

CHAPTER III: MINISTRY OF DEFENCE- INDIAN NAVY

3.1 Accidents of ships and submarines in Indian Navy

The loss of a ship/submarine adversely affects the operational preparedness of the Indian Navy, as acquisition of new ships/submarines involves procurement/ construction process of more than eight to ten years. It is, therefore, imperative that Indian Navy maintains its assets free from accidents during peacetime evolutions. Between 2007-08 and 2015-16, Indian Navy Ships and Submarines were involved in 38 accidents, primarily attributable to fire/explosion/flooding. These accidents led to a loss of two Naval Ships and one Submarine in addition to loss of precious lives. The Indian Navy since inception, has no institutionalised framework to deal with safety issues. A dedicated organisation for dealing with safety issues was setup by the Indian Navy only in 2014, however, it awaits Government's sanction.

3.1.1 Introduction

3.1.1.1 The principle of safe working practices is particularly relevant to a fighting force, such as the Indian Navy, where men and material are very often employed in hazardous and stressful environments. The existence of inflammable material, running machinery, high-voltage equipment and explosives, apart from the fact that the ship is a constantly moving platform subject to conditions such as weather, collision and grounding contribute to a hazardous environment. Any chain of mishaps could lead to a major catastrophe. Besides, both naval personnel and naval equipment are difficult and expensive to replace, as acquisition of new ships/submarines involves procurement/construction process of more than eight to ten years, and therefore, accident prevention is a very important aspect of the organisational setup. In view of the recent spate of ship and submarine accidents, the audit of Naval Ship and Submarines accidents was taken up with the following Audit Objectives:

- (i) To assess whether measures for preventing accidents of Naval Ships and Submarines are adequate?
- (ii) To assess whether accidents are investigated by competent Board of Officers to assess the reasons for the accidents and whether the recommendations of the boards are implemented effectively in time?
- (iii) To assess whether rescue and salvage operations were expeditious?
- (iv) To assess whether losses due to accidents have been assessed and regularised in time?

Sources of Audit Criteria

- Regulations for the Navy, Part-II Statutory
- Relevant Navy Orders *i.e.*, Policy on Board of Inquiry (BoI), Nuclear, Biological and Chemical Defence (NBCD) Policy for surface ships etc.
- Integrated Headquarters Ministry of Defence (Navy) {IHQ MoD (Navy)} Policy Letters on safety issues
- Financial Regulations Part-I

Scope and methodology of Audit

The audit covered the Naval Ship and Submarine accidents which occurred between 2007-08¹ and 2015-16. The audit scope, objectives and criteria were discussed with the Principal Director (Naval Operations), Principal Director (Personnel Services) and other concerned authorities at IHQ MoD (Navy) in an entry conference held in May 2016.

The audit examination was carried out between May and August 2016 and consisted of scrutiny of the Board of Inquiry Reports pertaining to Ships/Submarine accidents. This was followed up by audit scrutiny of relevant records at IHQ MoD (Navy) (DGNO)² and three Naval Commands at Mumbai, Visakhapatnam and Kochi. The records of Safety Class Authorities

¹ The details of accidents of Naval Ships/Submarines during each year of the 11th Plan and first three years of 12th Plan as provided by Ministry of Defence to the Parliamentary Standing Committee on Defence (2014-15) and those accidents which occurred thereafter till March 2016 were selected by Audit for detailed study.

² DGNO – Director General Naval Operations.

of ships (FOST³, Kochi) and submarines (FOSM⁴, Visakhapatnam) were also selected for detailed audit scrutiny.

3.1.1.2 Organisational structure

Prior to October 2012, the Indian Navy had no centralised and institutionalised framework for tackling safety issues but had a rather fragmented and compartmentalized setup to deal with these issues. Although, the Indian Navy Safety Organisation was promulgated in October 2012, yet it was setup in February 2014. The present setup involves multiple agencies at IHQ MoD (Navy), Naval Commands, Fleet, Flotilla, Squadron and onboard ships and submarines as indicated in paragraph 3.1.3.

3.1.1.3 Genesis of Accidents

During the period from 2007-08 to 2015-16⁵, a total number of 38 accidents occurred, which led to a loss of 33 lives⁶ of service officers/sailors as given in the Table-3.1 below:

Table-3.1: Year-wise accidents of Indian Navy Ships/Submarines

Year	Number of Accidents	Loss of Life (Officers)	Loss of Life (Sailors)
2007-08	06	01	05
2008-09	04	-	-
2009-10	04	-	01
2010-11	03	-	-
2011-12	02	-	-
2012-13	02	-	-
2013-14	12	06	15
2014-15	05	01	04
2015-16	-	-	-

³ FOST – Flag Officer Sea Training who conducts operational sea training through three teams located at Kochi, Mumbai and Visakhapatnam.

⁴ FOSM – Flag Officer Submarines who is also the Assistant Chief of Naval Staff (Submarines) based at IHQ MoD (Navy), New Delhi and is responsible for overseeing all submarine related issues.

⁵ Status of accidents occurred subsequent to March 2016 and BoIs thereof has been called for and is awaited (March 2017)

⁶ Loss of civilian lives in Naval Ship accidents was enquired, the information is awaited (March 2017)

Indian Navy lost two naval ships (INS Vindhyagiri and TRV A-72) and one submarine (INS Sindhurakshak) in these accidents. Of these accidents, the maximum number, viz., 12 occurred during 2013-14 followed by six in 2007-08, five in 2014-15 and four each in 2008-09 and 2009-10. The nature of accidents is as given in the Table 3.2 below:

Table-3.2: Nature of accidents

Year	Collision		Fire/explosion/flooding		Touching of bottom/grounding		Others		Total		Grand Total
	Ships	Subs	Ships	Subs	Ships	Subs	Ships	Subs	Ships	Subs	
2007-08	-	01	-	-	03	-	02	-	05	01	06
2008-09	-	-	-	01	02	-	01	-	03	01	04
2009-10	01	-	01	01	-	-	01	-	03	01	04
2010-11	02	-	01	-	-	-	-	-	03	-	03
2011-12	-	-	02	-	-	-	-	-	02	-	02
2012-13	-	-	01	01	-	-	-	-	01	01	02
2013-14	01	-	03	02	-	-	05	01	09	03	12
2014-15	01	-	02	-	01	-	01	-	05	-	05
2015-16	-	-	-	-	-	-	-	-	-	-	-
Total	05	01	10	05	06	-	10	01	31	07	38

Subs-Submarines

Out of 38 accidents, 15 (39 per cent) occurred due to fire/explosion/flooding, six cases (16 per cent) of vessels touching the bottom, another six accidents (16 per cent) were caused by collision of vessels and remaining 11 (29 per cent) were of miscellaneous nature which included accidental stranding and suspended movements, venting of poisonous gas, damages to sonar while docking and damage to aircraft hangar onboard the vessel, etc.

3.1.1.4 Causes of accidents

Naval accidents were mainly attributable to the following causes by the Indian Navy:

- **Crew error/non-compliance of Standard Operating Procedure**

Crew error includes non-compliance of Standard Operating Procedure (SOP)⁷ and organisational/system failure,⁸ errors in basics of navigation and ship

⁷ Every evolution/activity of ship operations is governed by laid down SOPs, which are quite comprehensive and voluminous in nature. The total number of SOPs in force in Indian Navy relating to various activities of ship handling and handling of weapons, equipment, ammunition, etc. has been called for from IHQ MoD (Navy) and is awaited (March 2017).

⁸ Ship Organisation- A group of dedicated Officers/personnel onboard a ship tasked to perform a specific duty.

handling such as not maintaining planned track in pilotage waters⁹, non-selection of appropriate head marks, failure to maintain a proper look out by radar and other means, not using all available means for risk assessment, over reliance on technology by relegating the time-tested methods of maintaining a good visual watch of ships and objects, etc.

- **Material failure**

Material failure is a state or condition of not meeting the desirable objective of a material or equipment. It includes poor fatigue strength of the hull due to vintage of the vessel, failure of steering gear, non-functional battery monitoring system, non-functional fire and flood alarm systems, unreliable AIS¹⁰ Interface, limitations of Radar Interface with ECDIS¹¹ etc.

- **Electrical short circuit/Electrical fire**

An electrical short circuit is an abnormal connection between two nodes of an electric circuit intended to be at different voltages. This results in an excessive electric current and potentially causes circuit damage, overheating, fire or explosion.

- **Non-carrying out of dredging**

Dredging is an excavation activity usually carried out underwater, in shallow seas with the purpose of gathering up bottom sediments and disposing them at a different location. This technique is often used to keep waterways navigable.

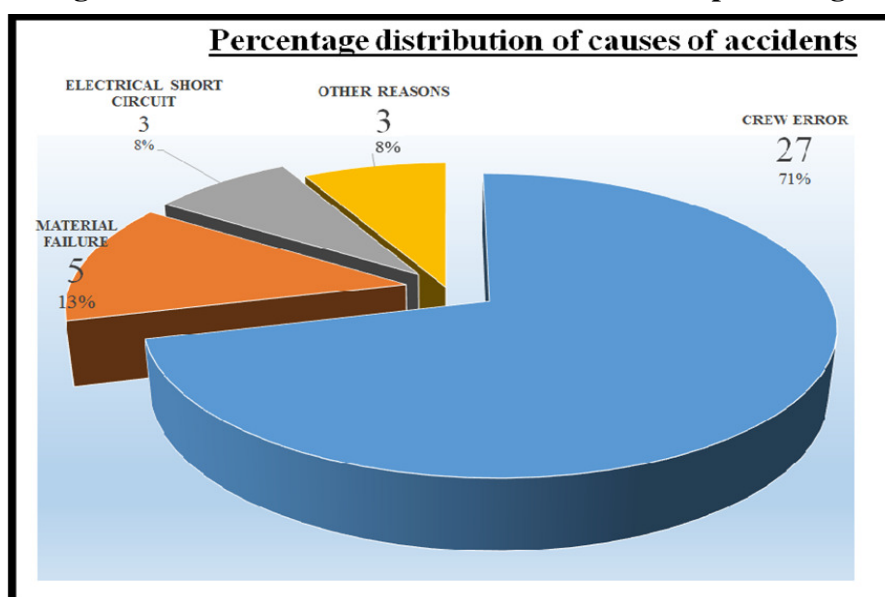
Indian Navy attributed 27 out of 38 accidents to crew error/non-compliance of SOP/Organisational failure, five accidents on account of material failure, whereas three accidents each due to electrical short circuit and other factors as depicted in the chart below:

⁹ Pilotage water is navigating using fixed points of reference on the sea usually with reference to a nautical chart to obtain the position of the vessel.

¹⁰ AIS – Automatic Identification System

¹¹ ECDIS – Electronic Chart Integrated Display System

Figure 3.1: Distribution of causes of accidents in percentage



3.1.1.5 Major ship accidents

All Naval Ship and Submarine accidents are required to be investigated by convening a Board of Inquiry (BoI). The proceedings of such BoIs are classified as confidential documents. Though Indian Navy has not classified/categorised the ships/submarine accidents as discussed in paragraph 3.1.5.1, yet, some accidents involving loss/severe damages to ships, submarines, equipment and loss of lives are discussed in the succeeding paragraphs:

(i) Loss of INS Vindhyagiri

INS Vindhyagiri was a Nilgiri Class Warship (Frigate)¹² of the Indian Navy originally costing ₹71.69 crore and was commissioned in July 1981.

The ship suffered a collision with a merchant ship on 30 January 2011 while entering Mumbai harbour. The catastrophic fire and flooding that ensued caused the ship to submerge and come to rest on the mud bottom at sea. The BoI found that flooding and major fire subsequent to collision, lack of expertise in fire-fighting, non-availing the services of civil fire brigade and

¹² Frigate is a class of warships used to protect other warships and merchant-marine ships, especially as Anti-submarine Warfare combatants for amphibious expeditionary forces, underway replenishment groups and merchant convoys.

lack of coordination between Headquarters Western Naval Command (HQ WNC), Naval Dockyard and ship staff, as the major causes for loss of the ship. After a prolonged salvage operation by Naval Dockyard Mumbai, the ship was refloated and dry docked in July 2011. Subsequent to this, the Board assessed the damage and opined (August 2011) that the ship was beyond technical and economic viability for further operation. The ship was finally decommissioned in July 2012.

