control framework comprising the Quality Control Section (QC) of the Ordnance Factories headed by Senior General Manager/General Manager (Sr. GM/GM) and representatives of the Controllerate of Quality Assurance (Armament) (CQA (A)) under DGQA. The QC section of the Factory inspects and accepts the components on their receipt, it checks at designated control points during the manufacturing process; and finally conducts 100 *per cent* check of the finished products The CQA is represented by the Senior Quality Assurance Establishments (SQAE) in each factory which provides the Quality Assurance (QA), sentencing the products as either cleared for issue or rejected. Flow chart of activities and agency responsible is depicted in **Chart No. 3** below:

Chart No-3

Flow chart of activities relating to Quality Management in ordnance factories



(Source: (1) Standing Order (Technical of DGQA Organisation)
(2) Ministry's Circular No. 16(2)/04/D(QA) dated 15.06.2005)

Return for Rectification (RFR)

DGQA's instructions (December 2010) provide that as per standard quality management practices since quality is the responsibility of the manufacturer, all QC activities ought to be carried out by the manufacturer on 100 *per cent* basis which besides ensuring quality would also enable him to weed out non conforming products. 100 *per cent* inspection would normally entail taking each item in a batch/lot for 100 *per cent* parameters required to be checked as per quality requirement. Consequently, based on successful completion of all such QC activities, the manufacturer ought to submit a quality conformance certificate along with all supporting documents such as test report to SQAE.

The instructions also provide for final clearance with only two options, acceptance or rejection of products by SQAE. This essentially removed the third option of RFR which would allow the Factory an opportunity to rectify the defects and re-submit it for inspection by the SQAE. In a joint meeting of the Ministry, OFB and the DGQA in July 2011, this issue was once again debated and it was decided that the above instructions would hold. The premise was that the DGQA provides the final clearance on the basis of inspections of only a sample and it was for the Factory QC which conducts 100 *per cent* checks to return a product to the production shop for RFR.

Moreover, we observed that the SQAE continued to sentence components under RFR. In 71 out of 123 instances during 2008-13, percentage of RFR was as high as 20 to 100 *per cent* in several types of ammunition. **Table-18** given below illustrates the instances where the RFR was 20 to 100 *per cent* of the quantity of ammunition inspected during the year. Some of the reasons for sentencing the components under RFR were (i) leakage of propellant, (ii) driving band (where the shell is fired after filling) not rotating, (iii) improper coating (phospating), (iv) imperfections in the body of the shell like cavities or excess varnish or dents or forging defects with the shell pitted at places, (v) dimensional deviations such as those in length and height of the shell, tail fin thickness higher than specified, *etc*. Evidently, these defects particularly imperfections in the shell body or dimensional deviations *etc*. should ideally have been detected in the inspections by QC. The fact that these components were sentenced as RFR in QA stage, points to gaps in Factory QC and the SQAE making compromises in its mandate.

Table-18: High percentage of RFR of components

Sl. No.	Factory	Ammunition /Component	2008-09 Qty inspected Qty RFR (Percentage of RFR)	2009-10 Qty inspected Qty RFR (Percentage of RFR)	2010-11 Qty inspected Qty RFR (Percentage of RFR)	2011-12 Qty inspected Qty RFR (Percentage of RFR)	2012-13 Qty inspected Qty RFR (Percentage of RFR)
1.	OF Ambajhari	Fuze A 670 M	42914 10696 **(25)**	-	21360 10656 **(50)**	-	-
2.	-do-	Primer GUV 7	10255 2051 **(20)**	14357 10255 **(71)**	47173 16408 **(35)**	-	-

Sl. No.	Factory	Ammunition /Component	2008-09 Qty inspected Qty RFR (Percentage of RFR)	2009-10 Qty inspected Qty RFR (Percentage of RFR)	2010-11 Qty inspected Qty RFR (Percentage of RFR)	2011-12 Qty inspected Qty RFR (Percentage of RFR)	2012-13 Qty inspected Qty RFR (Percentage of RFR)
3.	-do-	Shell 105mm IFG HE	32670 7050 **(22)**	53660 13580 **(38)**	500 500 **(100)**	1510 500 **(33)**	-
4.	-do-	Shell 125mm HE	46622 17734 **(38)**	47048 16634 **(35)**	49671 30333 **(61)**	40020 11104 **(28)**	-
5.	OF Kanpur	Shell 130mm HE	18000 8000 **(44)**	20000 10000 **(50)**	32000 16000 **(50)**	60000 30000 **(50)**	-
6.	-do-	Shell 125mm HE	-	-	16400 6200 **(38)**	24000 12000 **(50)**	-
7.	-do-	Shell 120mm TK HESH	-	-	17000 9500 **(56)**	8000 40009 **(50)**	-
8.	-do-	Shell 105mm TK HESH	-	24000 12000 **(50)**	-	-	-
9.	-do-	Shell 105mm EFG HE	256000 82000 **(32)**	260000 124000 **(48)**	220000 104000 **(47)**	196000 108000 **(55)**	-
10.	GSF Kolkata	Bomb 81mm Mortar C`	-	12078 6039 **(50)**	-	40260 8052 **(20)**	46299 21143 **(46)**
11.	-do-	Fuze DASA (51mm HE)	51324 30707 **(60)**	49244 24587 **(50)**	-	54711 14375 **(26)**	48744 18429 **(38)**
12.	-do-	Shell 40mm HE/T	21052 15036 **(71)**	3008 3008 **(100)**	75174 21032 **(28)**	39104 15040 **(38)**	24068 18048 **(75)**
13.	-do-	Fuze A670M (30mm HE/I)	77000 35578 **(46)**	76290 40770 **(53)**	-	45949 15000 **(33)**	75482 50669 **(67)**

(Source: Letters of CQA (A) Kirkee, OFAmbajhari, GSF, Kolkatta SQAE(A) Kanpur)

5.2 Rejection of filled ammunition and components

During the period 2008-13, we observed rejection of filled ammunition/ components by the SQAE in 43 out of 205 instances aggregating to ₹234 crore, representing around two *per cent* of the ammunition issued during the period. The highest instances of rejection were from Ordnance Factory Chanda (OFCh) and Ordnance Factory, Badmal (OFBL) which accounted for 93 *per cent* of the total rejection. **Table-19** illustrates instances of rejection over ₹10 crore during the review period.

Table No.19: Prominent final rejections of filled Ammunition/Components

Sl. No.	Ammunition	Factory	Qty rejected	Cost of rejection (₹ in crore)
1.	BBU of 155mm ERFB BB	OF Chanda	22363	60
2.	Shell 155mm ERFB	OF Chanda	3797	25
3.	Shell 155mm HE ERFB (BT)	OF Badmal	6000	24
4.	Shell 130mm RVC	OF Chanda	6000	24
5.	Bomb 81mm HE	OF Chanda	40221	25
6.	Bomp 81mm PWP	OF Chanda	24060	14
7.	Fuze B 429 (filled)	OF Chanda	18952	12
	Total			184

(Source: Annexure-VIII)

In addition, the SQAE also rejected empty components of ammunition aggregating ₹94 crore manufactured by three component making factories (OFAJ, OFC and GSF) during 2008-13. The rejections accounted for seven *per cent* of the production of these components in the factories during the same period. Some of the high value rejections are summarized in **Table-20** below:

Table No. 20: High value rejection of ammunition components by Quality Assurance

Ammunition Component	Ordnance Factory	Value of Rejection (₹ in crore)	Reasons of Rejection
Empty fuze A 670 M Empty fuze B 429	OFAJ GSF OFAJ	6.83 6.61 3.20	Premature and non-functioning, blind, non/misfire of fuze
Tail unit 1A Tail unit 2A	OFAJ OFC	3.32 4.17	Blind and standard deviation higher in respect of Tail Unit
Empty shell 30mm AP/T	GSF	3.41	Vertical and lateral dispersion beyond limit in respect of empty shell
Empty shell 155mm HE ERFB (BB)	OFAJ	20.08	Land engraving on body above driving band and nub in respect of empty shell
	Total	**47.62**	

(Source: Annexure IX)

From the table above it may be noted that the land engravings on body in the empty shell 155mm HE ERFB (BB), is a defect that could have been detected in visual inspection by Factory QC. That it was missed in QC stage points to compromises in Factory QC.

5.2.1 Investigations into rejections/defects

As per the direction given by the Ministry (DGQA) in March 2007 the investigations into rejections/defects are required to be completed within three

months. The stated objective of the investigations was to identify the underlying causes so that corrective measures are taken to prevent their recurrence. But investigations take inordinate time in the Factories depriving the Factory of timely feedback for corrective measures, leading to recurrence of rejections. The delays also send unintended wrong signals that rejections are not viewed seriously in the OFB.

For instance, propellant for 155mm[20] Ammunition manufactured in Ordnance Factory Badmal valued at ₹60 crore and 81mm bombs[21] produced by OFCh and AFK worth ₹39 crore were rejected in proof during 2008-13. These rejections were still under joint investigation by the Factories and SQAE (January 2015). Delays led to repeated rejections as described in **Annexure-VIII**.

Rejected 155 mm Ammunition due to corrosion

The rejections were due to a host of reasons including ammunition not covering the required range, non-functioning/malfunctioning of components, misfiring, failure of the ammunition to penetrate the target, high standard deviation than specified on certain quality parameters, muzzle break, defects in fuze including partial/low order detonation of the fuze, non-opening of parachutes of Illuminating ammunition.

Scrutiny of records revealed that rejections were also caused sometimes due to compromises made in the process. We observed that OFBL accepted and filled four lots of empty shells (105mm IFG HE[22]) without obtaining the Inspection Note/QA Certificate (QAC) in two out of three empty lots. During proof test of the ammunition (January 2010 to January 2011), these four lots (8,000 filled shells) met with accidents with the breaking of muzzle of the gun. Resultantly, 8,000 filled shells valuing ₹8 crore were rejected[23]. In reply to audit observation (23 May 2013), OFBL stated (June 2013) that sometimes empty shells were utilised without receipt of Inspection Notes and QAC from

[20] 155mm ERFB BB- Extended Range Full Bore – Base Bleed.
[21] HE and PWP- High Explosive and Plasticised White Phosphorous 81 mm bomb
[22] High explosive ammunition for 105mm Indian field gun
[23] A task force was formed (January 2011) to investigate the reason for failure of the lots. But the task force ruled out (October 2012) any probable cause of accident due to weapon, metallurgical, propellant and proof aspects. However, they suggested probable cause of accident due to poor/improper knurling combined with rusting in the empty shell, which might lead to stripping of driving band during motion of a projectile resulting in accident.

sister factories for gainful utilisation of manpower. The reply is an admission of the violation of the prescribed quality norm which ultimately led to rejection of shells.