HQ WNC intimated to Audit (July 2016) that a large number of old fire tenders had been replaced after the accident and the decision not to seek assistance from outside agencies might have been taken by competent authority depending on the situation at that point in time and cannot be commented upon now.

(ii) Capsizing of TRV A-72 with loss of lives

Torpedo Recovery Vessel (TRV) A-72 of the Indian Navy, primarily used for recovery of torpedoes fired from other ships/submarines, with an original cost of ₹1.41 crore and a designed life of 20 years, was commissioned in February 1983. Based on the recommendations of four different Life Extension Boards, the service life of the vessel was progressively extended till 2017 by IHQ MOD (Navy). As of November 2014, the vessel had rendered 31 years of service life and while on the return passage to Visakhapatnam after participating in an exercise involving torpedo firing at sea, the vessel capsized. Five out of 29 personnel onboard could not be rescued.

The Board of Inquiry (November 2014) concluded that the immediate cause of loss was flooding and foundering and that the vessel during her extended service life (155 *per cent* of designed life) could have suffered fatigue failure and the fatigue stresses weakening the hull.

Indian Navy intimated Audit (August 2016) that the proposal for refinement of the material assessment process with greater focus on 'fatigue strength' was under deliberation.

(iii) Accidental venting of poisonous Gas in INS Jalashwa

INS Jalashwa, an amphibious landing platform dock¹³ originally commissioned as USS Trenton in the US Navy in March 1971, was procured from the USA in 2005 at a cost of MUSD 50.63 (₹202 crore) and commissioned as INS Jalashwa in the Indian Navy in June 2007.

An accidental leakage (February 2008) of hydrogen sulphide gas from the collect-hold-transfer(CHT)/sewage compartment of INS Jalashwa occurred during a naval exercise which led to loss of six personnel. A Board of Inquiry attributed (February 2008) lapses relating to safe working practices, non-compliance of organisational procedures for record keeping, not undertaking essential maintenance routines and not sensitising/training of the crew to the accident.

(iv) Collision of INS Airavat leading to propeller damage

INS Airavat, a Shardul Class amphibious vessel of the Indian Navy was commissioned in January 2007. In January 2014, the ship collided with a civil boat and touched bottom, thereby damaging the port propeller. The BoI (February 2014) attributed the accident primarily to poor pilotage, which failed to establish the presence of a boat and assess the '*risk of collision*'. The BoI also found that the mandatory drills ('Work Up') had not been carried out even after two years of the due date (December 2012).

Indian Navy informed Audit (August 2016) that various constraints relating to operational commitments and capacity constraints of 'Work Up' teams precluded the execution of 'Work Up'.

(v) Loss of INS Sindhurakshak

INS Sindhurakshak costing ₹404.54 crore was a Russian made EKM submarine¹⁴ commissioned in December 1999. The submarine met with an accident of explosion and subsequent sinking with loss of lives in August 2013.

¹³ A landing platform dock is a warship that embarks, transports and lands elements of a landing force for expeditionary warfare missions.

¹⁴ The functional role of submarines includes attacking surface and sub-surface vessels, laying offensive mine-fields, blockade of enemy posts, etc.

The BoI which investigated (August 2013) the circumstances leading to the accident initially appreciated various vulnerabilities/causes for likelihood of the accident. The reconvened Board, in February 2014 after scientific analysis and careful consideration, inferred leakage of oxygen from a torpedo as a primary initiator of the incident. The oxygen leak was attributed to material failure of oxygen flask or its associated pipelines.

The BoI proceedings also brought out that the operational deployment of the submarine in August 2013 by Indian Navy was not justified due to the following:

- The laid down Ships Operating Standards (SHOPS) for the submarine had not achieved the requisite Harbour and operational evolutions.
- Complete 'Work Up' of the submarine was not conducted when the submarine was prepared for operational deployment as the 'Work Up' was completed within one week instead of prescribed two weeks.
- The trials and calibration of Navigational aids and sensors should be completed prior to deployment of a submarine for 'Work Up' with any consorts. However, in the case INS Sindhurakshak, the Sea Acceptance Trials of two critical equipment were not completed even at the time of its preparation for operational deployment.
- Submarine authorities concerned did not properly assess the crew fatigue, besides, the submarine was holding ammunition nearing life expiry.

Indian Navy appraised Audit (July 2016) that as the acceptance trials are extremely stringent, the Sonar performance was improved by the combined efforts of the Sonar OEM, yard and ships staff in order to clear the acceptance trials. However, due to advent of monsoon the acceptance trials were not attempted as the sea state was appreciated to be beyond the limits laid down in the protocol. For inadequacies in completion of SHOPS, Indian Navy stated that with the submarine's sound material state, satisfactorily completing Task-II and accomplishing a torpedo firing, the inadequacy of not having completed SHOPS was not overwhelmingly weighing against embark on a deployment.

(vi) Fire onboard INS Sindhuratna

INS Sindhuratna is a Russian made EKM submarine commissioned in December 1988.

In February 2014, INS Sindhuratna, while undergoing 'Work Up', met with two incidents of fire leading to loss of life and heavy damage to the submarine. The submarine has not been operationalised so far and is currently under refit (June 2016) at Naval Dockyard, Mumbai.

Board of Inquiry which investigated the accident found the following:

- There was inadequate holding of ISP-60 set, necessary for safety of personnel during damage/fire control. Further, there were significant numbers of lagging cells¹⁵ in the battery pit of the submarine, restricting the main motor propulsion.
- Even though the indicator buoy¹⁶ had partial defects which were brought to the notice of Commodore Commanding Submarines (West) [COMCOS (W)] through the Sea State report, yet the submarine was put to sea with these defects in contravention of the provisions laid down by Indian Navy themselves in August 1996.
- Smoke and fire detectors were not installed in all compartments of the submarine for warning. There were two incidents of fire in the submarine within a span of two hours. The occurrence of two fire incidents in the same compartment of the submarine within a span of about two hours is indicative of the fact that in all likelihood, the first fire in the compartment was not extinguished completely.
- HQ WNC also had held (March 2014) that failure to detect the exact origin of smoke at the first instance coupled with failure of the concerned personnel to take a decision to terminate the ongoing task, viz., 'Work Up' proved fatal and resulted in recurrence of fire and death of two officers.

¹⁵ Lagging cells: If only one of the cells in a battery discharges earlier than the other, the efficiency of the battery will be determined by this cell. Such a cell limits the capacity of the battery because, during discharge, its voltage will drop to the final value ahead of any of the other cells and is called a lagging cell.

¹⁶ Indicator buoy: It is a communication equipment (emergency transmitter) which indicates a submarine in distress at a recoverable depth.

The origin of first fire could not be conclusively identified nor the consequences of such a fire were properly appreciated despite the presence of senior officers/submarine experts.

Audit noticed (August 2016) that the relevant Navy Order stipulates that the selected members of a Board of Inquiry should not have any direct or indirect interest in the matter under inquiry. The BoI pertaining to Submarines is to be, *inter alia*, analysed by the Flag Officer Submarines (FOSM) being Class Authority from the professional or technical aspects. However, HQ WNC (February 2014), in violation of extant orders, constituted a BoI to investigate into the circumstances leading to accident of INS Sindhuratna, which consisted of officers linked to the accident in one way or the other. The President of the Board was FOSM himself, the Safety Class Authority of Submarines.

As regards appointment of FOSM as President of the BoI, Indian Navy stated (August 2016) that the same was a considered decision at HQ WNC in accordance with the provisions contained in the Navy Regulations and the members of the BoI had no personal interest in the subject accident.

3.1.1.6 In the Action Taken Report on the recommendations of the Parliamentary Standing Committee on Defence (2014-2015) (Eighth Report), Ministry had stated (April 2015) that all cases of accidents are investigated by a Board of Inquiry and lessons learnt from the reports of BoIs are implemented appropriately. Further, the Ministry in the Action Taken Report on the recommendations of Parliamentary Standing Committee on Defence (2015-16) (Sixteenth Report) has stated (February 2016) that a number of steps have been taken by the Indian Navy to ensure strict adherence to the laid down SOPs and precautionary measures for various evolutions, which include assessment of adherence to laid down SOPs by Flag Officer Sea Training (FOST)/respective Commanders-in-Chief and inspection of all operational units annually by Operational Authorities.

Audit Findings

The inadequacies noticed by Audit in measures taken by the Indian Navy in prevention of accidents are discussed in the succeeding paragraphs:

3.1.2 Inadequacies in implementation of recommendations of Boards of Inquiry

Most of the recommendations made by the Boards of Inquiry emphasized the need for strict adherence to the existing Standard Operating Procedures. The Boards also made certain generic recommendations such as emphasis to be laid on compliance with the provisions of International Regulations for Prevention of Collision at Sea (IRPCS), regular inspection of Stern Gland¹⁷ for excessive water ingress, adherence to norms of keeping watertight doors and hatches closed, thorough exercises in using volumetric markings during flooding exercises, completion of hull surveys without gaps, incorporation of Personal Locator Beacons (PLB) on lifejackets, issue of cautionary regarding limited sea room available in channels, installation of commercially available Voyage Data Recorder, cultivation of a seaman's eye, etc. in respect of surface ships. As regards submarine accidents, the BoIs broadly recommended conduct of 'Work Up' in a systematic manner with sequential exercises adhering to the laid down duration, ensuring presence of key personnel during conduct of 'Work Up' together with bifurcation of Inspecting Authority from Operational Authority, procurement of sufficient personal breathing apparatus, installation of smoke/ fire detectors, setting up of Damage Control Simulator, fixing of residual life of articles onboard submarines at least three months prior to proceeding on patrol, etc.

There were a total of 382 BoI recommendations in respect of 28 ships and 7 submarine accidents¹⁸ examined by Audit. Audit enquired the status of implementation of these recommendations. However, Indian Navy gave specific reply on the status of implementation of only 124 recommendations in

¹⁷ Stern gland is a long shaft known as the propeller shaft used for connecting a ship's engine with the propeller.

¹⁸ The records of BoI recommendations in respect of remaining three accidents were not readily available.

respect of eight ship accidents and two submarine accidents wherein 81 recommendations (*i.e.*, 21 *per cent* of the total recommendations) were fully implemented. This is primarily due to non-existence of an institutionalised mechanism in the Indian Navy for ensuring implementation of recommendations made by various BoIs.

Some of the recommendations which were not implemented are:

- Provision of protective clothing for fire-fighting and filling up of vacancy of Civilian Fire Officer at Naval Dockyard, Mumbai.
- Provision of Aqueous Film Forming Foam ¹⁹ to ships through tanks and pipes for fire-fighting in jetties and upgradation of Fire-Fighting Training Units at Naval Dockyards to the level of advanced Navies.
- Revision of authorisation of suction hoses for Drain Discharge pumps in all ships.
- Installation of smoke and fire detectors in all compartments of submarines and procurement of extended line breathing apparatus (ELBA) sets, Carbon composite submarine breathing apparatus (SBA), Light weight breathing sets for submarines.
- Positioning of separate Squadron Anti-Submarine Warfare Officers for each class of submarine at submarine commands.

3.1.3 Inadequacies in measures for prevention of accidents

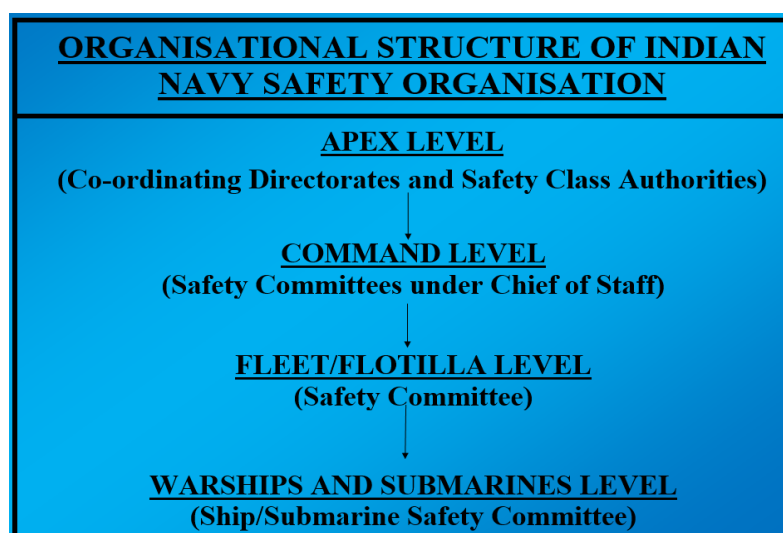
3.1.3.1 Delayed creation of IN Safety organisation.