5.2.2 Rejected Ammunition

We found that as of 31 March 2013, 13 types of ammunition valuing ₹1,617.94 crore were lying rejected in 856 lots due to manufacturing defects, of which 632 lots were for more than five years. The details of rejected ammunition are given below in **Table-21**:

Table No.21: Details of Ammunition lying rejected due to manufacturing defects in the Depots

Sl. No.	Nomenclature	Quantity (No)	Value (₹ in Cr)
1.	5.56mm INSAS	190000	34.02
2.	Fuze 162 Mk 8 & 9	242943	29.50
3.	Fuze 117 Mk 20	733667	825.71
4.	14.5 mm API/APIT	263695	12.58
5.	Igniter Set 4 Sec Delay	30396	1.54
6.	Rd 23mm	13036	4.46
7.	40mm L/70	14000	5.57
8.	125mm HE/HEAT	1754	8.34
9.	125mm FSAPDS/T	82000	590
10.	Carts 130mm RVC/FVC	6575	30.73
11.	Rd 130mm HE	2899	14.10
12.	Mine A/Tk ND	102805	47.29
13.	Carts 105mm IFG N/Chg	14905	14.10
		TOTAL	1617.94

(Source: Details furnished by AHQ)

We analyzed a few cases to ascertain the reasons for rejection even after the quality control and assurance exercised prior to their issue. These are discussed below:

❖ **Shell 125 mm HE 1A**

OFBL issued five lots of the ammunition to the Army during 2011-12 using the obturating band supplied by OF Katni and paint supplied by the trade firm. During inspection of a subsequent three batches of the shell, the SQAE Ambajhari found (February 2013) the obturating band material defective and the paint non conforming with the requirements. As a result eight lots of finished ammunition 125mm HE 1A valuing ₹75 crore was rejected.

125 mm HE 1A

❖ **125 mm HE / HEAT ammunition**

In February 2012, the CQA, Kirkee found that the glue imported from M/s Rosoboronexport in December 2011 for manufacturing the ammunition was below grade. OFBL, however, continued to manufacture the ammunition by

using the same glue and issue to Army. 16 lots of the ammunition using the glue were supplied to the Army in 2012-13. In August/September 2012, the Army issued instructions to segregate these 16 lots worth ₹157 crore, which were lying in depots.

❖ **105 mm IFG NC ammunition**

19,639 number of 105 mm IFG NC ammunition valuing ₹17.28 crore were lying at various Army depots in segregated condition due to black stains/patches found during receipt inspections. The ammunition was manufactured by OFCh and OFBL. A task force was constituted in September 2012 to investigate the reasons. The final report was yet to be submitted (January 2015).

Black patches in 105 mm IFG NC

❖ **Fuze 117**

7,33,000 numbers of Fuze 117 supplied by OF Chanda before November 2008 could not be utilized after defects were noticed by the users in May 2011. During revalidation of 1,32,338 fuzes, 41 fuzes were rejected. The rejected fuze would have caused fatal accidents during operation/training. Till the time the balance six lakh fuzes are revalidated, six lakh shell worth ₹924 crore could not be utilized for operational purpose.

5.2.3 Down-gradation of ammunition within shelf life

Every type of ammunition has its prescribed shelf life. In case, ammunition is found defective and downgraded within its shelf life, OFB is responsible to rectify the defects or to replace the downgraded ammunition free of cost, under the Warranty/Guarantee clause. Transportation cost for replaced ammunition would also be borne by OFB.

We noticed in September 2013, that DGOS was pursuing for free replacement of ammunition, worth ₹814 crore, downgraded within the shelf life, with OFB. DGOS also emphasized that unserviceable ammunition was deteriorating, and was a potential fire risk at various depots. The matter was reiterated time and again between December 2007 and February 2012 and OFB replaced ₹18.78 lakh worth of only one ammunition (5.56mm) free of cost against total downgraded ₹2.44 crore of that ammunition (November 2014). Free replacement of the remaining ammunition was yet to be effected (September 2013).

The fact thus remains that the down-gradation of ammunition within the shelf life entails loss to the state and the inordinate delay in its free replacement was adversely affecting the operational preparedness of the Army.

Chapter VI: Supply Chain Management and Depot Activities

Audit Objectives

To ascertain whether:

- **An efficient, effective and economical supply chain management is in place.**

6.1 General

Supply chain management of ammunition inventory involves receipt of ammunition items from various supplying agencies like OFB, ex-import, trade and PSU at CAD Pulgaon, their distribution to various ADs/FADs and Divisional Ordnance units (DOUs)[24] and their issue to dependent user units for operational and training purpose. Most of the ammunition are produced long before their ultimate consumption, therefore, the storage of ammunition is an important logistics consideration. Stock of ammunition which have been declared obsolete, or become defective and cleared for destruction, need to be moved out of the system at the earliest through disposal.

6.2 Serviceability status of ammunition

We observed during the review that significant quantities of ammunition were lying in segregated and unserviceable condition in various Ammunition depots. Total availability of ammunition with Army in various conditions as of 31 March 2013 is shown in **Table-22** below:

Table No. 22: Availability of ammunition as on 31 March 2013

Category	Quantity in MT	Percentage of Total Quantity
Serviceable	3,40,693	82.57
Segregated	28,771	6.97
Repairable Major	30,862	7.48
Obsolete	27	0.007
Obsolescent	141	0.034
Unserviceable	12,080	2.93
Total	4,12,574	

(Source: DGOS (OS-6A letter dated 5th Sept 2013))

As evident from the table above, on 31 March 2013, 71,881 MT out of 4,12,574 MT (17.5 *per cent*) ammunition held with the Army was either in

[24] An ordnance unit to control attached Ammunition Points forms a small ammunition depot/unit.

"Unserviceable", "Segregated"[25] or "Repairable Major"[26] category. We also found that neither category wise data for previous year nor age-wise data of segregated/repairable ammunition was maintained by AHQ. Absence of this data was suggestive of indifference of AHQ towards sentencing/treatment of the segregated/repairable ammunition.

6.2.1 Segregated Ammunition

Subsequent to any defect/accident occurring due to faulty ammunition, faulty weapon, faulty drills, *etc.*, an immediate ban is imposed on the ammunition for safety of all and it is only after DGQA carries out defect investigation and gives final sentencing, the ban is lifted for use of ammunition, if serviceable, or it is disposed off, if unserviceable. Till this sentencing is done, the entire ammunition is held in segregated condition.

We observed that 28,771 MT of the ammunition was lying "segregated" in different ammunition holding echelons in Army, as on 31 March 2013. The value of ammunition pertaining to the five year audit period of 2008 to 2013 was ₹3,578 crore. Out of this, ammunition valuing ₹1320 crore was of high calibre.

6.2.1.1 Inordinate delay in completion of defect investigation

As per DGQA policy, defect investigation of segregated ammunition has to be completed by CQA (A) within three months. However, we observed that the progress in completing the investigation was very slow. As of March 2013, out of 241 pending cases of the defect investigation, 167 cases were pending for more than a year. The year wise outstanding cases are indicated in **Table-23** below:

Table No. 23: Outstanding cases of defect investigation (as of March 2013)

Year of accident	Number of Outstanding cases
2008	**09**
2009	**07**
2010	**36**
2011	**41**
2012	**74**
2013	**74**
Total	**241**

(Source: DGOS (OS-6C) letter dated 12th July 2013)

[25] Subsequent to any defect/accident occurring due to faulty ammunition, faulty weapon, faulty drills, *etc.*, an immediate ban is imposed on the ammunition for safety of all and it is only after DGQA carries out defect investigation and gives final sentencing, the ban is lifted for use of ammunition if serviceable or it is disposed off if unserviceable. Till this is done, the entire ammunition is held in segregated condition.

[26] If a major defect is found in the quantity of an ammunition examined during its annual inspection, maintenance, turn over, proof, defect investigation, etc., 100 *per cent* examination of the contents of all packages will be made. If there are four *per cent* or less major defects in the quantity examined, the lot/batch will be sentenced serviceable after elimination of the defects observed; otherwise it will be sentenced Repairable Major (RMJ)

Reasons for delay in completion of defect investigations, as stated by DGQA, in September 2013, were non receipt of MGAOC Report from Command, non availability of samples in time, low priority accorded by Ordnance Factories in processing and dispatch of samples, actual transportation time, delays on account of other important designated work load and non finalization of report due to non receipt of all investigation reports at CQA, *etc.*

Evidently, all the reasons of delay adduced above are controllable at the appropriate level by the concerned authorities responsible to ensure timely completion of defect investigation.

We also observed that for a more objective assessment of reasons for accident in a time, DGQA accepted to establish a Predictive Technology Laboratory (PTL) to create all test facilities under one roof, based on one of the recommendations made in the Performance Audit Report No 18 of 2005. Despite the commitment made by DGQA, construction work of PTL could not be completed even after a lapse of more than seven years of the preparation of the project report of PTL (December 2005). As of September 2013, we observed that even the civil works for construction of the project had not been completed.

6.2.2 Repairable Major (RMJ) Ammunition

We observed that 30,862 MT of the ammunition was lying in "RMJ" condition in different ammunition depots, as on 31 March 2013. The value of RMJ ammunition pertaining to the five year audit period of 2008 to 2013 was ₹2,109 crore, which was awaiting repairs. Out of this, ammunition worth ₹437 crore had already become overage.

Provisioning of repair components is done by OS Directorate on yearly basis. Accordingly, indents were placed on OFB for supply of repair components. We observed that OFB failed to supply the repair components as per indented quantity, routinely during 2009-10, 2010-11, 2011-12 and 2012-13.

6.3 Delay in issue of ammunition

Ammunition holding depots issue ammunition to the dependent user units on the basis of demands placed by them. Inter depot transfer of ammunition takes place on the basis of Army Loading Order (ALO)[27], issued by the AHQ. The time schedule laid down for issue of ammunition by the depots in the case of Operation (OP) immediate, priority and normal demands is 7, 14 and 21 days respectively in equipping the newly raised units. However there was no fixed time schedule for issue of ammunition for the existing units.

The average time taken by the eight depots as seen during audit, for issue of ammunition items against the normal 21 days are given in the **Table 24** below:

[27] Army Loading Order is authority issued by Army Hqrs for issue of ammunition between commands

Table No. 24: Delay in issue by the Depots

Year	Total Issue vouchers	Issues within time (*i.e.* within max. 21 days)	Issues involving delay				Percentage of issues with delay w.r.t. to total issues
			22 days to 3 months	**3-6 months**	**6-12 months**	**> 12 months**	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
2008-09	16,106	6,869	6,481	979	1,735	42	57 %
2009-10	19,818	8,654	8,691	894	1,560	19	56 %
2010-11	20,850	7,671	10,021	1,156	1,549	453	63 %
2011-12	24,952	8,735	10,884	2,777	2,513	43	65 %
2012-13	21,838	10,459	9,129	1,101	1,138	11	52 %

(Source: Statement prepared on the basis of information furnished by the Ammunition Depots/Field Ammunition Depot)

We observed that there were inordinate delays ranging from 52 to 65 *per cent* in issue of ammunition during 2008-09 to 2012-13. Non issue of Ammunition to the Units in time results into their depleted stock of Ammunition and affects their preparedness for War. In reply to the observation regarding delay in issue of Ammunition, the depots attributed the delays to non availability of transport. This was despite the fact that the transport management at various echelons was the internal responsibility of Army.

6.4 Movement of ammunition

6.4.1 Irregular transportation of Ammunition that were specified to be transported by explosive vans

'Regulations for the Conveyance of Military Explosives and Ammunition by Road' issued by Storage and Transport of Explosives Committee (STEC) of Centre for Fire, Environment and Explosive Safety (a DRDO lab), 1995 and further revised in 2011, mandated for consignment of ammunition to be transported in explosive vans. A Statement of Case (SOC) for scaling of explosive vans in Peace Equipment Table (PET)/War Equipment Table (WET) of ammunition echelons of AOC was initiated by OS Directorate in May 2013.

Audit Scrutiny revealed that even though the ammunition was required to be transported in explosive vans since 1995, the AOC took more than 18 years to initiate the proposal for scaling of the explosive vans in the PET/WET of the ammunition echelons. In reply to the observation raised by Audit in this regard, the DGOS submitted that the point raised by Audit was well appreciated and all efforts would be made to get the explosive vans authorized to ammunition depots in the recast 12th Plan.