The ambit of safety issues onboard surface ships includes cargo operations, boat/craft operation, rope-work, anchoring, mooring and towing, helicopter operations, working over the side/aloft and in dry dock, electrical safety, shipboard POL safety, weapon/ordnance safety, etc. The US Navy, Royal Australian Navy and Republic of Singapore Navy have separate and dedicated safety organisations. The Indian Air Force has a dedicated Directorate (Directorate of Flight Safety) which formulates flight safety policies and deals with reporting and investigation of accidents. The Indian Navy, however,

¹⁹ Aqueous Film Forming Foam is the most common technology currently used in fire-fighting.

since inception, had no centralized and institutionalised framework, but had a rather fragmented and compartmentalized set up, to deal with safety issues. The idea of creating an IN Safety Organisation was mooted in 2006 and ultimately promulgated in October 2012. It was set up in February 2014, although it is yet to be sanctioned by Government. The existing organisational framework is indicated in the chart below:

Figure 3.2- Organisational structure of Indian Navy safety organisation



The duties and responsibilities of various authorities and committees of the Safety Organisation were defined and the frequency of the safety meetings to be conducted at Fleet/Flotilla/Squadron level and onboard ships was stipulated. The details are tabulated below:

Table-3.3: Duties of various authorities of the Safety Organisation

Authority	Duties and responsibilities	Periodicity of safety meetings
IHQ, MoD (Navy) • Directorate of Naval Operations • Directorate of Submarine Operations	As the apex level authority, to liaise with Safety Class Authorities, viz., FOST and FOSM	Not specified
Three Naval Commands	Single point authority to coordinate safety related aspects with the Safety Class Authorities at the Command level	Not specified
Fleet/Flotilla/Squadron	Conduct Safety Committee meetings at Fleet/Flotilla/Squadron level	Quarterly
Individual Ships	Conduct 'Ship Safety Committee' meetings onboard	Quarterly

Commencing 01 July 2013, Commands and Safety Class Authorities were to forward a half yearly feedback on the effectiveness of the measures implemented for enhancement of safety to IHQ MoD (Navy)/DNO. The feedback was to include recommendations for making the structure more robust with regard to developing 'Safety Culture' in the Indian Navy. Subsequently in February 2014, Command Level Safety Audit Team (COMSAT) and Operational Authority Level Safety Audit Team (OLSAT) were introduced with the stipulation that every ship has to undergo either OLSAT audit or COMSAT audit once in a year.

Audit scrutiny (June 2016 to August 2016) of the implementation of the above institutionalised mechanism of IN safety organisation revealed the following shortcomings:

- There was abnormal delay of two and a half years in institutionalising the Indian Navy Safety Organisation at Headquarters Western Naval Command. The full-fledged Command Safety Committee Meeting to be chaired by the Chief of Staff, scheduled for December 2012 was actually held only in May 2015, without any apparent reasons.
- HQ Southern Naval Command, Kochi was unable to furnish the minutes of the safety committee meetings for audit scrutiny. They, however, stated that even more elaborate and effective methods were also in place. However, in the absence of recorded minutes, Audit does not have any assurance about the adequacy of safety measures taken by the Command.
- While a dedicated Command Safety Officer for Eastern Naval Command was appointed in November 2014; for Southern Naval Command in May 2016, the Western Naval Command continues to function without a dedicated Command Safety Officer so far. The duties of Command Safety Officer at HQ WNC, Mumbai are being performed by the Command Submarine Officer which is in variance with Indian Navy's policy on the issue.
- Though Flag Officer Sea Training (FOST) has been designated (October 2012) as the Safety Class Authority for surface ships and all ships have

been directed to render minutes of Quarterly Safety Meeting to FOST, the ships were not reporting (May 2016) the proceedings of the safety meetings as per the stipulated timeliness. Further, the ships were not reflecting safety infringements, near misses and incidents/accidents in true spirit, thereby, precluding promulgation of Safety Advisories for all ships/concerned units.

- A ship should be cleared for operation at sea with all safeties in place, however, there is no extant system of safety certification in the Indian Navy, in as much as, a ship after being commissioned or after completing her refit does not have a mandatory certification by concerned authorities/trial agencies.
- There is no database of safety related incidents in the Indian Navy to analyse the causes *viz.*, material failure, unsafe practices, bad weather etc. Many a 'Near-Miss' incidents onboard ships go unreported for fear of backlash.

In response to audit queries, Indian Navy stated (June 2016) that like any fledgling organisation, it took a finite time for implementation and settling down, understanding of roles and responsibilities at each level and formalisation of policies, procedures and a rugged framework for executing/monitoring. Indian Navy also stated (October 2016) that there were deliberations at IHQ MoD (Navy) on the issue of creation of a safety organisation in the Indian Navy since 2006 and a consensus was reached (2007) that existing measures were sufficient.

Thus, there was inordinate delay in creation of safety organisation and even after promulgation of policy for the creation of the organisation the same has not been implemented fully.

3.1.3.2 Shortcomings in the working of COMSAT/OLSAT

Based on the promulgation of IN Safety Organisation in October 2012, Command Level Safety Audit Teams (COMSAT) were constituted under the Command operational authorities and Operational Authority Level Safety Audit Team (OLSAT) were constituted under the Fleet operational authorities.

The Presidents of COMSAT and OLSAT are to report their observations to Administrative Authority (Command HQs), keeping IHQ MoD (Navy) informed. Thereafter, the Command HQs are to signal to IHQ MoD (Navy) the way ahead to address these observations resulting in a situation where the auditor (Command HQs) is also effectively the auditee.

Further, the Safety Audits are required to be undertaken by Commands and Operational Authorities from within available manpower resources, which are already stretched, on account of existing shortages.

Audit noticed (July 2016) from the inputs from the field units regarding safety audit that the desired aim of achieving enhanced safety in operations has not been achieved primarily due to non-availability of suitably qualified manpower to conduct the audits. These audits are being conducted with manpower drawn from other ships/establishments under the command/operational authorities and thus an audit by higher authority has been largely reduced to 'peer level' audit.

Indian Navy in their reply stated (October 2016) that as part of streamlining of COMSAT/OLSAT, issues such as conduct of safety audits under the aegis of FOST, type and duration of safety audits and class of ship specific safety audit check lists were under deliberations at IHQ MoD (Navy).

Thus, even after four years of promulgation of IN Safety Organisation, the methodology of conducting the safety audits has not yet been streamlined.

3.1.3.3 Lack of manpower/expertise for analysis of accidents/incidents

Flag Officer Sea Training (FOST) as Safety Class Authority for surface platforms is, *inter alia*, responsible for analysis of incidents, accidents and all safety infringements including 'near misses' for review, formulation and promulgation of acquants for dissemination of lessons learnt and policies with respect to safety in their specific domains after due approval of IHQ MoD (Navy). In October 2012, FOST was designated as the Safety Class Authority for surface ships, by IHQ MoD (Navy).

Audit observed (June 2016) that HQ FOST does not have the requisite

manpower/expertise to analyse all types of safety related accidents/incidents pertaining to various classes of ships. According to HQ FOST, training schools/establishments are best suited to undertake formulation of lessons learnt in view of availability of experienced specialist officers/sailors in almost all classes of equipment. Any rethinking on the role of FOST in this regard is not known, as HQ SNC had not replied convincingly to audit queries.

Audit further noticed (July 2016) that between 2012-13 and 2014-15 even though fifteen Naval Ship accidents took place, yet HQ FOST did neither undertake safety assessment of five²⁰ ships nor prepared any safety acquaints. FOST also did not promulgate safety BRs, safety orders and periodic safety updates etc.

Indian Navy stated (August 2016) that the manpower constraints have been taken into account by IHQ MoD (Navy) while formulating the policy on IN Safety Organisation. However, the contention is not correct as evident from the fact that the core duty of FOST, *viz.*, conducting 'Work Up', is affected by shortfall of manpower as discussed later. As regards inaction by FOST in preparation of Safety Assessment and Acquaints, Indian Navy stated (August 2016) that out of the five accidents indicated by audit, approved BoIs in respect of three accidents were received by FOST in July 2016 and the same were under detailed study and safety advisories would be issued subsequently. Thus, without addressing the issues of manpower/expertise shortage, designating FOST as the Safety Class Authority for surface ships is considered imprudent.

3.1.3.4 Non-promulgation of safety equipment allowance list

A need was felt by Indian Navy (2014) that there has to be a standard safety equipment allowance list to be promulgated all over Indian Navy for use onboard ships. Accordingly, HQ Flag Officer Sea Training (March 2014) proposed a Safety Equipment Allowance list indicating various safety equipment to be used onboard ships, however, the standardised safety equipment allowance list across Indian Navy is yet to be promulgated.

²⁰ INS Airavat, INS Talwar, INS Kuthar, INS Kora and INS Cheetah

Besides, the ships were unable to demand the equipment as per the proposed allowance list, as approval of IHQ MoD (Navy) was awaited. Owing to non-promulgation of the safety equipment allowance list, procurement of these safety equipment is being processed by individual ships leading to induction of equipment of various make and quality.

Indian Navy in their reply stated (June 2016) that the approval of the Safety Equipment Allowance List is at final stages at IHQ MoD (Navy) and further directives regarding procurement of the same would be issued at the earliest.

Thus, IHQ MoD (Navy) has not taken a final decision on promulgation of Safety Equipment Allowance List even after two years of projecting the requirements by the Safety Class Authority.

3.1.3.5 Failure to carry out mandatory drills

The concept of 'Operational Sea Training' (OST) commonly referred to as 'Work Up' has evolved from the requirement to hone the skill of ship's crew to the requisite operational standard. The 'Work Up' of a ship, carried out under the overall supervision of Flag Officer Sea Training (FOST), Kochi ensures a comprehensive and systematic progression of the ship to achieve the prescribed performance standards to undertake the designed role and streamline ship management in totality. Further, the equipment and machinery status is also evaluated during the 'Work Up'. At the end of each 'Work Up' schedule, FOST is required to conduct an operational readiness assessment at sea and certify the ship's operational status highlighting the areas that need continuation training/attention. Timely 'Work Up' of a ship is, therefore, of paramount importance in ensuring crew proficiency and efficient overall ship management.

Extant Navy orders, *inter-alia*, stipulate that a ship is due for 'Work Up' on commissioning (after Part IV²¹ trials are completed); after Normal Refit (NR);

²¹ Part IV trials- Part IV trials are the last phase of trials that happen post acceptance and commissioning of the Ship. Throughout these periods setting to work, testing and tuning of weapon systems, outstanding Harbor Acceptance Trials/Sea Acceptance Trials are completed and accepted by the Navy in the presence of the OEMs.

after Short Refits to ship, which are for any reason extended to a period as long as that of NR for that class of ship and also 24 months after the last ‘Work Up’ of a ship.

There was heavy shortfall *vis à vis* the number of ships due for ‘Work Up’ and actually carried out by FOST, Kochi, in respect of entire naval fleet, from the year 2011-12 onwards. The details of ‘Work Ups’ prior to 2011-12 were not readily available with the Indian Navy. The details are tabulated below:

Table-3.4: Details of ‘Work Up’ conducted

Year	‘Work Up’ due	‘Work Up’ conducted	Percentage shortfall
2011-12	86	39	55
2012-13	92	36	61
2013-14	91	34	62
2014-15	98	21	79
2015-16	110	29	74

It can be seen from the table above that there were serious shortfalls in ‘Work Up’ carried out, when compared with the Ships due for ‘Work Up’ and number of ships which underwent ‘Work Up’. Further, there was a downward trend in the number of ‘Work Ups’ carried out by FOST, Kochi between 2011-12 and 2015-16.

Further, 10 ships which were commissioned in the Indian Navy since October 2011 had not undergone the mandatory ‘Work Up’ as of August 2016. These ships include Indian Navy’s only aircraft carrier in operation, *i.e.*, INS Vikramaditya, which was commissioned in November 2013.

Audit observed (August 2016) that out of a total number of 30 ship accidents, which occurred from the year April 2007 to March 2014, ‘‘Work Up’’ was not conducted in due time in respect of 16 ships. The details are given in Annexure-VI.

Indian Navy stated (August 2016) that the primary reason for shortfall in achieving the ‘‘Work Up’’ targets is the existing ‘Work Up’ capacity *vis à vis* the requirements. With the growth of Indian Navy, the operational sea training

(‘Work Up’) requirement has also increased. However, ‘Work Up’ capacity has remained constant.