We observed that the transportation of ammunition was being done in the general services vehicles which were not designed for such purpose. Delay in

procurement of explosive vans resulted in transportation of explosives without observing the standard norms for safety.

6.4.2 Accountal of ammunition

Paragraph 455 of the Defence Accounts Department, Office Manual Part VI stipulates that OFs are required to prepare six copies of Issue Vouchers for issue of stores/ammunition to the indentors, of which three copies are to be sent to the Army depots along with the consignments. Out of three copies, one copy duly receipted is to be sent back to the consignor OF by the Army depots.

Paragraph 503(b)(N) of Defence Accounts Department Office Manual (DAD OM) Part-VI, Vol-I also stipulates that for stores issued to arsenals, depots – Separate lists in IAFZ-2014 will be prepared for different formations in which the designation of the consignee and the numbers and dates of the vouchers forwarded will be entered. These lists with supporting vouchers will be sent to the Local Audit Officers (LAOs) concerned for verification of the necessary credits for stores and their acknowledgements obtained.

We observed that in out of 10 ordnance factories selected for review, three factories OFK, OFCh and OFBL failed to receive 639 Issue Vouchers valuing ₹2,347 crore duly receipted by Army depots during 2008-2013. Age wise breakup of these Issue Vouchers is given in **Table 25** below:

Table No.25: Age wise analysis of pending Issue Vouchers

Year	Number of Issue Vouchers pending	Value (₹ in Crore)
2008-09	18	65.42
2009-10	35	118.12
2010-11	45	163.59
2011-12	118	515.90
2012-13	423	1483.88
Total	639	2346.91

As a result, actual receipt of these consignments by the Army depots could not be vouched by us. However, no effective step was taken by these three factories to get those Issue Vouchers from the Army Depots.

On this being pointed out, OFCh and OFK stated (August/September 2013) that the matter would be taken up with Army depot for reconciliation and collection of receipted copy of issue vouchers. However, replies were silent as to why no action was taken up for such a long period to ensure that acknowledgement of receipts of all the issues from OFs were received in time as an evidence of delivery of full consignments to Army depots as scheduled.

Thus, the receipt of ammunition valuing ₹2,347 crore issued by three Ordnance Factories during 2008-09 to 2012-13 by Depots could not be ensured (September 2013).

6.5 Storage Accommodation in Army

Centre for Environment and Explosive Safety (CFEES) is the body under the DRDO, which prescribes norms for storage of explosives, based on Storage, Transport and Explosive Committee (STEC) Regulations and UN classification. As per CFEES there is no scope for any storage of Ammunition in temporary accommodation.

We observed that in contravention to CFEES norms Army was holding 18 *per cent* Ammunition in Temporary Accommodation as of 31 March 2013. The details are given below:

Total Ammunition held (MT)	Ammunition held in Permanent Accommodation (MT)	Ammunition held in Temporary Accommodation (MT)
391303	320086	71217

18 *per cent* of ammunition was stored in Temporary accommodation in violation of CFEES regulations.

Further the deficiency in storage accommodation of Ammunition with reference to authorisation of WWR of 40 (I) was 57 *per cent* as of 31 March 2014 as detailed below:

Total Ammunition Authorized in terms of 40 (I) (MT)	Permanent Accommodation held for Ammunition (MT)	Deficiency of Permanent Accommodation for Ammunition (MT)
742736	320086	422650

6.5.1 Irregular emergence of civil constructions within safety zone of Ammunition Depots

As per section 3 of Indian Works of Defence Act 1903, Ministry may declare any area as no construction area (safety zone) in the vicinity of perimeter of any ammunition dump. As per the Act, it is mandatory to start proceedings for issue of public notices within three years from the date of such declaration. We observed that in contravention to the Act, a number of civil constructions emerged in the safety zone around Depots audited during the review. The details are as under:

- Gazette notification in respect of AD Dappar for imposition of restriction was issued in July 2004. AD Dappar in October 2005 made correspondence to appoint a Collector under the provision of the Act. After six years of publication of Gazette notification, District Magistrate, Mohali in April 2011 issued notification notifying an area of 1,200 yards

all around from the depot parapet to be no construction zone. But, 130 unauthorized constructions within clearance zone were noticed by AD Dappar and police complaint was lodged (January 2008 to February 2013).

- Gazette notification in respect of 18 FAD and 2 ASD (Pathankot) were issued under SRO[28] in October 2001 and November 2003 respectively notifying 1,000 yards (914 metres) as safety zone. The said notification was promulgated by DM Hoshiarpur and DM Gurdaspur in July 2008. No action has been taken by DM Hoshiarpur so far. A large number of illegal/unauthorized constructions were carried out within the safety zone.

We noticed that at number of places, unabated constructions in the notified areas have taken place violating the statutory provisions of the Act and in detriment to the security interest of the Army. In certain cases, complete townships have come up in these restricted areas and in some other cases large scale commercial plants, complexes *etc.* have been allowed to come up. Army Headquarters in June 2012 opined that the concerned officer responsible for ensuring the proper implementation of this Act have not taken the adequate steps to stop such unauthorized construction right at the time of its inception.

Fact remains that due to delay of more than 54 years (after independence) in publication of Gazette notification in respect of the safety zone, a number of civil constructions emerged within safety zone of depots.

6.6 Fire Fighting Equipment

Scale of firefighting equipment and authorization of Fire Fighting staff was last revised by Government in March 2004.

Station Fire Committee is convened to assess the requirement of firefighting equipment as per scale laid down in the Army Instruction and as per risk assessed in respective establishments. Command wise Station Fire Committee (SFC) were last convened during the period March 2002 to February 2003. DGOS in November 2011 stated that the scenario in most of the echelons in AOC has changed substantially, so far as fire fighting risks and ordnance held in their possession are concerned and instructed to finalize board proceedings of SFC by December 2011. The board proceedings were finalized by depots as given in **Table 26** below:

Table No. 26: Details of Board proceedings

Depot	Date of finalization of board proceeding
AD Bathinda	16.6.2011
15 FAD	Not finalized till May 2013.

[28] SRO – Statutory Rules and Orders, a terminology used for classification of orders issued under Gazette Notification

AD Dappar	Not finalized till June 2013.
18 FAD	2.1.2013

(Source: ADs/FADs letters)

Deficiency of firefighting staff and main firefighting equipment during 2008-13 was 47 and 65 *per cent,* respectively, in eight selected depots.

We observed that the step for revision of Firefighting staff and Equipment was initiated by DGOS in November 2011, but the same could not be finalized till 31 March 2013. Thus, the depots were functioning with risk of fire accident as the equipment and manpower are not held as per requirement/authorization, as these depots were holding depots of ammunition.

6.7 Disposal of ammunition

Disposal of ammunition is required to purge the distribution system of ammunition which became obsolete, excess, unserviceable, uneconomical to repair, and/or condemned/hazardous for continued storage, maintenance, and/or use. Disposal as addressed herein primarily pertains to ammunition disposal/demilitarization operations involving large quantities of ammunition.

6.7.1 Disposal system

Presently ammunition is disposed off by burning and demolition. Once ammunition is found/declared unserviceable, it is deposited to the dependent ammunition depot wherein the ammunition is disposed off by a team of ATAs[29] and ATO[30].

Unserviceable ammunition is disposed off at the depots through breakdown or demolition, after disposal instructions are received from the AHQ on approval from the competent authority. The details of ammunition disposed off and those outstanding for disposal during the period 2008-09 to 2012-13 are given below in **Table-27**:

Table No. 27: Ammunition disposed off and awaiting break down or demolition during the period 2008 to 2012

(Quantity in MT)

Year	Disposed off	Awaiting break down	Awaiting demolition	Total awaiting disposal
a	b	c	d	e = c+d
2008	9,550	1,875	2,452	4,327
2009	5,556	2,213	3,236	5,449
2010	6,239	4,130	2,917	7,047
2011	7,683	4,410	2,787	7,197
2012	5,307	9,843	2,213	12,056

(Source: DGOS letter dated 20 March 2013 and 10 July 2013)

[29] ATA – Ammunition Technical Assistant
[30] ATO – Ammunition Technical Officer

It would be seen from the above table that the quantity of ammunition awaiting disposal has steadily gone up from 4,327 MT at the end of 2008 to a huge quantity of 12,056 MT of ammunition awaiting disposal as at the end of 2012. This is mainly attributable to the fact that ammunition disposed off every year has gradually gone down from 9,550 MT in 2008 to 5,307 MT in 2012.

DGOS stated (July 2013) that though constant endeavour is made by AOC to dispose off unserviceable ammunition in time, various constraints like limited manpower, demolition ground/range and temperature/weather conditions *etc.* also have to be kept in mind. The reply of AOC does not clarify the constantly decreasing trend in disposal of unserviceable ammunition during the period from 2008 to 2012 when annual quantity disposed off came down by nearly 44 *per cent* and the steps taken to improve the performance.

The delay in disposal of unserviceable Ammunition resulted in occupation of valuable storage space and increased risk of accidental explosion, fires *etc.*, besides depriving the Government of realization of revenue from disposal in timely manner.

6.7.2 Demilitarisation of ammunition

The employment of conventional disposal techniques (open burning and open demolition) results in environmental damage. Demilitarisation is an environment friendly method of disposal of ammunition and explosives.

Centre for Fire, Explosive and Environment Safety (CFEES), is the nodal agency for implementing environmental rules and regulations in the Ministry of Defence. Being the R&D establishment, CFEES stated in February 2007 that disposal of unserviceable ammunition by demolition will be made as per STEC regulation however, environment friendly methods were available in the global market as 'Demilitarisation plant' and suggested to procure the plants for disposal of unserviceable ammunition.

However, no action has been taken so far by CFEES to develop environmental friendly demilitarization plant. DGOS in reply stated (July 2013) that his office had approached firms for giving presentation on demilitarisation to which three foreign firms have responded so far. No further action has since been taken by DGOS.

6.8 Delay in computerization of inventory control system

Accurate ammunition accounts are an essential part of stockpile management as a control measure because they can quickly identify stock losses. They are also essential to the effective technical surveillance of ammunition.

We observed that the benefits of use of IT have, largely, eluded management of ammunition in the Army due to delay in implementation of the project sanctioned by the Government 19 years back.

6.8.1 Computerized Inventory Control Project (CICP)

In July 1994, Ministry sanctioned the CICP for full scale computerization of Ordnance Services for online transaction processing multi user RDBMS computerized management system linking all the echelons in the Ministry, AHQ and Ordnance units within a targeted period of five years. The objectives of CICP included interconnecting CODs to Divisional Ordnance Units (DOUs)/Brigade Ordnance Units (BOUs) through Wide Area Network (WAN) and to design Management Information System (MIS) and Decision Support System (DSS) for the AHQ and the Ministry by phased planning and control of their inventory.

6.8.2 Project activities

Though Ministry sanctioned the project in 1994, the contract for the pilot phase (Phase I) was entered in February 2000 for a sum of ₹11.80 crore. The Phase I was completed in December 2003 at the total cost of ₹13.60 crore.

CCS approval for conducting system study and porting developing software in Phase II across 23 selected Depots/units was accorded in November 2005. However, no contract could be concluded so far. CICP Phase II was at RFP stage in April 2013.

6.8.3 Delay in implementation of the project

We observed that due to delay in execution of the project through implementation of ERP systems, the Army has been deprived of the benefits envisaged *viz.* efficiency in processes; computer generated MIS Reports; access to real time data; total asset visibility; inventory reduction and standardization of processes.