Thus, there is acute shortage in conducting ‘Work Up’, which is an important mandatory drill ensuring the safety of the crew and ships at sea. Indian Navy has not been able to provide any concrete plans to increase the ‘Work Up’ capacity.

3.1.3.6 Ineffective monitoring mechanism for liquidation of material issues

On completion of OSTs (‘‘Work Up’’) the ship staff gives detailed feedback/way ahead to Operational Authority/Command Headquarters for liquidating outstanding observations. The same has to be monitored periodically at Commands till their liquidation.

Audit scrutiny (July 2016) of annual ‘Work Up’ reports prepared by FOST revealed that a large number of material issues are persisting/pending in many ships. Some of the issues which directly impinged safety onboard the ships pending are Harbour Acceptance Trials (HATs)/Sea Acceptance Trials (SATs) of newly fitted/overhauled equipment onboard most ships; sub-optimal performance of emergency communication systems; non-fitment of Flood Sensors and Alarm systems, etc. In response to our queries, HQ Southern Naval Command stated (August 2016) that they were not aware of the status of liquidation of these observations.

It indicates that the monitoring mechanism for liquidation of serious material/equipment failure issues, raised by FOST, was not effective/ efficient. This fact is validated by non-functional flood and fire alarm system onboard INS Agray as discussed below:

The Board of Inquiry which investigated into the circumstances leading to the incident of fire onboard INS Agray in July 2009 found that the Flood and Fire Alarm System onboard the ship was not functioning. HQ WNC, while analysing the BoI proceedings pointed out (April 2010) that from the emergencies that had occurred in the past, the fire and flood alarm systems

onboard ships had not been of any aid in detecting the crisis. It was also pointed out that the Fire Detection System's SOTR,²² themselves, were not very exhaustive. In response to an Audit query (June 2016) on the review of SOTR and induction of new systems, Indian Navy stated (July 2016) that IHQ MoD (Navy) had issued (February 2011) policy directives for induction of Addressable Automatic Fire Detection System (AAFDS) in lieu of the existing AFDS system. Similarly, policy directives for induction of Addressable Flood Alarm System (AFAS) were issued in April 2012 in lieu of the existing Flood Alarm Systems. Revised SOTRs for AAFDS and AFAS were promulgated in December 2015 and January 2016 respectively. However, the induction of these systems was at the initial stage of procurement.

Thus, there was inordinate delay in induction of critical fire and flood alarm systems impinging on safety onboard ships.

3.1.4 Training related issues

3.1.4.1 Deficient study and analysis of incidents/accidents by Collision and Grounding Analysis Cell

A Collision and Grounding Analysis Cell (CAGAC) was formed at Navigation and Direction (ND) School, Kochi in 2005 for analysis of navigational incidents and dissemination/incorporation of lessons learnt from the same. On receipt of Board of Inquiry proceedings at IHQ MoD (Navy), the same is examined by the professional directorates there and the cases meriting inclusion as case studies are sent to CAGAC for analysis and further dissemination of lessons learnt from the same. The cell received a compendium of navigational incidents from IHQ MoD (Navy) till early July 2006 which included narrative, analysis and lessons learnt. From the year 2007-08 onwards, a total number of five collision and six grounding accidents of ships took place, however, only one incident relating to the grounding of a ship in early 2008 was received by the cell. The cell had no information about

²² SOTR- Statement of Technical Requirements

remaining cases of collision/grounding by Indian Navy ships/submarines. As CAGAC bears significant potential for assisting improvement of navigational training and safety, it is imperative that the Cell is provided with full Board of Inquiry proceedings of all accidents. In response to an Audit observation (June 2016) relating to non-receipt of BoI extracts by CAGAC, HQ Southern Naval Command stated (June 2016) that IHQ MoD (Navy) forwards the appropriate information for updation of records of CAGAC and that ND School was provided with the latest compendium of BoI/advisories in 2007 which had 30 case studies and another 22 case studies were provided from 2009-15. But no documentary evidence was furnished to Audit for verification.

Similarly, NBCD School, Lonavala which imparts Nuclear, Biological and Chemical Defence (NBCD) training and having a role in NBCD policy formulation, study of NBCD problems, formulation of appropriate NBCD standards, conduct of user trials of NBCD equipment, etc. had received the last incident report from IHQ MoD (Navy) in September 2011.

In reply to audit queries, IHQ MoD (Navy) stated (October 2016) that NBCD Directorate at IHQ has commenced forwarding of BoI extracts to NBCD School. However, the reply was silent on the gap from September 2011 to October 2016. Thus, non-forwarding of BoI extracts/information on BoI proceedings, in time, is indicative of the fact that the lessons learnt from the accidents are not being analysed and disseminated by these cells timely.

3.1.4.2 Need for dedicated survival and rescue training

It emerged from the lessons learnt from the sinking of Torpedo Recovery Vessel TRV A-72 off Visakhapatnam in 2014 that survival training and abandon ship training is carried out in the Indian Navy as part of Operational Sea Training (OST) and covers only ships undergoing OST and individuals get exposure sporadically during their service life only when being posted to such a ship. An independent school with comprehensive facilities dedicated only to sea survival, rescue/recovery and Search and Rescue (SAR) was

proposed (November 2014) by Flag Officer Commanding Eastern Fleet. The school was envisaged to cover intensive survival training and abandon ship drills in a three to four day for all Indian Navy personnel, however, there is no progress on the issue of creating a dedicated school for survival and rescue training.

3.1.4.3 Inadequate number of NBC Instructors at Indian Naval Academy

Audit observed (July 2016) that Indian Naval Academy (INA), Ezhimala, the *ab initio* officers training academy of the Indian Navy, functions with a sanctioned strength of only one Nuclear, Biological and Chemical Defence (NBCD) Control Instructor against a projected requirement of two specialist NBCD Officers and five Sailors (Instructors).

Due to shortage of NBCD qualified instructors, NBC classes are conducted by officers engaged in other duties. Any shortage of instructors has direct and proportional impact on training. Lack of dedicated NBCD Officer and NBCD Instructor in training establishment like the INA precludes any enhancement of training material which adversely affects the revamped curriculum and training output.

In their reply to audit queries, HQ SNC (August 2016), however, denied having any adverse impact on training due to shortage of NBCD instructors. The reply of HQ SNC is not tenable for the reason that it is during *ab initio* training that the safety culture first gets inculcated in a cadet. Moreover, as stated by INA Ezhimala, *ab initio* training is instructor intensive and any shortage does adversely impact the training.

3.1.5 Other Miscellaneous issues

3.1.5.1 Non-classification of accidents

Accident classification is a standardised method by which the causes of an accident, including the root causes, are grouped into categories. By analysing a classification of accidents, an organisation can cover as many aspects as

possible *i.e.*, human performance, organisational issues, technological issues and also to understand the magnitude of the accident in terms of the losses.

Audit observed (June 2016) that Indian Navy has so far not classified/categorised the ship/submarine accidents for the purpose of analysis. Audit further observed that armed forces in other countries like United States and also Indian Air Force are classifying accidents into various categories for better analysis.

In their reply to audit queries, Indian Navy stated (July 2016) that as per extant policies on the subject, accidents are not classified into categories, however, all contributory aspects are brought out and analysed in Boards of Inquiry.

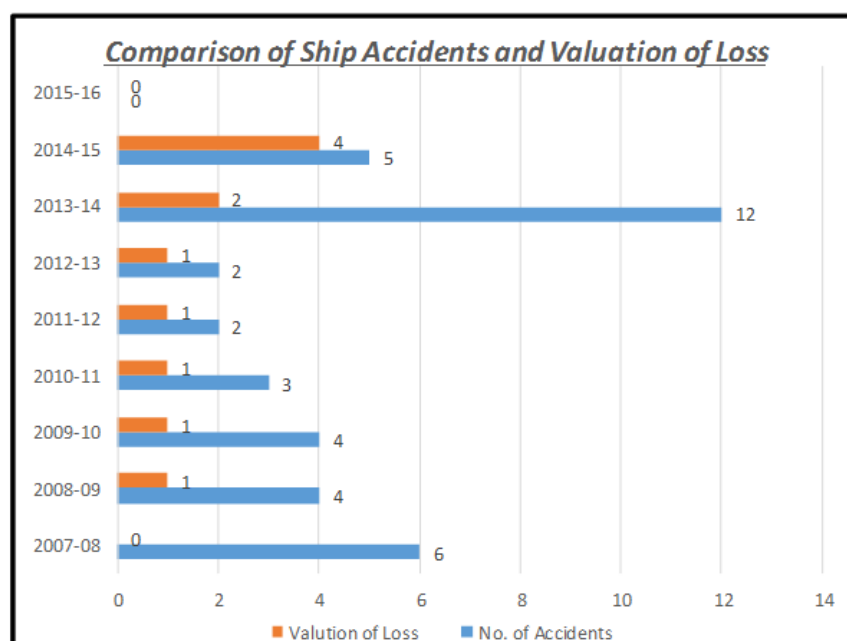
Notwithstanding the above, Audit, however, considers that a proper classification of accident is beneficial in analysing the accidents with reference to its magnitude and financial implication.

3.1.5.2 Non-assessment of loss by BoIs

As per the extant orders, in cases of major losses of stores due to enemy action, collision, grounding and fire, loss statements are required to be prepared and loss is required to be regularised by Competent Financial Authority.

During the period 2007-08 to 2015-16, although Indian Navy reported 38 accidents, yet the BoIs assessed value of loss at ₹8.86 crore in respect of eleven accidents only which included two ships lost irretrievably, *viz.*, INS Vindhyagiri and TRV A-72. The value of loss for remaining 27 accidents was not assessed by BoI/Navy. The details are depicted below:

Figure 3.3: Comparison of Ship accidents and valuation of loss



Audit observed (August 2016) that the provisions laid down for preparation of loss statement and its regularisation had not been adhered to by the Indian Navy. Incidentally, Indian Navy initiated action for preparation of loss statements for loss due to accidents only after being pointed out by audit.

As regards action initiated for regularisation of loss, no comments have been offered by Indian Navy and IHQ MoD (Navy) stated (October 2016) that information had been sought from the Commands and a consolidated response would be forwarded; the same was awaited (March 2017).

3.1.6 Conclusion

The loss of a ship/submarine adversely affects the operational preparedness of the Indian Navy, as acquisition of new ships/submarines involves procurement/ construction process of more than eight to ten years. It is, therefore, imperative that Indian Navy maintains its assets free from accidents during peacetime evolutions. During the period 2007-08 to 2015-16, 38 naval ships and submarines met with accidents, wherein 33 trained naval personnel lost their lives in addition to their retrievable loss of three vessels. Accidents were attributable to crew error and material failure which was due to

shortfalls, ranging from 55 per cent to 79 per cent in carrying out of 'Work Up' of vessels.

There was no monitoring mechanism for implementation of recommendations made by various BoIs. Further, BoI had assessed losses in only eleven accidents, however, loss statement was not prepared in any of the accident unlike Indian Air Force. Indian Navy also did not classify the accidents keeping in view the magnitude/severity of the accidents.

The Indian Navy since inception, has no institutionalised framework to deal with safety issues. A dedicated organisation for dealing with safety issues was implemented by the Indian Navy only in 2014, however, it awaits Government's sanction. The Indian Navy Safety Organisation has been functioning sub optimally with various deficiencies including dedicated manpower.

3.1.7 Recommendations

- ✓ *Present Indian Navy Safety Organisation is ad hoc in nature formed without approval from the competent authority. This needs to be institutionalised with proper sanction from the Government and dedicated manpower be allocated for its effective functioning.*
- ✓ *Ministry may ensure that there is an institutionalised mechanism in place for monitoring the implementation of BoI recommendations in a time bound manner.*
- ✓ *Ministry may ensure that there is no delay in forwarding the extracts of BoIs and dissemination of information of accidents to respective study centres so that the lessons learnt can be implemented timely.*
- ✓ *Ministry may ensure proper classification of accidents, on the basis of severity and financial implication, for better analysis of the accidents and its causes. BoI may categorise their proposed recommendations on the basis of priority for implementation.*
- ✓ *Immediate steps need to be taken to liquidate the constraints faced by Flag Officer Sea Training to ensure that 'Work Up' of ships are carried out in*

time without any backlog.