Chapter-VII: Conclusion

The Review of Ammunition Management in Army was taken up to assess the effectiveness of procedures, practices and built-in-controls existing for management of ammunition in Army. While availability of authorized stock against War Wastage Reserve (WWR) to meet the expected duration of operation formed the basic criteria for ensuring the operational readiness of the Army, we found during the review that against the WWR of 40 (I) days, the availability of ammunition was only in 10 *per cent* of the total types of ammunition held (March 2013). Further, in 50 *per cent* of the total types of ammunition, the holding was 'critical' *i.e.*, less than 10 (I) days. We observed that the overall holding had been continuously depleting over the years and was more prominent in High Calibre ammunition. The percentage of High Calibre ammunition, which was critical, ranged up to 84 *per cent* during the five years period of audit. To tide over the persistent acute shortages, the AHQ had set (1999) a minimum threshold of MARL *i.e.*, 20 (I) days to be achieved first. We found that even after 15 years, the threshold of MARL could not be achieved. The acute shortage was a serious cause of concern directly impairing the operational readiness of the Army.

Inability of OFB to meet the demand of Army was a major cause for shortage of ammunition. OFB, which had a limited production capacity *vis-à-vis* the requirement of Army, accepted the targets for supply of ammunition covered under the Roll on Indent in mutual consultation with AHQ. It however, failed to supply the accepted quantities, and there was shortfall in 54 to 73 *per cent* types of ammunition. Shortfall in production capacity by the OFB was further compounded by high rate of RFR. In 71 out of 123 instances examined during audit, the percentage of items returned for rectification ranged from 20 to 100 *per cent*. Even the ammunition passed by QC and QA was not of desired qualitative standards. We found that due to manufacturing defects ammunition worth ₹1,618 crore was lying rejected in depots. Further, ammunition worth ₹814 crore was declared unserviceable within shelf life due to its poor quality.

Import, as an alternate source of procurement, also proved to be unreasonably slow as no procurement fructified against the nine items initiated through capital route during the period 2008-2013. In case of revenue procurements also, the success rate of fructification of contracts was as low as 20 *per cent*.

Overall serviceability state of the ammunition revealed that 17.5 *per cent* of total quantity of ammunition held was lying in segregated, repairable and unserviceable condition (March 2013). During the period covered in audit, ammunition worth ₹3,578 crore was lying in segregated condition, due to delay in timely investigation. Further ammunition worth ₹2,109 crore was lying in repairable condition due to routine failure of OFB in supply of repair components. Timely sentencing and repair of these ammunition would have improved the serviceability state of ammunition holding.

Recommendations

- Given the persistent shortfall in availability of authorized reserves, Ministry should devise an objective and realistic mechanism, duly considering the capacity of Ordnance Factories, availability of budget and inescapable requirement of the Army to ensure that the operational requirements of the Army are fully met.

- Urgent steps need to be taken to modernise the Ordnance Factories and judiciously augment their capacity to produce items required by Army and plug the shortfalls in availability of critical ammunition.

- Once the production targets for factories are fixed after mutual consultation between Ministry, AHQ and OFB, responsibility needs to be fixed for subsequent slippages.

- In order to ensure strict adherence to timelines for procurement as per DPP/DPM, agencies involved in the procurement process should be made accountable for delays on their part.

- To avoid frequent revisions, GSQR should normally be framed after issue of Request for Intent/responses from potential vendors. Detailed matrix of responses *vis-à-vis* QRs should be prepared and must be highlighted while seeking the AON.

- In view of high rate of RFR and the facts that defects were noticed even after the prescribed quality checks, immediate and effective steps needs be taken to make the controls for QC and QA more robust and accountable.

- There is an urgent need for action on Segregated and Repairable Major (RMJ) ammunition. DGQA should ensure that defect cases are investigated and cleared within the prescribed time frame of three months.

- Effective steps may be taken to establish environment friendly demilitarisation method for disposal of ammunition and explosives.

- The Ministry may ensure online connectivity among AHQ, depots and user units to enhance visibility of assets, speedy issue and receipt to effectively carry out the management of ammunition through a speedy implementation of CICP, which is already delayed.

New Delhi
Date: 24 April 2015

(Rajiv Kumar Pandey)
Principal Director of Audit
Defence Services

Countersigned

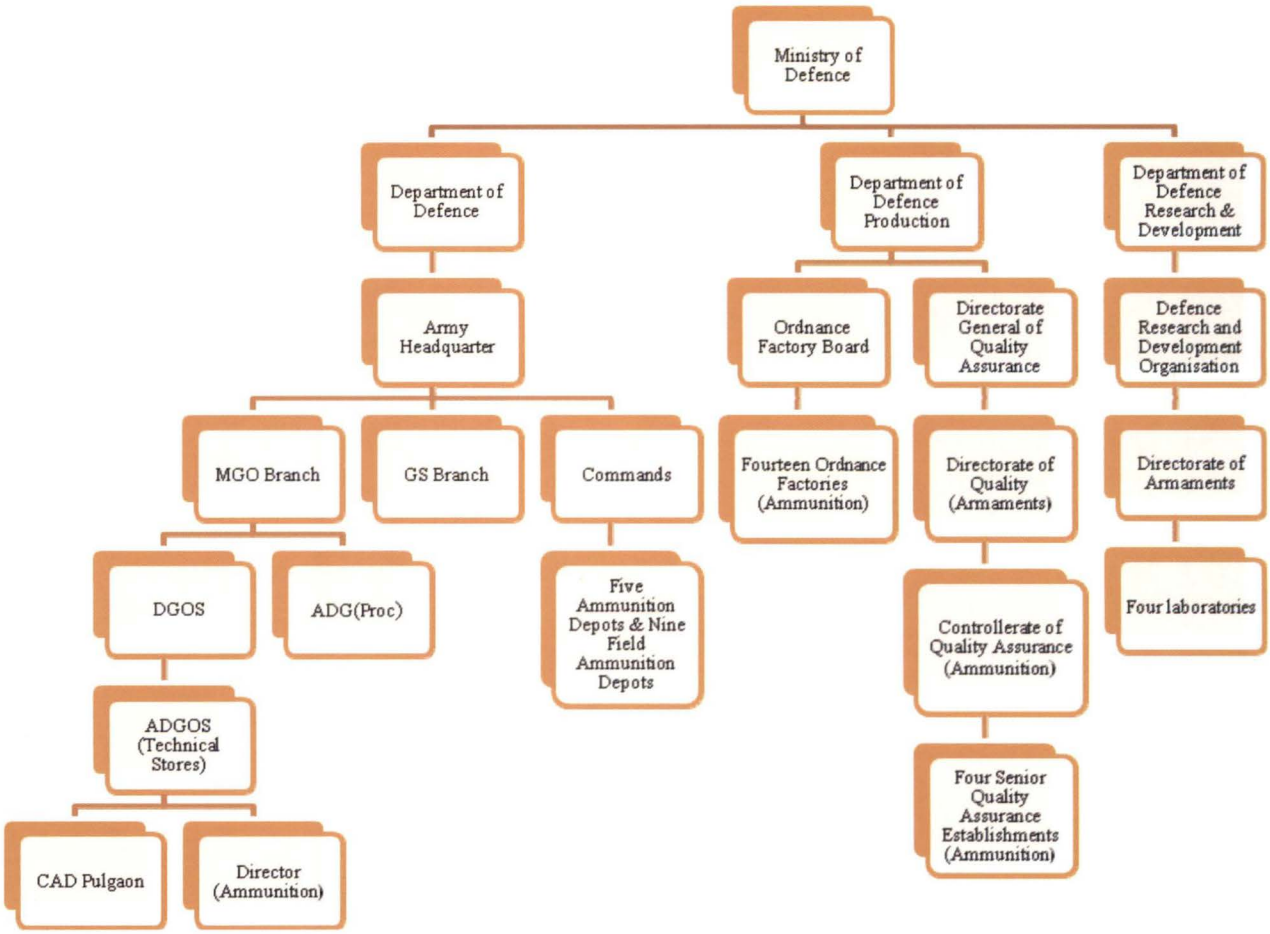
New Delhi
Dated: 24 April 2015

(Shashi Kant Sharma)
Comptroller and Auditor General of India

Annexure-I

(Referred to in Paragraph 1.4)

Flow chart of Ammunition Management in Army



(Source: DGOS letter dated 23.11.2013 & extract of allocation of work 2011 issued by Ministry of Defence)

Annexure-II

(Referred to in Paragraph 1.7)

Details of 69 types of Ammunition selected for Review

SI. No.	Name of the Ammunition
1.	155 mm M 107
2.	155 mm ERFB (BB)
3.	155 mm ERFB(BT)
4.	155 mm ERFB Illg.
5.	130mm FVC
6.	130mm RVC
7.	125 mm HE
8.	125 mm HEAT
9.	125mm FSAPDS/T
10.	120 mm HESH
11.	120 mm FSAPDS
12.	120 mm Mor HE
13.	120mm Mor. Illg.
14.	120mm Smoke PWP
15.	105 mm TK HESH
16.	105 mm TK FSAPDS/T
17.	105 mm IFG HESH
18.	105mm Smoke (Red)
19.	105mm Smoke (Orange)
20.	105mm Smoke (Blue)
21.	105mm Illg.
22.	105 mm IFG N/Charge
23.	105 mm IFG S/Charge
24.	84 mm HE MK-II
25.	84 mm HEAT 551 MK-III
26.	84 mm Illg
27.	81 mm Mor. HE
28.	81 mm Smoke PWP
29.	81 mm Mor. Illg
30.	81mm Smoke Grenade3D6
31.	51 mm ILLG
32.	40 MM L/70/HE/1
33.	30 mm AP/T
34.	30mm HE/I
35.	12.7mm AP/I
36.	12.7mm API/T
37.	Cartg SA 9 mm Ball MK 2z
38.	SWITCH NO 10 TP WHITE
39.	CHG DEMO NO 1
40.	BANGLORE TORPEDO
41.	Fuze DA 117/M85P13 PD-1 Fuze 117 MK-20
42.	Fuze-213 MK-5 M-2

Sl. No.	Name of the Ammunition
43.	Fuze B429/PD-2
44.	Fuze PDM572/PD3A
45.	PRIMER M 191 A2
46.	Propellant Charge M4A2
47.	155 mm Charge M-8
48.	155 mm Charge M-9
49.	SA 7.62MM SNIPPER RUSSIA
50.	SA 7.62MM RIMMED/STEEL CORE RUSSIA
51.	SA 7.62MM TRAC RIMMED RUSSIA
52.	SA 7.62MM AP INCEN B-32 RUSSIA
53.	RD QF 122MM HOW HE F/CHG PLGD
54.	RD QF 122MM HOW HE R/CHG PLGD
55.	RD QF 122MM HOW SMK WP F/CHG
56.	RD QF 122MM HOW SMK WP R/CHG
57.	RD QF 122MM HOW ILL F/CHG
58.	SHELL 155MM HOW ERDP CARGO M-397
59.	BMCS 155MM M-91 (I) A1 SA
60.	BMCS 155MM M-92 (I) A1 SA
61.	RD 20MM SAPHEI AMR SA
62.	RD 30MM HE/I
63.	RD 30MM AP TRACER
64.	GREN 30MM VOG
65.	RD 40MM HE VOG-25 BULG
66.	GREN 40MM SMK BST RP SA
67.	GREN 40MM HE AP M-848 SA
68.	GREN 40MM HE DP
69.	GREN 40MM TM

(Source: AIA Report for March 2013)

ANNEXURE-III

Shortage in stock holding in WWR *(Referred to in Paragraph 2.3.2)*

Sl. No.	No. of Days(I)	Category of Ammunition						
		AFV	ARTY	AD ARTY	DEMO/E XPT	INF & SAA	NEW GEN AMN	AVN
Category wise Stock Position as on 31st March 2009								
1	<10	2	11	--	--	2	--	--
2	10 to <=20	9	9	3	3	8	--	--
3	>20 to <=30	4	8	1	4	5	--	--
4	>30 to <=40	2	--	--	4	2	--	--
5	>40	3	1	--	11	9	--	--
		20	29	4	22	26		
		Total = 101						
Category wise Stock Position as on 31st March 2010								
1	<10	12	25	3	0	6	11	0
2	10 to <=20	5	16	4	4	5	2	0
3	>20 to <=30	4	7	1	3	6	0	0
4	>30 to <=40	2	1	0	4	1	1	0
5	>40	1	0	0	11	10	0	0
		24	49	8	22	28	14	0
		Total = 145						
Category wise Stock Position as on 31st March 2011								
1	<10	15	29	7	3	1	7	0
2	10 to <=20	2	12	2	1	11	1	0
3	>20 to <=30	4	7	2	4	5	1	0
4	>30 to <=40	3	2	0	7	5	1	0
5	>40	0	0	0	7	5	1	0
		24	50	11	22	27	11	0
		Total = 145						
Category wise Stock Position as on 31st March 2012								
1	<10	18	36	10	3	3	9	0
2	10 to <=20	4	14	4	3	11	0	0
3	>20 to <=30	1	5	0	4	4	1	0
4	>30 to <=40	0	2	0	3	2	0	0
5	>40	0	0	0	9	8	0	0
		23	57	14	22	28	10	
		Total = 154						
Category wise Stock Position as on 31 March 2013.								
1	<10	13	46	11	3	3	7	2
2	10 to <=20	8	15	4	2	11	0	0
3	>20 to <=30	0	4	1	5	4	0	2
4	>30 to <=40	0	3	0	2	5	0	2
5	>40	1	1	0	10	5	0	0
		22	69	16	22	28	7	6
		Total = 170						

Source:- *Service Stock shown in the AIA Report to March 2009, 2010, 2011, 2012 and 2013. All the Groups mentioned in the Report have been incorporate except the Groups wherein the service stock in days have not been mentioned.*

ANNEXURE-IV

(Referred to in Paragraph 3.3.2)

DETAILS OF PROCUREMENT OF AMMUNITION EX-IMPORT 2008-2009 ONWARDS

Sl. No.	Item	Contract No.	Date
1.	9mm 115 GR JHP	B/30607/SP/GS/WE-4	13 May 2008
2.	9mm 147 GR FMC flat subsonic		
3.	40mm Grenade	B/30607/ASLT-1183/GS/WE-4	13 Aug 2008
4.	5.56 mm Amn		
5.	40mm VOG-25	PC-12(2008) A/15436 /Bul/ PPO-3	21 Nov. 2008
6.	Explosive Rkts head FZ-71	A/18104/Lancer/OS-6B/D(O-1)	29 Jan. 2009
7.	Rkt Mor FZ-90		
8.	Smk Rkt Head FZ-32		
9.	Rkt Mor MK-40		
10.	Carts 122mm RC	A/18139/OS-6B/D(O-1)	25May 2009
11.	Carts 122mm HE RC		
12.	Carts 122mm Smk RC (WP)		
13.	Carts 122mm ILL		
14.	125mm FSAPDS	P/035606140991	10 Dec 2010
15.	84mm HEAT	A/18151/84mm/OS-6B/D(O-1)	09 Mar. 2011

ANNEXURE-V

(Referred to in Paragraph 3.3.2.1)

Delay in finalization in contracts for Ammunition Ex-import (Revenue Procurement)

Sl. No.	Date of Initiation of case /Acceptance of Necessity	Name of Ammunition	Completion date of procurement as per DPM 2006 (20 to 23 weeks)	Present Position of case	Delay in procurement (in weeks) as on 31 March 2013 taking into account the maximum periodicity of 23 weeks
1	2	3	4	5	6
1	01 Oct 06	Carts 7.62 MM Steel Core Bullet	30.04.2007	Under progress	308
2	01 Oct 06	Carts SA 7.62 MM B-32	30.04.2007	Under progress	308
3	01 Oct 06	Carts 7.72 MM T-46	30.04.2007	Under progress	308
4	10 Apr 06	12.7 HE (Ball)	10.10.2006	Under progress	335
5	19 Dec 08 28 Nov 11	7.62 Sniper Amn	19.06.2008	CNC stage	245
6	17 Oct 11 07 Dec 11	20 mm SAPHEI	17.04.2012	Under progress	46
7	17 May 10	30 mm VOG 17	17.10.2010	RFP retracted, case under progress	126 *
8	July 2008	40 mm MGL TM)	30.01.2005	Ministry decided to retract the RFP and fresh tender enquiries to be issued.	252
9	July 2008	40 mm MGL RP	30.01.2005	-do-	252
10	July 2008	40 mm MGL MEHC/DP	30.01.2005	-do-	252
11	July 2008	40 mm MGL HEAP	30.01.2005	-do-	252
12	31 Jan 11	40 mm L 70	30.06.2011	Trial Stage	88 *
13	22 Feb 10	ERA element for T-90 Tank	22.08.2010	Under progress	133
14	04 Jan 10	23mm HEI/T	04.07.2010	Under progress	139
15		23 mm API/T			139
16	02 July 10	BOMB ML 120 mm MOR SMK PWP	02.01.2011	Offers found non-compliant, Fresh RFP under vetting	112
17	18 Mar 11 22 Sept 11	40 mm VOG-25	18.09.2011	Case vetted by Ministry and CFA sanction accorded on February 2013. RFP to be issued	78
18	NA	30 mm VOG-17	----	Ministry retracted the RFP due to variation in Tech parameters. Fresh RFP under issue.	----
19	24 Mar 11 09 May 11	122 mm Rkt BM-21	24.09.2011	Case is held up for approval of Amn. Rd Map	77

20	24 Mar 11 09 May 11	FZ MRU-49 E 244	24.09.2011	-do-	77
21	June 2011 06 June 13	Air Trg Imitator (ATI)	31.12.2011	NA	64
22	05 May 10 30 June 10	Mine HPD-2	05.11.2010	Draft RFP Stage (Qty Revised)	123
23	19 June 12	HEAP 40mm MGL	19.12.2012	Case held-up for approval of Amn. Rd Map	13
24	19 June 12	HEHC/DP 40mm MGL	19.12.2012		13
25	19 June 12	RP 40mm MGL	19.12.2012	Under progress	13
26	19 June 12	TM 40mm MGL	19.12.2012		13
27	29 May 12	12.7 mm Ball for Lancer Aircraft	29.11.2012	-do-	16
28	29 May 12	12.7 mm API –do--	29.11.2012	-do-	16

ANNEXURE-VI

(Referred to in Paragraphs 3.2 and 4.3)

Item-wise Target and shortfall of ammunition manufactured by OFB during 2008-13

Sl. No.	Name of the Ammunition	2008-09		2009-10		2010-11		2011-12		2012-13	
		Target	Shortfall/ (%age)	Target	Shortfall/ (%age)	Target	Shortfall/ (%age)	Target	Shortfall/ (%age)	Target	Shortfall/ (%age)
1	155 mm M 107	20000	0/0	20000	0/0	30000	23/0.08	35000	3032/9	35000	2191/6
2	155 mm ERFB (BB)	50000	6000/12	60000	26771/45	20000	0/0	15000	2884/19	15000	7448/50
3	155 mm ERFB (BT)	30000	0/0	10000	0/0	5000	4451/89	5000	3043/61	5000	1034/21
4	155 mm ERFB Illg.	1900	1900/100	1000	895/90	1000	1000/100	1000	1000/100	1000	1000/100
5	130mm FVC	0	0/0	10000	10000/100	20000	2059/10	20000	79/0.40	10000	0/0
6	130mm RVC	40000	2420/6	50000	7229/14	130000	26290/20	132000	0/0	140000	20835/15
7	125 mm HE	38000	0/0	45000	1296/3	70000	23043/33	80000	39092/49	80000	39431/49
8	125 mm HEAT	0	0/0	16000	13996/87	20000	18003/90	30000	30000/100	30000	11298/38
9	125mm FSAPDS/T	45000	43982/98	15000	13720/91	30000	21000/70	30000	29571/99	30000	30000/100
10	120 mm HESH	0	0/0	2000	253/13	5000	1220/24	5000	0/0	6000	6000/100
11	120 mm FSAPDS	0	0/0	3000	1308/44	5000	0/0	5000	0/0	5000	0/0
12	120 mm Mor HE	0	0/0	40000	26082/65	40000	3087/8	50000	36451/73	47000	25398/54
13	120mm Mor. Illg.	3000	1989/66	1000	0/0	2000	995/50	2500	0/0	2000	0/0
14	120mm Smoke PWP	0	0/0	10000	8031/80	5000	5000/100	5000	3000/60	5000	5000/100
15	105 mm TK HESH	20000	5792/29	10000	0/0	0	0/0	0	0/0	0	0/0
16	105 mm TK FSAPDS/ T	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0
17	105 mm IFG HESH	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0
18	105mm Smoke (Red)	0	0/0	1000	0/0	1000	1000/100	1000	0/0	1000	0/0
19	105mm Smoke (Orange)	8000	6819/85	3000	161/5	3000	248/8	2000	0/0	1500	0/0
20	105mm Smoke (Blue)	3000	0/0	0	0/0	0	0/0	0	0/0	0	0/0
21	105mm Illg.	8000	0/0	5000	0/0	5000	475/10	5000	171/3	4000	75/2
22	105 mm IFG N/Charge	300000	0/0	275000	9475/3	130000	0/0	135000	6335/5	150000	103/0.07
23	105 mm IFG S/Charge	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0
24	84 mm HE MK-II	40000	0/0	35000	0/0	35000	0/0	30000	0/0	30000	22250/74
25	84 mm HEAT 551 MK-III	30000	8820/29	40000	22900/57	60000	14800/25	70000	23000/33	70000	19000/27
26	84 mm Illg	40000	0/0	35000	0/0	45000	9000/20	45000	18634/41	40000	0/0
27	81 mm Mor. HE	300000	65804/22	440000	105745/24	600000	233165/39	650000	264392/41	650000	272564/42
28	81 mm Smoke PWP	50000	123/0.25	75000	27164/36	100000	76033/76	150000	134050/89	150000	106059/71
29	81 mm Mor. Illg	40000	2974/7	40000	0/0	50000	5000/10	50000	9551/19	40000	5205/13
30	81mm Smoke Grenade3D6	0	0/0	0	0/0	45000	35120/78	0	0/0	0	0/0
31	51 mm ILLG	60000	0/0	100000	0/0	60000	0/0	30000	0/0	23000	0/0
32	40 MM L/70/ HE/1	150000	456/0.30	150000	0/0	200000	30000/15	200000	28900/14	200000	35277/18
33	30 mm AP/T	0	0/0	200000	67620/34	150000	43037/29	100000	16545/17	100000	0/0
34	30mm HE/I	150000	65000/43	150000	88092/59	150000	0/0	100000	23084/23	100000	15713/16
35	12.7mm AP/I	400000	55000/14	650000	0/0	400000	0/0	400000	0/0	300000	0/0
36	12.7mm API/T	300000	45000/15	150000	0/0	60000	0/0	45000	45000/100	40000	0/0
37	Cartg SA 9 mm Ball MK 2z	0	0/0	0	0/0	20000000	0/0	20000000	1607000/8	20000000	0/0
38	SWITCH NO 10 TP WHITE	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0