- ✓ *As majority of the accidents are attributable to crew error, Indian Navy may consider to have a relook at training syllabus and methodology.*

The matter was referred to the Ministry (December 2016); their reply was awaited (March 2017).

3.2 Functioning of Marine Gas Turbine Overhaul facility

INS Eksila is overhauling the M3E GTs since 1991, but continued to encounter abnormal delays in completion of the overhaul of the GTs, *inter alia*, due to non-availability of spares and manpower. The facility required for overhaul of M-15 GTs was yet to be completed though the facility had been planned to be set up since 1986. Meanwhile, two out of twelve 1241 RE class ships, which employ the M-15 GTs, had been decommissioned by April 2016. Overhaul facility for M-36 GTs planned in 2008, has also been delayed for want of synchronisation between civil works and procurement of equipment. Consequently, Navy continued to depend on OEM for overhaul of GTs, incurring an expenditure of ₹317.77 crore. INS Eksila is grappling with inadequate availability of technical expertise, due to non-retention of manpower for long duration.

Introduction

3.2.1 The overhaul facility for the marine gas turbine (*i.e.* M3E GTs²³) was set up in October 1991 as Marine Gas Turbine Overhauling Centre (MGTOC) which was subsequently commissioned as INS Eksila, in August 2000, under the administrative control of Flag Officer Commanding-in-Chief, Headquarters Eastern Naval Command (HQ ENC), Visakhapatnam. INS Eksila is primarily tasked with capital repairs and overhauls of the Marine Gas Turbines (GTs) and Gas Turbine Generators (GTGs) fitted onboard Naval Ships as given below:

²³ M3E GTs are installed on five Rajput class ships of Indian Navy.

- To undertake major overhaul (OH) of Marine Gas Turbines (M3E GTs) and Gas Turbine Generators (GTGs) of Rajput class ships.
- To cater for major Overhaul (OH) of Cruise²⁴ and Boost²⁵ GT Aggregates²⁶ (M-15) of the 1241 RE class ships.
- To cater for major OH of Marine Gas Turbines (M-36E GTs) of the Delhi/Talwar class ships, and
- Be the repository and engine holding authority for M3E Marine Gas Turbine Engines in the Indian Navy.

INS Eksila has completed a total of 38 major overhauls since 1991 which includes 37 OH of M3E GTs, one OH of M-15 GTs and Nil OH of M-36 GTs.

Organisational Structure

INS Eksila is headed by an officer of the rank of Commodore of Indian Navy, who functions under the administrative control of the Flag Officer Commanding-in-Chief, Eastern Naval Command, Visakhapatnam and technical control of the Principal Director of Marine Engineering (PDME)/Integrated Headquarters, Ministry of Defence, Navy {IHQ MoD (Navy)}.

Budget Management

The total budgetary allocation under locally control heads *viz.*, repair of equipment, procurement of naval stores, procurement and upkeep of IT facilities etc. for INS Eksila during the last five years from 2011-12 to 2015-16 was ₹12.84 crore, against which there was an expenditure of ₹12.61 crore. The budgetary allocation does not include expenditure on capital procurements including overhaul spares, pay and allowances of officers, sailors and civilians etc., as these are budgeted separately for the entire Navy.

²⁴ Cruise GT - 1241 RE class ship have two Cruise Gas Turbines located in forward engine room. They are mostly employed onboard ships for cruising evolutions

²⁵ Boost GT - 1241 RE class ship have two Boost Gas Turbine located in Aft engine room. They are mostly employed onboard for high speed evolutions

²⁶ M-15 GT Aggregates –is fitted with two each cruise and boost marine gas turbines. Cruise GTs are used when the ship is in sailing and Boost GTs are used for adjustment of speed when the ship reaches the harbor/port.

Manpower Position

The position of sanctioned and posted strength of manpower in INS Eksila during the last five years is tabulated in Table 3.5 given below:

Table-3.5: Sanctioned and posted strength of manpower in INS Eksila

Year	Officers			Sailors			Civilians		
	S	P	Def (in %)	S	P	Def (in %)	S	P	Def (in %)
2011	27	18	34	424	293	31	77	53	31
2012	27	16	41	424	266	37	77	51	34
2013	27	18	34	424	265	38	77	47	39
2014	27	18	34	424	277	35	77	51	34
2015	27	22	19	424	267	37	77	51	34

S- Sanctioned, P-Posted and Def-Deficiency in percentage

Deficiencies in posted strength exist in all cadres of INS Eksila. The deficiencies in sailors cadre, ranged between 31 and 38 *per cent* and civilians cadre ranged between 31 and 39 *per cent*.

Audit Objectives

Audit was carried out to ascertain:

- the performance of INS Eksila in the overhaul²⁷ of M3E GTs,
- the capability of INS Eksila in the overhaul of M-15 and M-36 GTs,
- availability and utilisation of man power
- indigenisation/production of overhaul spares

Audit Scope and Methodology

Mention was made in Paragraph No. 2.7 of C&AG Report No. 5 of 2008 (Air Force & Navy) for the year ended 31 March 2007 about 'Delay in creation of overhaul facilities in Eksila', wherein delay in establishment of overhaul facilities for M-15 GTs and its limited utility upon completion of the project in view of these GTs having already been overhauled and short residual life of the ships, were highlighted. In their ATN, Ministry stated (August 2010) that

²⁷ Since, the role and functioning of INS Eksila involves major overhaul of M3E, M-15 and M-36 GTs, all these were selected as Audit Objectives.

1241 RE class ships would remain in commission for another 15-20 years and the benefits accruing from the M-15 overhaul facility would be substantial.

The creation of overhaul facilities for M-15 and M-36 GTs post 2007, in addition to overhaul of M3E GTs for which infrastructure was already available since 1991, were examined in Audit.

Records of INS Eksila for the period from 2011-12 to 2015-16 were examined between August and October 2016. Certain clarifications on the creation of infrastructure and utilisation of the existing facilities were sought for, through preliminary enquiries, and replies received thereto, have been suitably incorporated.

Audit Criteria

We adopted the following sources of audit criteria:

- i) Commanding Officer Standing orders issued on the functioning of INS Eksila.
- ii) Annual Inspection Reports issued by HQ ENC, Visakhapatnam.
- iii) Technical Inspection Reports issued by IHQ MOD (Navy).
- iv) Contracts concluded with Original Equipment Manufacturer (OEM) M/s Zorya Mashproekt, Ukraine for supply of spares, Jigs, tools, fixtures and test stands for all the three types of GTs.
- v) Contracts concluded for procurement of indigenous repair equipment and test bed facilities.
- vi) Records of Planning and Production Control section.

Audit Findings

Major audit findings are discussed below:

3.2.2 Performance in overhauling of M3E GTs of Rajput class Ships

M3E GTs are installed on five Rajput class ships of Indian Navy as mentioned in paragraph 3.2.1. Each ship comprises of four GTs and two Reduction Gears

(RGs)²⁸. Audit examined issues relating to timely completion of overhauls, accrual of benefits due to experience gained in overhaul and availability of technical manpower etc. pertaining to M3E GTs and the results are discussed in the succeeding paragraphs:

3.2.2.1 Abnormal delay in overhaul of M3E GTs

An overhaul is required to be planned with fixed priorities and a pre-determined schedule for the commencement and completion of overhaul after ensuring the availability of requisite spares and technical manpower.

As per the extant norms a total of 184 working days amounting to eight calendar months are required for completion of overhaul excluding two to four months for completion of test bed trials. Thus, the overhaul of M3E GTs including test bed trials is required to be completed within 12 months (8M + 4M). Merging of the overhauled GTs into serviceable stock indicates completion of overhaul in all respects.

Audit, however, observed (August 2016) abnormal delays in completion of overhaul of all seven M3E GTs undertaken during the period covered in audit, wherein the actual overhaul period ranged from 19 to 70 months as compared to stipulated 12 months (Annexure-VII).

INS Eksila attributed (September 2016) the delay in completion of overhaul of GTs to the change in priorities based on the ship requirement, non-availability of spares, waiting period at shop floor due to ongoing work load, non-availability of manpower, and frequent transfers of experienced sailors.

However, audit noticed from the production data furnished by INS Eksila that in four out of seven GTs overhauled, the delays had occurred mainly due to poor workmanship leading to failure in test bed trials necessitating repeated revisia²⁹ (rework) (Annexure-VIII).

²⁸ Reduction Gear- Power generated by the Gas Turbine is transmitted to the propeller shaft through Reduction Gear.

²⁹ Revisia - Disassembly of GT after completion of overhaul for inspection of internal components based on the observations of Gas Turbine Testing and Tuning Team at Naval Dockyard (V).

3.2.2.2 Non-accrual of benefits from the experience gained in overhaul

The overhaul activities of M3E GTs had commenced way back in June 1991 and by January 2016, 37 GTs had been overhauled and merged into serviceable stock. An examination of the average overhaul period taken for the first five completed overhauls with that of last five overhauls revealed that the average overhaul period had increased from 41 months to 43 months as against the prescribed period of 12 months. On being enquired (September 2016) about the efforts made by the Indian Navy to reduce the man-days/man-hours for the overhaul with the expertise gained over the last 25 years, INS Eksila stated (September 2016) that the reduction of man-days/man-hours was not feasible considering the constraints such as non-retention of expertise for longer duration at INS Eksila and various other ship's activities that were planned from time to time.

The reply is indicative of the fact that the Indian Navy could not derive benefits in terms of reduced overhaul period, reduced instances of revisia etc. from its experience of 25 years in overhaul of M3E GTs.

3.2.2.3 Shortage of technical manpower for overhaul of M3E GTs

As per INS Eksila's communication (November 2015) to Flag Officer Commanding-in-Chief, Eastern Naval Command (FOC-in-C, ENC), overhaul of a GT, being a highly specialised task requires extensive 'hands on' training under the guidance of experienced and trained personnel before an Engine Room Artificer (ERA³⁰) can be tasked to undertake the overhaul independently. Audit observed (September 2016) that out of 141 ERAs sanctioned at INS Eksila, only 80 to 88 ERAs on an average were available during the period from January 2012 to January 2016, indicating a shortage of up to 43 *per cent*. Further, out of the borne strength, only three to twenty ERAs had a continuity of four to five years, whereas, 22 to 47 ERAs were posted for one or two years. Audit also observed that INS Eksila had proposed to FOC-in-C, ENC, for stay of ERAs for a period of four to five years highlighting that due to quick and unplanned turnaround of key ERAs posted

³⁰ ERAs-Engine Room Artificers are the sailors who mainly deal with the operation and maintenance of marine engines.

in Eksila, there were nil or negligible experienced ERAs left in core production expertise.

INS Eksila stated (September 2016) that the proposal for training and retention of experienced manpower for continuous duration of four to five years was forwarded (November 2015) and was under examination at IHQ MoD (Navy). The fact remains that lack of development of expertise among Engine Room Artificers (ERAs) due to their non-retention for a specific period/ tenure had adversely affected the efficiency of INS Eksila, resulting in revisia and delays in the overhauls of GTs undertaken as discussed in the previous paragraph.

3.2.2.4 Non-maintenance of war reserve

As per the Material Planning Manual, in addition to insurance spares³¹, specified quantities of spares and items of consumable and permanent naval stores are also required to be maintained as war reserve³². All items of war reserve, including insurance spares are to be stocked in addition to Minimum Stock Level (MSL)³³. Issues/ spares stocked against war reserve can be made only with the prior approval of Assistant Controller of Logistics. Integrated Headquarters Ministry of Defence (Navy) {IHQ MoD (Navy)} prescribed a war reserve of four M3E GTs in May 2014 only. The reasons for not prescribing the war reserve prior to 2014 were not available on records of Eksila.

INS Eksila intimated (August 2016) audit that the war reserve quantity of M3E GTs was not maintained but, did not furnish any reasons.

3.2.3 Setting up of overhaul facilities for M-15 and M-36 GTs under INS Eksila

An overhaul facility includes civil works for Overhaul Bay, Assembly Stands, Special Tools, Jigs and Fixtures, Repair Technical Documents including Quality Control Procedures; Test Bed for Testing & Acceptance of GTs; provisioning of 'Mandatory' and 'Anticipatory' GT spares as recommended by the OEM; and training of personnel by the OEM. Planning to set up the

³¹ Insurance spares are equipment held in stock to cater for war and other unexpected damage.

³² These are stocks of materiel which an MO or NSD is required to maintain to meet the needs of operations. These are to be held additional to Minimum Stock Level (MSL).