Sl. No.	Name of the Ammunition	2008-09		2009-10		2010-11		2011-12		2012-13	
		Target	Shortfall/ (%age)	Target	Shortfall/ (%age)	Target	Shortfall/ (%age)	Target	Shortfall/ (%age)	Target	Shortfall/ (%age)
39	CHG DEMO NO 1	0	0/0	1000	0/0	4000	3800/95	4000	0/0	4000	0/0
40	BANGLORE TORPEDO	2600	0/0	0	0/0	10000	920/9	5000	3/0	5000	52/1
41	Fuze DA 117/ M85P13 PD-1 Fuze 117 MK-20	0	0/0	304403	302425/99	300000	160116/53	160000	38203/24	150000	93530/62
42	Fuze-213 MK-5 M-2	0	0/0	0	0/0	0	0/0	0	0/0	20000	19000/95
43	Fuze B429/PD-2	0	0/0	0	0/0	0	0/0	15536	1132/7	50000	45878/92
44	Fuze PDM572/ PD3A	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0
45	PRIMER M 191 A2	0	0/0	0	0/0	70000	0/0	70000	0/0	75000	24882/33
46	Propellant Charge M4A2	40000	0/0	30000	7300/24	15000	9000/60	15000	6920/46	20000	4992/25
47	155 mm Charge M-8	32	0/0	0	0/0	0	0/0	0	0/0	0	0/0
48	155 mm Charge M-9	142	0/0	0	0/0	0	0/0	0	0/0	0	0/0

Source:

 # Minutes of Target Fixation Meeting (Army) for the year 2008-09 & Army's consolidated indent on OFB for Five years (2009-10 to 2013-14)

 # Production Performance Report Part-I (Army)(Special & Other than Special Items) For the year 2008-09 to 2012-13.

 # Annual accounts of the Ordnance & Ordnance Equipment Factories in India Vol-II (For the year 2008-09 to 2012-13).

ANNEXURE-VII

(Referred to in Paragraph 4.4.)

Capacity of filling and component making factories *vis-a-vis* MARL Requirement

Sl No	Name of Ammunition	MARL requirement average *per annum*	Filling Capacity (Deficiency)	Capacity of main components (Deficiency)			
				Empty shell	Fuze	Propellant	Cartridge case/SCCC
155mm							
1	M-107	40000	40000	OFC-20000 *(50%)*	No capacity identified *(100%)*	CFA - 40000	Not applicable
2	ERFB (BB)	20000	75000	OFAJ-Full capacity (FC)		Full capacity	
3	ERFB (BT)	5000	30000	OFAJ – FC			
4	ERFB Illg.	1000	2000	OFC-2000			
5	**130mm** FVC	160000	100000 *(38%)*	OFC- 40000 OFAJ-80000 *(25%)*	OFAJ-50000 *(69%)*	CFA & OFI – Full Capacity	OFKat -30000 OFA-138000
6	RVC						
125 mm							
7	HE	80000	50000 *(38%)*	OFAJ-50000 OFC- 20000 *(13%)*	OFAJ-80000	Nil	OFBL-45000 *(44%)*
8	HEAT	30000	30000	GSF-20000 *(33%)*	GSF-20000 *(33%)*	Nil	OFCh-20000 *(33%)*
9	FSAPDS	100000	50000 *(50%)*	HAPP-30000 (Shot) *(70%)*	Not required	Not required	OFK-30000 *(70%)*
120mm							
10	HESH	5000	5000	OFC-Full capacity	OFK-Full capacity	CFA-Full capacity	Trade source
11	FSAPDS	5000	5000	HAPP-Full capacity	Not required	Not required	Trade source
12	MOR HE	45000	40000 *(11%)*	Trade source	OFAJ-45000	OFBA-45000	OFCh-Full capacity
13	MOR Illg.	2500	2000 *(20%)*	NA	OFDR-Full capacity	Not required	Not required
14	SMK PWP	5000	5000	Trade source	OFCh-Full	Not required	Not required
84mm							
15	HE MK-II	42500	40000 *(6%)*	NA	OFK-Full	NA	NA
16	HEAT 551MK-III	77000	30000 *(61%)*	OFAJ- Nil Met by Import	OFK-Full	OFBA-Nil *(100%)*	OFAJ-77000
17	ILLG	48000	38000 *(21%)*	OFAJ-48000	GSF-Full	Not required	Not required
81 mm							
18	MOR HE	835000	550000 *(34%)*	GSF,MTPF, OFM, HAPP-390000 *(53%)*	OFDC,GSF, OFAJ- 420000 *(50%)*	OFBA- Nil *(100%)*	Not required
19	SMK PWP	145000	100000 *(31%)*	OFM-75000 *(48%)*	OFCh-100000 *(31%)*	NA	Not required
20	MOR ILLG	138000	60000 *(57%)*	NA	OFDR-60000 *(57%)*	Not required	Not required
51 mm							
21	ILLG	130000	100000 *(23%)*	OFC-Full capacity	NA	Not required	Not required

Sl No	Name of Ammunition	MARL require-ment average *per annum*	Filling Capacity (Deficiency)	Capacity of main components (Deficiency)			
				Empty shell	Fuze	Propellant	Cartridge case/SCCC
40 mm							
22	L/70 HE/I	200000	170000 *(15%)*	OFK-170000 *(15%)*	OFK-170000 *(15%)*	OFBA-Full capacity	OFK,OFA – Full capacity
30mm							
23	AP/T	150000	Full capacity	GSF, OFK - 150000	NA	OFBA-Full capacity	OFAJ,MSF – Full capacity
24	HE/I	150000	Full capacity	Full capacity	OFK,GSF, OFAJ- 200000	NA	OFA-Full capacity
9mm							
25	Ball	70000000	40000000 *(43%)*	OFA, OFKat – Full capacity	Not required	OFBA- Full capacity	Not required

Source : (a) Report of Shri B.N. Singh Committee (December 2010)
(b) Minutes of Board Meeting held on 26.8.2008
(c) OFB's letter No. 983/IV/Capacity/PA/A dated 27.1.2012

ANNEXURE-VIII

(Referred to in Paragraph 5.2)

Details of rejection of filled Ammunition/Component by SQAE/ CQA (A)

Year	Items	Factory involved	No. of Lots/ Quantity rejected	Cost of rejection (₹ in cr.)	Reasons of rejection
155 mm Ammunition					
2008-09	BBU of 155 mm ERFB BB Ammn	OF Chanda	02/4066	10.98	Short ranging of Round, Non-functioning & malfunctioned
2009-10	BBU of 155 mm ERFB BB	OF Chanda	05/10165	27.44	Short ranging of Round, Non-functioning & malfunctioned
2010-11	BBU of 155 mm ERFB BB	OF Chanda	02/4066	10.98	Short ranging of Round, Non-functioning & malfunctioned
2011-12	BBU of 155 mm ERFB BB	OF Chanda	01/2033	5.49	Short ranging of Round, failure of Base Bleed Motor to function
2012-13	BBU of 155 mm ERFB BB	OF Chanda	01/2033	5.49	Failure of Base Bleed Motor to function
2012-13	Shell 155 mm ERFB (BB)	OF Chanda	02/3797	24.52	Premature functioning
2011-12	Shell 155 mm HE M 107	OF Badmal	01/2000	4.45	Under investigation
2008-09	Shell 155 mm HE ERFB (BT)	OF Badmal	01/2000	6.89	Deferred to CQA(A)
2011-12	Shell 155 mm HE	OF Badmal	01/2000	8.50	Under investigation
2012-13	Shell 155 mm HE	OF Badmal	01/2000	8.50	Malfunction during flight &
130 mm Ammunition					
2012-13	Shell 130 mm RVC	OF Chanda	03/6,000	24.48	Lot deferred to CQA, under investigation
2012-13	Shell 130 mm RVC	OF Badmal	01/2000	9.41	Malfunctioning of shell, under investigation
Bomb 120 mm Ammunition					
2010-11	Bomb 120 mm HE	OF Chanda	01/1999	2.47	Standard deviation found more than specified
2009-10	Bomb 120 mm PWP	OF Chanda	01/1004	1.18	Standard deviation found more than specified
105 mm Ammunition					
2009-10	Shell 105 mm IFG	OF Badmal	01/2000	1.92	Muzzle brake damaged
2010-11	Shell 105 mm IFG	OF Badmal	03/6000	5.95	Muzzle brake damaged
84 mm Ammunition					
2012-13	RD 84 mm HE	OF Khamaria	02/1626	2.12	Blinds, misfire and ground burst
81 mm Ammunition					
2009-10	Bomb 81 MM HE	O F Chanda	01/2,013	1.16	High standard deviation, blind, partial detonation, *etc.*
2010-11	Bomb 81 MM HE	OF Chanda	02/4026	2.51	High standard deviation, blind, partial detonation, *etc.*
2011-12	Bomb 81 MM HE	OF Chanda	04/8052	5.22	High standard deviation, blind, partial detonation, *etc.*

Year	Items	Factory involved	No. of Lots/ Quantity rejected	Cost of rejection (₹ in cr.)	Reasons of rejection
2012-13	Bomb 81 MM HE	OF Chanda	10/20130	12.91	High standard deviation, blind, partial detonation, *etc.*
2009-10	Bomb 81 MM HE	A F Kirkee	01/2000	1.01	High standard deviation
2012-13	Bomb 81 MM HE	A F Kirkee	02/4000	2.61	High standard deviation
2008-09	Bomb 81 MM PWP	O F Chanda	02/4,010	1.78	High standard deviation, blind, *etc.*
2009-10	Bomb 81 MM PWP	OF Chanda	01/2,005	1.11	Blind
2010-11	Bomb 81 MM PWP	OF Chanda	03/6,015	3.56	High standard deviation, blind, *etc.*
2011-12	Bomb 81 MM PWP	OF Chanda	04/8020	4.80	High standard deviation, blind, misfire, partial detonation, *etc.*
2012-13	Bomb 81 MM PWP	OF Chanda	02/4010	2.61	High standard deviation, blind, misfire, partial detonation, *etc.*
2012-13	81 mm SMK Grenade 3D6	OF Khamaria	01/1920	1.14	Blinds
2010-11	Bomb 81 mm Illuminating	OF Dehu Road	02/2052	1.55	Failure in proof
2011-12	Bomb 81 mm Illuminating	OF Dehu Road	01/1026	1.02	Failure in proof
2012-13	Bomb 81 mm Illuminating	OF Dehu Road	08/8208	7.19	Failure in proof
30 mm Ammunition					
2012-13	30 mm AP/T	OF Badmal	02/4957	1.82	Misfire
2012-13	30 mm HE/I	OF Badmal	01/4670	2.49	Misfire
12.7 mm Ammunition					
2010-11	12.7 mm APIT	OF Varangaon	02/32000	1.12	Problems in charge mass and velocity
Fuze B 429 E (Filled)					
2010-11	Fuze B 429 E (filled)	OF Chanda	01/2,060	0.49	Blind in dynamic proof
2011-12	Fuze B 429 E (filled)	OF Chanda	01/2,120	0.64	Delay in distance low in dynamic proof
2012-13	Fuze B 429 E (filled)	OF Chanda	04/8414	3.01	Delay time lower than specification in static proof
Fuze 117 MK 20 (Filled)					
2008-09	Fuze 117 MK 20 (Filled)	OF Chanda	01/2,009	0.3	Flight premature
2010-11	Fuze 117 MK 20 (Filled)	OF Chanda	01/2013	0.65	Two rounds found blind
2011-12	Fuze 117 MK 20 (Filled)	OF Chanda	01/2,013	0.54	One round found blind
Fuze B 429 (Filled/0					
2011-12	Fuze B 429 (filled)	OF Chanda	06/12606	8.14	Fuzes found blind
2012-13	Fuze B 429 (filled)	OF Chanda	03/6346	4.15	Two fuzes found low order detonation