³³ Minimum Stock Level is the level below which the stock of an item should not be allowed to fall.

overhaul facilities for M-15 and M-36 GTs commenced in 1986 and 2008 respectively.

Audit examined the status of creation of the overhaul facilities of these GTs as discussed below:

3.2.3.1 Non-setting up of overhaul facilities of M-15 GTs

1241 RE class ship is equipped with four M-15 GTs (i.e. two each of Cruise GTs and Boost GTs) and two Reduction Gears. Twelve³⁴ 1241 RE class ships were commissioned into Indian Navy between March 1987 and December 2002 as Veer class corvettes of Indian Navy. M-15 GTs constitute upto 61 *per cent* of the total GTs of Soviet origin held with Indian Navy. The M-15 Cruise and Boost GTs have a maximum service life of 6000 hours/12 years with the overhauling cycle of 3000 hours/six years.

Mention was made in Paragraph No. 2.7 of the C&AG Report No. 5 of 2008 (Air Force & Navy) for the year ended 31 March 2007 that the project conceived in 1986 for repair and overhaul of GTs for 1241 RE class ships awaited completion even after two decades and lack of synchronisation led to technical documents, equipment and spares procured at a cost of ₹21.16 crore remaining unutilised. The Report further pointed out that even after completion of the project, its utility to the Navy would remain limited as these GTs had already received their scheduled overhaul by the OEM and the benefits accrued from the facility would be marginal as more than half of the service life of the ships would be over. In their ATN, Ministry stated (August 2010) that 1241 RE class ships would remain in commission for another 15-20 years and the benefits accrued from M-15 overhaul facility would be substantial.

The creation of overhaul facilities for M-15 GTs post 2007, was examined during current Audit and it was noticed (September 2016) that the facilities were not fully completed even after incurring an expenditure of ₹197.79 crore on civil works (overhauling bay and test station), procurement of tools/jigs, purchase of Repair Technical Documents, purchase of mandatory/defectation

³⁴ Two out of 12 ships have been decommissioned in April 2016.

stores/spares and creation of Test Bed etc. Further, INS Eksila had overhauled only one M-15 CGT (August 2008-April 2009) which had failed prematurely in October 2012. Meanwhile, two RE class ships have already been decommissioned in April 2016 which needs to be looked against the backdrop of Ministry's ATN in 2010 stating that these ships would remain in commission for another 15-20 years.

Audit examined the creation/utilisation of various facilities as discussed in succeeding paragraphs:

(a) Non-installation of test stands for M-15 CGTs

It was mentioned in the earlier Audit Report that Special Tools, Jigs and Fixtures required for the overhaul of M-15 CGT procured between June 1997 to December 1999 at a cost of ₹7.53 crore were lying unutilised due to non-establishment of repair facilities. Further, the test stands³⁵ costing USD 1,869,700 (₹9.27 crore) were received in 2010 and were yet to be installed/set to work. In addition, tools, appliances costing USD 2,230,300 (₹11.06 crore) were procured between the year 2010 and 2012.

INS Eksila attributed (October 2016) the delays to non-inclusion of installation of test stands and translation of installation documents, in the contract (May 2009). They further added that the problems encountered during installation had been taken up with the OEM (M/s Zorya) and setting up/ installation of test stands would be undertaken jointly with the specialists (OEM).

Thus, non-inclusion of installation clause in the contract for procurement of test stands resulted in its non-installation since procurement in April 2010.

(b) Non-procurement of tools, appliances, jigs and fixtures for M-15 BGTs

INS Eksila forwarded the requirement (December 2008) of tools, appliances, jigs and tools for BGTs to IHQ MoD (Navy). IHQ MoD (Navy) intimated INS Eksila only in April 2015 that the case for procurement was kept in abeyance due to lapse of the funds which were allocated, directing them to forward a revised statement of case (SoC) to enable the procurement against the Annual

³⁵ Test Stand– the overhaul of GTs is carried on test stands which are installed in the repair/overhaul bay.

Acquisition Plan 2015-17 . INS Eksila forwarded the SoC in May 2015, which was under consideration (October 2016) at IHQ MoD (Navy). Reasons for the delay of seven years in processing the requirement were enquired and the reply was awaited (March 2017).

(c) Non-Provisioning of ‘Mandatory’ and ‘Defectation’ GT spares

Mandatory spares are necessarily replaced during the overhaul process and are shortlisted based on the OEM’s experience in conducting the overhaul. Mandatory spares are of two types. Type-I are non-reusable spares used during ‘Revisia’ and Type-II are the spares used during overhaul process. Defectation spares cater for items which are replaced based on checks recommended by the OEM during overhaul. Audit examination of provisioning of these spares revealed as discussed below:

(i) Cruise GT:

Two sets of mandatory spares were procured in the year 2001 at a cost of ₹1.95 crore. Of these, spares costing ₹0.94 crore were consumed during the maiden overhaul of M-15 Cruise GT (2008-2009) leaving the balance quantity of one incomplete set of spares. The procurement of balance spares to complete the incomplete set was progressed (February 2011) by INS, Eksila with IHQ MoD (Navy)/DME, which concluded the contract in March 2016 and the spares were received in December 2016. One set of defectation spares costing ₹15.03 crore was received in October 2010 against the contract (December 2009) and was held in stock (September 2016) with prospect of its utilisation being remote in view of non-availability of the technical expertise at INS Eksila as discussed in paragraph 3.2.3.1 (e).

(ii) Boost GT

The demand for six sets of mandatory spares and one set of defectation spares, catering for overhaul of six Boost GTs, was raised by INS Eksila in December 2008. However, the spares were contracted by IHQ MoD (Navy)/DME only in

March 2016 at a cost of USD 11,018,427.60 (₹73.46 Crore) and received in December 2016³⁶.

Audit enquired (September 2016) about the delay of eight years in conclusion of contract and the procurement policy of GT spares. IHQ MoD (Navy) stated (December 2016) that the policy for demanding and procurement of spares for INS Eksila was under drafting/ review. The reply was, however, silent on delay.

(d) Inadequate Repair Technical Documents

Repair Technical Documents (RTDs), are essential in undertaking the overhaul of GTs because they lay down the process of overhaul. It was mentioned in the previous Audit Report that RTDs were procured in 1997 for GTs at a cost of ₹10.70 crore.

Audit noticed (September 2016) from the Annual Technical Inspection Report that the RTDs procured in 1997 were inadequate for undertaking the overhaul of new version of CGTs (*i.e.*, DC76.1³⁷), which were inducted into Indian Navy post 2008. In response to audit query INS Eksila stated (September 2016) that these RTDs would be contracted separately for overhaul of DC76.1 CGTs. In view of this, the capability of INS Eksila with regard to the overhaul of DC76.1 CGTs was constrained till receipt of these RTDs.

The fact remains that RTDs for DC76.1 CGTs were yet (September 2016) to be contracted despite its (*i.e.*, CGTs) induction into Indian Navy post 2008.

(e) Training of Manpower

Planning to set up the overhaul facilities for M-15 GTs commenced in 1986, while training of personnel by the OEM was considered essential only after 28 years (May 2014) owing to the requirement of higher skills for overhaul of these GTs.

Audit noticed (September 2016) that INS Eksila had written (May 2014) to IHQ MoD (Navy) that no sailor was borne on its (*i.e.*, INS Eksila) strength with expertise in overhaul of M-15 GTs, which required higher skills and

³⁶ INS Eksila's letter No. 438/19 dated 14 March 2017

³⁷ 1241 RE class ships were originally fitted with Cruise GTs (DC76), which have been replaced by the OEM with new version CGT (DC 76.1) post 2008.

appropriate training by the OEM. In response to an audit query, INS Eksila stated (September 2016) that two teams of six personnel each were likely to be deputed to the OEM for training during future overhauls of the GTs undertaken by OEM. Thus, absence of trained manpower impinged on the capacity of INS Eksila to undertake overhaul of M-15 GTs even while the planning for setting up of facilities had started as early as 1986.

(f) Non-Setting up of test bed facility for M-15 GTs

Audit Report (2008) had pointed out that the Draft Project Report (DPR) for setting up of testing facilities was under consideration by Director General Naval Projects, Visakhapatnam [DGNP(V)] even 17 years after approval (October 1989) of the of project. Ministry's ATN (August 2010) was silent on the issue. Audit noticed (September 2016) that based on the DPR(November 2007), sanction was accorded (July 2008) for consultancy for project monitoring and setting up of test bed by the Ministry at a cost of ₹29.62 crore, which was revised³⁸ (February 2010) to ₹37.82 crore. DGNP concluded a consultancy contract (2009) with M/s Rail India Technical and Economic Services (RITES) at a cost of ₹2.32 crore. The consultancy contract, *inter alia*, stipulated that the test data was to be generated by using proven GT. Further, the DGNP concluded (March 2010) a contract for creation of test bed facility with M/s Ultra Dimensions Ltd., Visakhapatnam at a cost of ₹35.29 crore. The work was completed in February 2014 with a delay of 17 months.

Audit noticed (September 2016) that in March 2014, the DGNP (V) {*i.e.*, the contract concluding authority} had issued a completion certificate to the firm (*i.e.*, M/s Ultra Dimensions Ltd.) based on generation of test bed parameters on two GTs which had been exploited by the Indian Navy up to 99.5 *per cent* and 110 *per cent* of their useful service life and no proven/serviceable/new GT was earmarked by the Navy/INS Eksila for calibration/authentication of test bed parameters. Subsequently, INS Eksila had written (May 2014) to the

³⁸ Revision in sanction was due to increase of ₹2.14 crore in cost of civil works, ₹5.33 crore in cost of equipment and ₹0.73 crore in cost of external services.

IHQ MoD (Navy) on the issues³⁹ which needed immediate attention to progress of M-15 GTs overhaul, emphasising the necessity to position one set of new GTs to calibrate /authenticate the generated test bed parameters and procedures. Audit also noticed that the test bed facility was offered (August 2014) by INS Eksila to M/s Zorya (*i.e.*, OEM of the GTs) for joint review to ascertain its readiness for M-15 GT tests.

INS Eksila stated (October 2016) that instead of using a new GT, test bed parameters were generated by using two GTs which were removed from ships due to expiry of their service life and the GTs were proven.

The reply is not tenable as the usage of proven GTs for calibration of test bed parameters was envisaged in the consultancy contract and GTs at usage up to 99.5 *per cent* and 110 *per cent* of their useful service life, do not befit a 'proven GT', as is evident from INS Eksila's request (May 2014) to IHQ MoD (Navy) for new GTs. The Audit contention is buttressed by the fact that INS Eksila had emphasised (May 2014) to IHQ MoD (Navy) the necessity to position one set of new GT to calibrate /authenticate the generated test bed parameters and in the review (August 2014) of the test bed facility by M/s Zorya to ascertain its readiness for M-15 GT tests.

Thus, the authentication of the parameters and procedures generated by the M-15 test bed facility created (February 2014) at a cost of ₹37.61 crore (₹2.32 crore + ₹35.29 crore) remained to be proven (October 2016)⁴⁰ as the test bed parameters were not generated by using new GT as requested by INS Eksila to IHQ MoD (Navy).

(g) Non-utilisation of CNC⁴¹ grinding machines for M-15 GTs

Based on an urgent need (January 2008) for augmentation of grinding machinery related to M-15 cruise GTs and sanction accorded (March 2008) by

³⁹ In May 2014, CO INS Eksila took up pending requirements for M-15 GT overhaul such as expertise in training, manpower enhancement, special tools and jigs for BGT, fuel equipment overhaul facility, mandatory and anticipatory spares, commissioning of equipment stands, etc. with IHQ MoD (Navy).

⁴⁰ INS Eksila's letter No. 438/19 dated 21 October 2016

⁴¹ Computer Numerical Control (CNC) is the automation of machine tools by means of computers executing pre-programmed sequences of machine control commands. This is in contrast to machines that are manually controlled by hand wheels or levers, or mechanically automated by cams alone.

the Ministry, Director General of Naval Projects [DGNP (V)] procured four grinding machines at a cost of ₹27.47 crore, which were received at INS Eksila between August and October 2010.

Audit scrutiny (October 2016) revealed that the machines had not been utilised for overhauling of M-15 GTs.

INS Eksila stated (October 2016) that the machines were being utilised for undertaking machining of M-3E GTs and its generator components.