ANNEXURE-IX

(Referred to in Paragraph 5.2)

Details of rejection of Empty Component by CQA (A)/SQAE

Year	Items	Factory involved	No. of Lots/ Quantity rejected	Cost of rejection (₹ in cr.)	Reasons of rejection
Empty Shell 155mm					
2011-12	Shell 155mm HE ERFB(BB)	OF Ambajhari	03/6048	14.03	Land engraving on body above driving band (DB)
2011-12	Shell 155mm HE ERFB(BT)	OF Ambajhari	01/2018	5.87	Double engraving of DB and copper wash below DB
2012-13	Shell 155mm HE ERFB(BB)	OF Ambajhari	01/2013	4.51	Land engraving on nub
2012-13	Shell 155mm M-107	OF Kanpur	01/1000	1.54	Under investigation
Empty shell 130mm HE					
2012-13	Empty shell 130mm HE 1B	OF Ambajhari	01/2010	1.80	Land engraving on body and CB
Empty shell 30mm					
2011-12	Empty shell 30mm AP/T	GSF Cossipur	03/15210	1.43	Vertical and lateral dispersion beyond limit
2012-13	Empty shell 30mm AP/T	GSF Cossipur	04/20000	1.98	Lateral & Vertical dispersion beyond limit
Empty Shell 125mm					
2011-12	Empty Shell 125mm HEAT	GSF Cossipur	01/1028	4.00	Stabilizer unit of shell broken an detached
2012-13	Empty Shell 125mm HEAT	GSF Cossipur	05/5140	19.90	Deformation of funnel, burnout of lead gasket
2011-12	Empty Shell 125mm HE	OF Kanpur	01/2000	1.80	Under investigation
2012-13	Empty Shell 125mm HE	OF Kanpur	02/4000	5.53	Under investigation
Empty shell 105mm					
2012-13	Empty Shell 105mm IFG HE	OF Kanpur	04/8000	5.73	Formation of set up in shells
Empty shell 51 mm					
2012-13	Empty shell 51 mm	OF Kanpur	04/8116	0.37	Defective filling
Tail unit 8 A					
2009-10	Tail unit 8 A for 51 mm Bomb	OF Kanpur	03/12174	0.49	Short ranging
2012-13	Tail unit 8 A for 51 mm Bomb	OF Kanpur	02/8112	0.48	Short ranging
Tail Unit 1A					
2009-10	Tail Unit 1A	OF Ambajhari	02/8052	0.46	Blind & standard deviation higher
2010-11	Tail Unit 1A	OF Ambajhari	03/12078	0.55	Standard deviation higher
2011-12	Tail Unit 1A	OF Ambajhari	08/32205	1.34	Standard deviation higher, short range of two rounds
2012-13	Tail Unit 1A	OF Ambajhari	05/20130	0.97	Standard deviation higher
Tail Unit 2A					
2010-11	Tail Unit 2A	OF Kanpur	02/3986	1.08	Standard deviation higher
2011-12	Tail Unit 2A	OF Kanpur	02/3996	1.57	Standard deviation higher
2012-13	Tail Unit 2A	OF Kanpur	02/4000	1.52	Standard deviation higher

Fuze A 670					
2009-10	Fuze A 670	OF Ambajhari	03/15448	1.35	Failed in adequate action at 50° C
2011-12	Fuze A 670	OF Ambajhari	04/20380	1.81	Blind in condition, Misfire
2012-13	Fuze A 670	OF Ambajhari	08/40841	3.67	Blind, not fired, standard deviation
Fuze A 670					
2008-09	Fuze A 670	GSF Cossipur	03/15000	1.32	Premature function/non-function
2010-11	Fuze A 670	GSF Cossipur	04/20000	2.59	Premature function/non-function
2011-12	Fuze A 670	GSF Cossipur	01/5000	0.69	Premature function/non-function
2012-13	Fuze A 670	GSF Cossipur	03/15000	2.01	Premature function/non-function
Fuze B 429 Empty					
2010-11	Fuze B 429	OF Ambajhari	03/6371	0.39	Blind in condition A & B
2011-12	Fuze B 429	OF Ambajhari	07/14786	2.08	Absence of premature blind
2012-13	Fuze B 429	OF Ambajhari	02/4236	0.73	Absence of pre mature blind
Fuze 162 MK-8					
2012-13	Fuze 162 MK-8	OF Ambajhari	02/4036	0.24	Blind
Fuze 162 MK-9					
2009-10	Fuze 162 MK-9	OF Ambajhari	01/2005	0.19	Blind
Primer GUV-7					
2010-11	Primer GUV-7	OF Ambajhari	02/4046	0.27	Misfire at condition C
				₹ 94.29 crore	

Appendix-I

List of Abbreviation

A

A/TK	:	Anti Tank
AAP	:	Annual Acquisition Plan
AD	:	Ammunition Depot
ADG	:	Additional Director General
ADGOS (TS)	:	Adll Director General Ordnance Services (Technical Stores)
AEFG	:	Ammunition and Explosive Factories Groups
AFK	:	Ammunition Factory, Kirkee
AFV	:	Armoured Fighting Vehicle
AGL	:	Anti Guided Launcher
AHQ	:	Army Headquarters
AHSP	:	Authority Holding Sealed Particulars
AIA	:	All India Availability
AICP	:	Ammunition Inventory Control Package
AICS	:	Ammunition Inventory Control System
AIMS	:	Ammunition Inventory Management System
ALO	:	Ammunition Loading Order
AMA	:	Army Maintenance Area
AMI	:	Ammunition Maintenance Instruction
AMK	:	Ammunition Master Key
AMN	:	Ammunition
AON	:	Acceptance of Necessity
APG	:	Ammunition Planning Group
APR	:	Annual Provision Review
AR	:	Audit Report
ARDE	:	Armament Research & Development Establishment
ARTY	:	Artillery
ASEC	:	Army Standing Establishment Committee
AT	:	Acceptance of Tender
ATGM	:	Anti Tank Guided Missile
ATN	:	Action Taken Note
ATO	:	Ammunition Technical Officer
AWMS	:	Ammunition Warehouse Management system
30(I):30(N)	:	30 days Intense: 30 days Normal

B

BDL	:	Bharat Dynamics Limited
BE	:	Budget Estimates
BPC	:	Bulk Production Clearance

C

CAD	:	Central Ammunition Depot
CCC	:	Combustible Cartridge Case
CCS	:	Cabinet Committee on Security

CDM	:	College of Defence Management
CEES	:	Centre for Environment and Explosive Safety
CFA	:	Cordite Factory Aruvankadu
CFEES	:	Centre for Fire, Explosive and Environment Safety
CGSR	:	Command General Staff Reserves
CICP	:	Computerized Inventory Control Project
CHT	:	Civil Hired Transport
CICPTG	:	CICP Technical Group
CIMS	:	COD Inventory Management System
CNC	:	Commercial Negotiation Committee
COD	:	Central Ordnance Depot
Col	:	Colonel
CONCOR	:	M/S Container Corporation of India Limited
CQA (A)	:	Controller Quality Assurance (Armament)
CQA (ME)	:	Controller Quality Assurance (Military Explosive)
CQA (Met)	:	Controller Quality Assurance (Metal)
Cr	:	Crore

D

DAC	:	Defence Acquisition Council
DDG	:	Dy. Director General
DDP	:	Department of Defence Production
DBS	:	Defence Brick Stores
DCOAS	:	Deputy Chief of Army Staff
DGMF	:	Director General of Mechanized Forces
DGOF	:	Director General of Ordnance Factories
DGOS	:	Directorate General Ordnance Services
DGMO	:	Director General Military Operation
DGQA	:	Director General Quality Assurance
DI	:	Defect Investigation
DIMS	:	DOU Inventory Management System
DPM	:	Defence Procurement Manual
DPP	:	Defence Procurement Procedure
DRDO	:	Defence Research and Development Organisation

E

ECIL	:	Electronic Corporation of India Limited
EM	:	Equipment Management
EOI	:	Expression of Interest
ERP	:	Enterprise Resource Planning
ESH	:	Explosive Store House

F

FAI	:	Final Acceptance Inspection
FAD	:	Field Ammunition Depot
FF	:	Fire Fighting / Fully Formed
FFC	:	Field Force Contact

FIFO	:	First in First out
FP	:	Financial Planning
FSAPDS		Fin Stabilized Armour Piering Discarding Sabot

G

GM	:	General Manager
GFR	:	General Financial Regulations
GSF	:	Gun & Shell Factory, Cossipore
GS	:	General Staff
GSQR	:	General Staff Qualitative Requirement

H

HE	:	High Explosive
HEAT	:	High Explosive Anti Tank
HEMRL	:	High Energy Material Research Laboratory
HOW	:	Howitzer
HAPP	:	Heavy Alloy Penetrator Project
HQ	:	Headquarters
HVF	:	Heavy Vehicle Factory

I

IA	:	Indian Army
ICD	:	Inland Container Depots
IFG	:	Indian Field Gun
IHQ of MoD	:	Integrated Headquarter of Ministry of Defence
IP	:	Interim Period
ISO	:	International Standard Organization
ITI	:	Indian Telephone Industry

K

KRA	:	Key Result Area

L

LWE	:	Land, Works & Environment Dte
LFG	:	Light Field Gun
LMG	:	Light Machine Gun
LICO	:	Low Intensity Conflict Operation

M

MARL	:	Minimum Acceptable Risk Level
MBRL	:	Multi Barrel Rocket Launcher
MFFR	:	Mahajan Field Firing Range
MG AOC	:	Major General Army Ordnance Corps
MGO	:	Master General of Ordnance
M&C	:	Materials and Components

MGL	:	Multi Grenade Launcher
MIS	:	Management Information System/Material Inwards Slip
MISO	:	Management Information System Organisation
MO	:	Military Operations
Ministry	:	Ministry of Defence
MOF	:	Ministry of Finance
MSTC	:	Metal & Scrap Trading Corporation
MT	:	Military Training
MWP	:	Major Works Plan

N

NABL	:	National Accreditation Board for Laboratories
NES	:	Non-explosive Stores
NIAMK	:	Not in Ammunition Master Key (AMK)
NISG	:	National Institute of Smart Governance
NFP	:	Not Further Procurement

O

OBE	:	Obsolete
OBT	:	Obsolescent
OEM	:	Original Equipment Manufacture
OE Group	:	Ordnance Equipment Group
OF	:	Ordnance Factory
OFAj	:	Ordnance Factory, Ambajhari
OFBL	:	Ordnance Factory, Badmal
OFCh	:	Ordnance Factory, Chanda
OFDR	:	Ordnance Factory, Dehu Road
OFK	:	Ordnance Factory, Khamaria
OFC	:	Ordnance Factory, Kanpur
OFI	:	Ordnance Factory, Itarsi
OFBa	:	Ordnance Factory, Bhandara
OFKat	:	Ordnance Factory, Katni
OFV	:	Ordnance Factory, Varangaon
OFB	:	Ordnance Factory Board
OIMS	:	Ordnance Store Section Inventory Management System
OL	:	Operational Logistics
OS	:	Ordnance Stores