It is evident from the reply that the grinding machines procured on grounds of urgent necessity (January 2008) at a cost of ₹27.47 crore, were not being utilised for the intended purpose of grinding the M-15 GT components, due to delays in creation of other overhaul facilities.

(h) Offloading of overhauls to the OEM due to delay in completion of overhaul facilities

Overhaul facilities for M-15 GTs planned (1986) even before induction/commissioning of the envisaged ships remained incomplete (November 2016) due to apparent lack of synchronisation thereby necessitating continued offloading of overhaul of M-15 GTs to the OEM (*i.e.* M/s Zorya) as discussed below.

Mention was made in the Audit Report (2008) about the fact that non-establishment of repair facilities compelled Indian Navy to send nine GTs, between May 2001 and December 2005, to OEM for overhaul and repair at a cost of ₹107.94 crore. Ministry in their ATN had stated (August 2010) that it would be immensely beneficial even if the facility is set up within the envisaged timeframe of 2010.

In view of non-availability of the facility for overhaul of M-15 GTs, Audit enquired (September 2016) about the GTs sent for overhaul to the OEM (*i.e.* M/s Zorya) and cost incurred thereon.

IHQ MoD (Navy) intimated (December 2016) Audit that between 2006 and 2015, 72 GTs (*i.e.* M-15) were offloaded to OEM for repair/overhaul at a cost of ₹194.41 crore.

The fact remains that the envisaged timeframe of 2010 for completion of the

M-15 overhaul facility as indicated by the Ministry in their ATN, was yet (October 2016) to be met as discussed in paragraph 3.2.3.1 (f) thereby further diluting the benefits from creation of the facility. Meanwhile, two out of twelve 1241 RE class ships had been decommissioned by April 2016.

3.2.3.2 Non-setting up of the overhaul facilities for M-36 GTs of Delhi Class Ships

M-36 GTs are installed on three ships each of Delhi and Kolkata class @ four GTs per ship. The Delhi class ships were inducted into Indian Navy from November 1997 and the Kolkata class ships from August 2014. The M-36 GTs have a service life of 40,000 hours /20 years and the overhauling cycle of 20,000 hours/10 years.

Headquarters, Eastern Naval Command constituted (March 2008) a Board of Officers (i.e. Board) for provision of overhaul facilities for M-36 GTs at INS Eksila. Based on the recommendations (February 2010) of the Board and with the objective of reduced dependence on OEM (i.e., M/s Zorya) for the overhaul, the Ministry sanctioned (June 2012) the setting up of overhaul facility for M-36 GTs at INS Eksila' at an estimated cost of ₹38.27 crore. The work was to be completed by July 2014. The sanction catered for civil works (₹21.45 crore) and equipment⁴² (₹16.82 crore). The civil works were completed (October 2015) at ₹12.83 crore and handed over (December 2015) to the Indian Navy. All equipment were procured by March 2016 at a cost of ₹5.59 crore except assembly/dismantling stands (sanctioned cost of ₹5.79 crore) and storage containers (₹0.77 crore), which were in process of procurement as of September 2016⁴³.

Audit noticed (August 2016) that the design for assembly and dismantling stands considered at the Board (February 2010) stage was provided by a local vendor and INS Eksila had apprised (May 2014) IHQ MoD (Navy) that it was difficult to generate the manufacturing drawings based on the design of the local vendor and involvement of the OEM for supply of the original drawings/equipment was inescapable.

⁴² Equipment- comprised of overhaul equipment including 17 numbers of assembly/dismantling stands (₹15.76 crore) along with storage facility and containers (₹1.06 crore).

⁴³ INS Eksila's letter No.438/19 dated 7 October 2016.

On an Audit query (August 2016) about suitability of the design at the Board (February 2010) stage, whereas the same being found unsuitable at the procurement stage, INS Eksila stated (October 2016) that the task of indigenous designing was considered due to non-availability of OEM's assistance at the Board stage and OEM's advice was obtained (August 2014) as development of stands locally was not found feasible. It was further stated that the overhaul of M-36 GTs could not be undertaken as the dismantling/assembly stands and training of personnel through OEM were required for carrying out the overhaul. INS Eksila also stated that a case for augmenting the existing M-15 test bed facility for undertaking testing of M-36 GTs, post their overhaul, at an estimated cost of ₹95.52 crore was initiated in July 2016, while the issue of imparting training to the personnel was under process at IHQ MoD (Navy).

Thus, Indian Navy's inability to synchronise the civil works completed in October 2015 and equipment, which were under procurement (October 2016), delayed the creation of the facility conceived in March 2008. Meanwhile, two M-36 GTs had been offloaded⁴⁴ (March 2015) for overhaul through OEM at a cost of ₹15.42 crore.

3.2.4 Low indigenisation of overhaul spares

As per the Indian Navy's Material Management Manual (MMM) indigenisation is important for self-reliance as in many cases equipment become obsolete in the country of origin but requirement for the same in the Navy persists. The Manual provides for identification of equipment that require to be indigenised and according priority to indigenisation.

Audit noticed (October 2016) that the annual plan for indigenisation of mandatory spares was neither prepared nor promulgated and cases for indigenisation were proposed by INS Eksila as emergent requirements. Further, there was no provision of funds for indigenisation of GTs during 2012-13 and 2013-14 and no expenditure thereof was incurred after 2011-12. Audit examination of indigenisation of mandatory spares revealed as given in Table 3.6 below:

⁴⁴ Directorate of Marine Engineering IHQ MoD (Navy) letter No. EG/3512/GT dated 15 December 2016

Table-3.6: Details of indigenisation of mandatory spares

SI No.	Type of GT	Total No. of mandatory spares	No. of mandatory spares indigenised	Percentage of indigenisation
1	M3E GT	562	104	18.50
2	M-15 CGT	657	130	19.78
3	M-15 BGT	626	61	9.74
4	M 36 GT	No. of spares not yet known as discussions were in progress with OEM and lists yet to be finalised		

INS Eksila stated (October 2016) that no spares were identified for indigenisation with respect to the GTs indicated in Table 3.6 and indigenisation was undertaken on emergent basis. Further, lack of details of drawings, manufacturing procedure in the OEM documents were the main reasons for continued dependency on imported spares. It was also stated that procurement and financial procedures in vogue and violation of Intellectual Property Rights in trying to make components through reverse engineering, were also responsible for slow progress in indigenisation.

The fact remains that spares were not identified for indigenisation with respect to any of the GTs indicated in Table 3.6, which was in deviation from the provisions in the MMM. Further, no provision of funds for indigenisation of GTs during 2012-13 and 2013-14 and 'Nil' expenditure thereof after 2011-12, is indicative of a lack of seriousness in efforts for indigenisation of the spares for GTs.

3.2.5 Non-maintenance of Cost Accounts in INS Eksila

Naval Dockyard Cost Accounting Instructions prescribe for cost accounting to be followed in Naval Dockyards (NDs) in order to ensure that the Government money is spent efficiently/ economically, the progress of expenditure is maintained within the limits of estimates, the manpower is deployed against authorised works, the materials drawn for each work are properly accounted for/expended, the estimates are prepared properly and correctly assessed.

Since INS Eksila is a repair organisation akin to NDs, Audit enquired (October 2016) into the reasons for not maintaining the cost accounts/data.

INS Eksila cited (October 2016) differences in the nature of work force between NDs (civilian personnel) and INS Eksila (service personnel), difficulty in establishing man hours at work due to deployment of service

personnel for various other duties besides overhaul work and frequent turning around of sailors as reasons for not maintaining the cost accounts.

The reasons given by INS Eksila do not obviate the necessity for maintaining the cost data as in the absence of the data the economy and efficiency in utilising of public money is not ensured and the cost effectiveness of the overhaul of GTs under taken in INS Eksila cannot be established.

3.2.6 Conclusion

INS Eksila is overhauling the M3E GTs since 1991, but it continues to encounter abnormal delays in completion of the overhaul of the GTs. Neither Eksila accrued any benefits in terms of reduced overhaul period and reduced instances of revisa nor was it in a position to maintain the war reserve of M3E GTs as prescribed. The facility required for overhaul of M-15 GTs was yet (October 2016) to be completed though the facility had been planned to be set up since 1986. Meanwhile, two out of twelve 1241 RE class ships, which employ the M-15 GTs, had been decommissioned by April 2016. Overhaul facility for M-36 GTs planned in 2008, has also been delayed for want of synchronisation between civil works and procurement of equipment. Consequently, Navy continued to depend on OEM for overhaul of M-15 and M-36 GTs, incurring an expenditure of ₹317.77 crore up to December 2016. INS Eksila is grappling with inadequate availability of technical expertise, due to their non-retention for longer duration. Indigenisation of equipment was undertaken on emergent basis instead of being planned and prioritised as envisaged in Material Management Manual. Due to non-maintenance of cost accounts, Audit could not derive assurance about the cost accuracy of the expenditure on overhauls of GTs.

3.2.7 Recommendations

- ✓ *While establishing the overhaul facilities in INS Eksila, Navy may adopt an integrated approach for setting up of various facilities, with planned schedules and defined time lines.*
- ✓ *Creation of infrastructure facilities for the overhaul of GTs may be synchronised with the overhaul cycle of GTs prescribed by the IHQ MOD (Navy).*
- ✓ *In order to derive optimum benefit from the technical expertise gained by*

ERAs the Navy should fix a specific tenure of posting and should also deploy adequate manpower.

- ✓ *Indigenisation of the GT spares need to be taken up in a planned and time bound manner.*
- ✓ *Cost accounting system should be introduced to ensure economics of expenditure incurred on overhauls.*

The matter was referred to the Ministry (December 2016); their reply was awaited (March 2017).

3.3 Operation and Maintenance of UH-3H helicopters

The UH-3H fleet of helicopters, procured as an integral part of Landing Platform Deck, was unable to maintain the desired levels of serviceability in six out of seven years of its operations since commissioning despite reduction of the Unit Establishment of the squadron from four to three helicopters. In absence of clear targets, the deck based flying remained significantly low. Non-existence of dedicated depot level maintenance facilities and non-availability of spares adversely impacted the maintenance of the fleet. Further, Navy continues to be dependent on the foreign repair agency for maintenance, servicing and logistics issues due to lack of training of Naval personnel.

3.3.1 Background

Six UH-3H helicopters along with training and support facilities at an approximate cost of ₹182.14 crore were acquired from the United States Government (USG) to be used on the Landing Platform Dock (LPD), INS Jalashwa {also acquired (June 2007) from the USG}. These helicopters with the envisaged objective of providing an all-weather day and night assault transport of combat troops, supplies and equipment, were received⁴⁵ in September 2007. The designated life of the LPD was 12 to 15 years, whereas, the UH-3H helicopters had a service life of 2,000 flying hours⁴⁶ or ten years.

⁴⁵ Indian Naval Air Squadron (INAS)- 350 was commissioned in Indian Navy in March 2009

⁴⁶ Out of the total designated life of 17000 hours, helicopters had already exhausted 15000 hours and were available for 2000 hours more.

Audit, in its Report (2010-11), had pointed out that in view of vintage⁴⁷ of the helicopters and obsolescence of spares, maintenance of the six refurbished helicopters by Indian Navy would be a challenging task and one helicopter had already been cannibalised to ensure serviceability of the other five helicopters. The Ministry, in their draft⁴⁸ Action Taken Note (ATN), had stated (September 2013) that the procurement of UH-3H helicopters was a considered decision to provide an interim solution for onboard aircraft of INS Jalashwa pending proving of Advanced Light Helicopter (ALH) for deck operations and inductions of Multi Role Helicopters (MRH), which was expected to take another 10 years. The Ministry also stated that the decision of robbing of one aircraft was taken in order to quickly operationalise the other five helicopters and all but one helicopter have been operationalised by US contractors.

With this background, Audit examined the exploitation of these helicopters with reference to the objective, management of the spares, setting up of infrastructural facilities since their induction in Indian Navy. In view of their significance for operations onboard INS Jalashwa, their availability and maintenance were examined at the Squadron and at Material Organisation, Visakhapatnam {MO (V)}. Audit noticed (February 2016) that Indian Navy had obtained approval (February 2014) from the competent authority for life extension of these helicopters till 2022 so as to match with service life of the LPD.

Audit Findings

3.3.2 Low serviceability of helicopters even with the assigned UE

As per the Indian Navy Air Publication-2 (INAP-2) for assessing the efficiency of squadrons/flights, serviceability of below 50 *per cent* is categorised as “Unsatisfactory”, whereas above 90 *per cent* is termed as ‘Excellent’. Serviceability of helicopters thus indicates its availability.