P

P&S	:	Planning & Systems
PA	:	Performance Audit
PDC	:	Probable date of completion
PDI	:	Pre-dispatch Inspection
PE	:	Peace Establishment
PKT	:	Pulemyot Kiloshnspera Tank
PMB	:	Project Management Board
PMF	:	Para Military Force

PMT	:	Project Management Team
P&P	:	Production & Planning
PRF	:	Provision Review Form
PSU	:	Public Sector Undertaking
PTL	:	Predictive Technology Laboratory
PTS	:	Proof Test Sheet
PXE	:	Proof and Experimental Establishment

Q

QA	:	Quality Aspects
QA	:	Quality Assurance
QASR	:	Quarterly Ammunition Stock Return
QC	:	Quality Control
QMG	:	Quarter Master General

R

RDBMS	:	Relational Database Management System
RE	:	Revised Estimates
RFP	:	Request for proposal
RIMS	:	ROD Inventory Management System
RL	:	Restriction List
RM	:	Raksha Mantri
RMJ	:	Repairable Major
RR	:	Record of Receipt
ROE	:	Rosobornexport
RURM	:	Raksha Utpadan Rajya Mantri

S

SCCC	:	Semi Combustible Cartridge Case
SAA	:	Small Arms Ammunition
SD	:	Staff Duties
SEG List	:	Segregation List
SFC	:	Station Fire Committee
SKD	:	Semi Knock Down
SOC	:	Statement of Case
SOP	:	Standard Operating Procedure
SQR	:	Staff Qualitative Requirement
SQAE (A)	:	Senior Quality Assurance Establishment (Ammunition)
STEC	:	Storage and Transport of Explosives Committee

T

TD Project	:	Technology Development Project
TGSM	:	Terminal Guided Submunition
TBRL	:	Terminal Ballistics Research Laboratory
TEC	:	Technical Evaluation Committee
TIL	:	Tata InfoTech Limited
TM	:	Time Available to reach MARL

TNT	:	Tri Nitro Toluene
TOT	:	Transfer of Technology
TR	:	Training Requirement
TS	:	Technical Services

U

UBGL	:	Under Barrel Grenade Launcher
UE	:	Unit Entitlement
UH	:	Unit Holding
UNSV	:	Unserviceable
USD	:	Unserviceable for demolition

V

VCOAS	:	Vice Chief of Army Staff

W

WV&E	:	Weapons, Vehicles and Equipment
WE	:	War Establishment
WWR	:	War Wastage Reserve

Appendix-II

GLOSSARY OF TERMS

1.	**AIA**	All India Availability (AIA) is defined as the total availability of ammunition stock within the country in number of days for WWR ammunition and in number of years for ammunition used in training purpose only.
2.	**Ammunition Loading Orders (ALOs)**	Ammunition Loading Orders are generated by the Army HQ for issue of ammunition to Ammunition Depots and Field Ammunition Depots by Central Ammunition Depot and other Depots.
3.	**Annual Review**	The process of comparing assets with liabilities for an item annually with a view to determining surplus or a deficiency.
4.	**Army Headquarters Reserve (GS Reserve)**	This is a reserve of vital items of equipment, ammunition and vehicles intended to cover unforeseeable operational contingencies specially during the early stages of a campaign. This is held to the extent of unit entitlement of specified force and is controlled by Army Headquarters.
5.	**Assets**	Stores available or likely to become available as a result of provision action already taken.
6.	**Authorities Holding Sealed Particulars (AsHSP)**	The establishment responsible for maintaining technical information, including drawings and specifications in respect of stores of their responsibility. The AHSP is also responsible for scrutiny of tenders against defence demands; laying down inspection criteria; drafting technical documents for introduction of stores; and guidance for procurement and production of stores by the industry.
7.	**Bottom- line requirements/Minimum Acceptable Risk Level (MARL)**	Minimum inescapable requirement of ammunition is to be maintained at all times to meet operational preparedness.
8.	**Census Stores**	Items which are vitally important and whose supply is restricted necessitating a return to examine the overall stock situation *vis-a-vis* units' requirements
9.	**Class 'A' Stores**	Usually main equipments the liability for which consists of UEs plus maintenance requirement assessed on the basis of a fixed percentage wastage for unit entitlements plus policy reserves ordered by higher authorities. Assets for Class 'A' items include all stocks held in depots/units. Provision for these stores is arranged by AHQ.
10.	**Class 'B' Stores**	Items related to main equipments and items of General Stores and Clothing, the provision of which is based on scales or issues experience. Assets for class 'B' stores normally include stocks held by Ordnance Depots only. Provision for these stores is usually arranged by CODs.

11.	**Component**	A part of a complete article such as the breech block of a gun without which the article is useless.
12.	**Contract Rates**	The average number of equipments/vehicles wasted out during previous operations in the circumstances of a force in contact with enemy and expressed as percentages (*e.g.* percentage of UE).
13.	**Controlled stores**	Stores, the issue of which is controlled by AHQ/Formation HQ (General Staff) owing to their importance, high cost and difficulty in production. List of such stores is published by ADG Sys, MISO, GS Branch, AHQ. (Master List of Controlled & Census Stores (1989)
14.	**Critical Ammunition**	The ammunition with AIA less than 10 (I) is termed as critical Ammunition.
15.	**Demand**	The actual requirement of a particular item that is to be demanded.
16.	**Dues in**	Dues in indicate items/ammunition outstanding from DGOF/Trade against order placed on them.
17.	**Dues out**	Stores owing to a unit or establishment from a depot which are not available for issue from stocks in that depot.
18.	**Field Force**	That portion of the Army which is organised on WE and is likely to be employed in an operational area in the case of an emergency.
19.	**General Staff Reserve**	This is a reserve of all items placed at the disposal of Commands and held at the directions of Command Headquarters or lower formation headquarters. This may be used only on the orders of the General Staff of the Headquarters of the formations specified in this regard to meet operational and administrative requirements of units and formations. This will not include Signal Theatre Stores and Engineer Theatre Stores Reserves.
20.	**Inability percentage**	Refers to the percentage of demands from the dependant units, which the supplying depots are unable to meet due to stocks of the demanded items not being available. Inability percentage is inversely related to the level of user satisfaction.
21.	**Indent**	A form on which a Unit, Formation or Individual requiring stores from the AOC make application for them. This form, when approved, is the authority for issue.
22.	**Initial Requirements**	These are requirements of stores resulting from increases to scales, raising of new units or introduction of a new item. They are calculated by multiplying the scale for an item by the number dependent.
23.	**Issues**	
	(a) Normal	Issues of recurring nature against authorized scales.
	(b) Special	Issue not recurring with any degree of regularity *e.g.* initial issues, increases in scales, special workshop programmes

		and issues, for which special provision action is normally taken.
24.	**Liability**	All calls that have been or are likely to be made upon stocks.
25.	**Maintenance Demand**	A demand placed at the time of provision review to meet the anticipated normal issues during the period for which provision is being made.
26.	**Maintenance Reserve**	This is a reserve of items, stocks of which are held in units, like OFP/OMC, to meet maintenance requirements for specified periods and issue of which to units are not controlled by the formation General Staff.
27.	**Non-Field Force**	That portion of the Army which is organized on a PE and is likely to remain in a Peace area. Maintenance for this part of the Army is provided at peace wastage rates.
28.	**Obsolescent Stores**	An equipment/store, for which no further provision will be made but the existing stocks, if any, will be used till they are exhausted.
29.	**Obsolete Store**	An equipment/store for which approval has been given to its withdrawal from the Service.
30.	**Operative Period (OP)**	The second financial year following the date of stock-details related to an annual review.
31.	**Ordnance Stores**	Stores and materials of all descriptions supplied by the AOC.
32.	**Post Operative Periods**	The third and the fourth financial years following the date of stock-details related to an annual review.
33.	**Pre-operative Period**	The period between the date of stock-details and the end of the next financial year.
34.	**Provision**	It is the process of calculating and obtaining the quantities of stores required by the Army.
35.	**Provision Factor (PF)**	The multiplication factor, expressed in months/years or fractions thereof, which is applied to the monthly maintenance figure/annual maintenance figure to obtain the liability in respect of the maintenance period plus store margin plus interim period, where authorized.
36.	**Provision Review Form (PRF)**	A form on which data and calculations pertaining to provision review of an item are recorded while carrying out review of a class 'B' item at Command depot, a COD or AHQ Central Provision Section. The reverse of the form used in a COD/AHQ Central section presents a working sheet for recording provision data by establishments and for carrying out detailed provision calculations. The obverse of the form gives all the detailed particulars with regard to the status of the item and other information relevant to provisioning. In addition, the consolidated figures are transcribed from the reverse on to the obverse. This form is a permanent record of provision work and is subject to financial check.

37.	**QASR**	The sole aim of Quarterly Ammunition Stock Return (QASR) is to have all the data required at various levels in a return form which can be used for correct managerial decisions and effective ammunition management at all levels.
38.	**Receipt Voucher**	A document supporting an entry in respect of the receipt of stores, on the receipt side of a ledger.
39.	**Reserve (Res)**	Stocks held for specific war purposes. Reserves can be of different types. They are generally named after the purpose they are intended for.
40.	**Review**	The process of comparing assets with liabilities for an item with a view to determining a surplus or a deficiency.
41.	**Review Action Figure (RAF)**	A pre-determined stock level(s) at which the provision position of an item is to be reviewed.
42.	**Stock Details / Stock Statements**	Details of stock balance including details of issues and Dues Out over a required period submitted by various Ordnance units to CODs at the time of review.
43.	**Surplus Stores**	Serviceable and repairable stores which cannot be utilised against present or anticipated requirements over a period as decided from time to time by Army HQ or which are liable to deteriorate by the time they could be issued in the normal course of events.
44.	**Trial Indent**	An order placed on the DGOF or on the DGS&D to see whether the Ordnance Factories or the industry in India can manufacture a store upto the required standard.
45.	**Unit Entitlement (UE)**	Quantity of an item authorized to be held on unit charge under the authority of unit WET/PET, an Army Order or a Government of India letter.
46.	**War Wastage Reserve**	This is a reserve intended to cover the wastage in items of equipment, ammunition and vehicles in operations up to a maximum of the first six months of campaign, until the indigenous production gets into stride or other arrangements are made for procurements of supplies. It is maintained at contract rates. A proportion of this reserve will be placed at the disposal of Commands who may locate them at convenient places from administrative and operational points of view and will be part of General Staff Reserve of Commands and formations as defined below.
47.	**WWR Levels**	This denotes the level at which stocks are required to be maintained so as to cover the complete duration of operations till the time the desired culminating point is reached. In the present case, the level will be 3 days 'Intense' and 30 days 'Normal' battle. The Bottom Line Levels have been incorporated as 'in house' interim arrangement due to financial constraints.

48.	**WWR Rates**	These denote the rate at which any equipment/weapon is expected to be wasted in an operation lasting 24 hours. It is expressed in terms of quantities 'Per day', and qualified into two categories: 'Intense' battle and 'Normal' battle.
49.	**WWR Scales**	This would denote the stock level/scale at which a particular equipment/weapon would have to be maintained on an All-India basis, so as to conform to the laid down WWR Level. The scales are to be interpolated from the WWR Rates, duly modified to cater for the time lag between wastage and recoupment. Determination of WWR Scales, therefore, would necessitate additional examination of the origin, the chain of procurement, as well as the lead time.

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