Audit observed that despite the fact that Unit Establishment (UE) of the squadron had been reduced by Indian Navy from four to three helicopters in

⁴⁷ Six UH-3H helicopters were manufactured between January 1961 and July 1965

⁴⁸ The Action Taken Note of Ministry is still to be vetted as on March 2017.

view of their vintage and their maintenance intensive nature, yet the average serviceability levels of the fleet were unsatisfactory as given in Table 3.7 below:

Table-3.7: Annual average serviceability status of UH-3H helicopters

	Year						
	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Serviceability (in %)	46.84	46.09	42.79	54.69	44.06	46.17	27.10

Source: Half yearly flying returns of the Squadron

The Ministry accepted (July 2016) the Audit observation and stated obsolescence of system, lack of expertise to maintain vintage helicopters, frequent failure of components and lack of spares as the reasons for low serviceability.

The fact remains that the average serviceability levels of the helicopter fleet remained unsatisfactory in six out of seven years of its operation, since commissioning of the Squadron in March 2009, despite reducing the number of helicopters for Squadron operations to three against the sanctioned UE of four helicopters.

3.3.3 Non-promulgation of quantum for deck based flying

The proposal for acquisition of six helicopters had envisaged (August 2006) that with the ability to perform various roles, these helicopters would be a potent force multiplier and would operationally enhance the utilisation of the LPD. The Annual Flying Tasks (AFTs) are issued by Integrated Headquarters Ministry of Defence (Navy) {IHQ MoD (Navy)} and prescribe the number of hours of day and night flying required to be undertaken by the Squadron each year with reference to their operational, training and miscellaneous tasks.

Audit examination of the AFTs issued by Indian Navy revealed that the AFTs issued by IHQ MoD (Navy) between 2009-10 and 2015-16 did not specifically indicate the targets for Deck Based Flying to be carried out by the Squadron. Further, examination of the records of flying carried out by the Squadron revealed that the Deck Based Flying carried out by these helicopters from

2009-10 to 2015-16⁴⁹ was significantly low. The Deck Based Flying carried out ranged from 2.7 to 34 *per cent* of the total flying carried out by the helicopters during the day and zero to 52.08 *per cent* of the total flying of helicopters carried out during night.

In its reply, the Ministry stated (July 2016) that there was no fixed percentage of Deck Based Flying as it depends on the operational requirement and exercises being undertaken.

The reply is not tenable as the UH-3H helicopters were procured for enhancement of operational performance of LPD with helicopters to be used as the potent force multiplier. However, in view of the low percentage of Deck Based Flying and no prescribed quantum for Deck Based Flying, Audit could not derive assurance with regard to the usage of these helicopters *vis à vis* the LPD as envisaged at the time of their procurement.

3.3.4 Maintenance of helicopters

A mention was made in Report of C&AG's Report No 7 of 2010-11 that considering the vintage (1961-1965) of helicopters and the obsolescence of spares, maintenance of the six helicopters would be a challenging task. The Ministry, in its draft ATN (September 2013), stated that the induction of UH-3H helicopters was made to meet INS Jalashwa's requirements pending availability of utility role MRH for about 10 years. In view of criticality of the helicopter fleet to the needs of Indian Navy, audit examined the availability of Standard Depot Level Maintenance (SDLM) facility and Engineering Technical Services required for ensuring optimal maintenance of these helicopters. Details are as discussed below:

3.3.4.1 Non-existence of Standard Depot Level Maintenance facility

Standard Depot Level Maintenance (SDLM) for these helicopters is required to be undertaken after every 33 months of operations. SDLM for these six helicopters was carried out (April 2001–October 2004) prior to their induction (September 2007) into the Indian Navy. The facility for SDLM of helicopters was not contracted by the Ministry due to envisaged limited utilisation.

⁴⁹ Deck based flying for the year 2011-12 was not considered due to LPD undergoing refit in that year

Audit observed (December 2015) that four cycles of SDLM for these helicopters, as per the maintenance schedule; fell due between October 2004 and December 2015 (*i.e.* 134 months). However, due to non-availability of the facilities, SDLM was not being carried out *vis a vis* the prescribed duration of 33 months. Instead, the helicopters had undergone only Aircraft Service Period Adjustment (ASPA) inspection⁵⁰ (a visual inspection) annually since their receipt, even though ASPA inspection must be performed in conjunction with SDLM, *i.e.* six months prior to or 90 days after the expiry of an aircraft's Period End Date (PED)⁵¹. Audit also observed that HQ ENC (V) had processed (August 2014) a case to IHQ MoD (Navy) for creation of SDLM facility.

In response, the Ministry stated (July 2016) that SDLM is a condition based maintenance and is warranted based on ASPA result. The Ministry added that since ASPA never failed, SDLM was not warranted.

The reply of the Ministry is not tenable because the ASPA evaluation is not a substitute for SDLM. Further, scope of ASPA is restricted to visual inspection, whereas, SDLM takes care of air frame, systems and components inspection, defect correction, preventative maintenance, modification and technical directive compliance. Thus, in view of specific time period of 33 months fixed for undertaking SDLM and also due to difference in its scope *vis a vis* ASPA, these two activities cannot be treated as complementary to each other. Significance of SDLM is further substantiated by the proposal (August 2014) of HQ ENC (V) for creation of the SDLM facility, which was under consideration (January 2017)⁵² at IHQ MoD (Navy).

3.3.4.2 Dependency on hired Contractor Engineering Technical Services (CETS)

As per the Letter of Offer and Acceptance (LOA)⁵³, Contractor Engineering

⁵⁰ ASPA inspection - The object of ASPA is to assess the overall material condition of the helicopter for the purpose of determining if each helicopter can remain in service beyond PED. Airframes which meet all the qualification requirements of ASPA will receive a 12-month deferral of standard SDLM induction.

⁵¹ PED is completion of 33 months after SDLM

⁵² Headquarters ENC (V)'s letter No. AE/0168/AUDIT dated 7 February 2017

⁵³ LOA- Letter of Offer and Acceptance forwarded by US Government in August 2006 and approved by the Ministry in November 2006.

Technical Services⁵⁴ (CETS) were to be provided by the supplier to the Indian Navy for a period of two years at a total cost of MUS\$ 1.48 (₹6.9 crore). Main functions of the CETS were to conduct refresher training for the technicians, assisting the maintenance personnel as technical advisors and on-the-job training. CETS was to act as a focal point for communication with the Naval Air⁵⁵ for Aircraft on Ground (AOG) spare support and maintenance with the organisation. As per the provisions of LOA, the CETS could be extended for additional two years, beyond which, Indian Navy personnel were to carry out the function.

Audit observed (December 2015) that the services of CETS were hired beyond the contractual period, as tabulated in Table 3.8 below:

Table-3.8: Contracts for Engineering Technical Services

Period of Contract	Contract No & Date	Total Contract Cost
09/2007 to 9/2009	As per LOA for acquisition of helicopters	₹6.89 crore
10/2009 to 01/2011	Not available	Not available
01/2012 to 02/2014	AR/6500/CETS Dt 28-11-2011	₹4.83 crore
w.e.f. 11/2015	AR/6500/CETS Dt 23-11-2015	₹12.77 crore

As may be seen from the Table 3.8, no CETS contract was in force between February and December 2011 and again from March 2014 to October 2015. Audit noticed (December 2015) that the Indian Navy did not acquire expertise of technical/maintenance services as envisaged in the LOA even after eight years since induction (September 2007) of helicopters.

The Ministry stated (July 2016) that support from Programme Management Authority (PMA) of US (Navy) was available up to 2011 and support from US vendors was established for the repair and overhaul. Ministry further added that CETS contract was inevitable due to different maintenance philosophies between the US Navy and Indian Navy and due to lack of product support from US Navy.

The reply is not tenable as assurance given at the time of acquisition that various maintenance, servicing and logistics issues beyond the contractual

⁵⁴ CETS-Services of an airframe/Engine technician, Avionics/Electrical technician for two years and a logistics support representative for one year were provided under CETS.

⁵⁵ Naval Air is the aviation wing of US Navy.

period would be carried out by the trained Indian Naval personnel and the timelines envisaged in the LOA for catering to the requirement within a maximum period of four years, were not complied with.

3.3.4.3 Annual Review of Demands for spares

Provisioning of spares for naval aviation assets is primarily done by raising Annual Review of Demands (ARDs). The average gestation period for supply of spares under this method is about 36 to 42 months from raising of demands under ARDs. In order to ensure availability of required spares for smooth operations of UH-3H helicopters, preparation of Annual Review of Demands (ARDs) was commenced in 2010-11 at Material Organisation, Visakhapatnam {MO (V)}.

Audit noticed (December 2015) that the process was terminated by IHQ MoD (Navy) with effect from 2013 in view of anticipated de-induction of helicopters in 2017 and it was decided that the procurement of spares will be progressed based on actual requirement on a case to case basis. Further, the Board of Officers convened (December 2014) by HQ ENC (V) observed that the second line helicopters were cannibalised/robbed extensively in order to ensure serviceability of front line helicopters. The Board had, therefore, recommended procurement of spares under ARD cycle for their timely procurement so as to ensure smooth UH-3H operations from 2015-16 onwards and also; in case the operational life of UH-3H helicopters was extended till 2022.

Audit observed (January 2016) that three helicopters (SU 539, SU 538 and SU 540) had been grounded since January 2014, May 2014 and March 2015 respectively due to non-availability of spares and as cited (October 2015) by Regional Air Quality Assurance Service (RAQAS) to HQ ENC (V), 728 demands for spares on all six helicopters were outstanding which contributed to poor availability and reliability of the helicopters. Thus, discontinuation of ARDs had resulted in cannibalisation/robbing of second line helicopters leading to three helicopters being Aircraft on Ground (AoG).

The Ministry stated (July 2016) that procurement of spares under ARDs was discontinued in order to prevent accumulation of non-moving inventory and

the spares were continued to be procured to meet the actual requirements on the basis of recommendations of Headquarters, Naval Aviation (HQ NA), Goa.

The reply of Ministry is not acceptable as the shortage of required spares had not been addressed in time as was evident from the serviceability status of second line helicopters, all three of which were AoG.

3.3.5 Non-utilisation of costly Air Stores

Audit noticed (January 2016) that three Receiver Transmitter, Radar valuing US\$ 643,473 (₹3.00 crore) were received in year 2009 from the US (Navy) and were lying with MO (V) since their receipt.

The Ministry stated (July 2016) that the procurement was based on manufacturer's recommendation in view of the non-availability of expertise with the Indian Navy. Criticality of the equipment was also one of the factors for the procurement to maintain the float till 2022.

The Ministry's reply was not backed by any evidence as all the stores received in the year 2009 were held in stock (November 2016). Further, the decision to extend life of the helicopters up to 2022 was taken only in 2014.

3.3.6 Conclusion

The fleet of six UH-3H helicopters, procured as an integral part of Landing Platform Deck, with primary objective of providing an all-weather day and night assault transport of combat troops, was unable to maintain the desired levels of serviceability which remained unsatisfactory *i.e.*, below 50 *per cent* in six out of seven years of its operations since commissioning (March 2009) despite reduction of the Unit Establishment of the squadron from four to three helicopters. Further, in absence of clear targets, the deck based flying remained significantly low ranging from 2.7 to 34 *per cent* of total day flying and zero to 52.08 *per cent* of the total night flying undertaken by the squadron. The maintenance of the helicopter fleet was impacted adversely due to non-existence of dedicated depot level maintenance facilities and non-availability of spares due to lack of continuity in ARDs for procurement of spares. The timelines of four years for training of Navy personnel (*i.e.*, maintenance,

servicing and logistics issues) as envisaged in the Letter of Offer and Acceptance was not adhered to resulting in continued dependence of Navy on the foreign repair agency.

3.4 Risky exploitation of Sindhughosh class submarines due to delay in installation of periscopes

Delay of more than 34 months in according approval by the Ministry for amendment to contract for change in ownership of the seller and delivery period extension, required for supply of the periscopes, led to delay in delivery and installation of periscopes for Sindhughosh class submarines. This resulted in risky exploitation of submarines for 22 to 62 months till next refit.

Periscopes are visual sensors fitted in submarines, used for safe navigation, collision avoidance, surveillance of targets, torpedo attack and periscope photography. Sindhughosh class submarines are fitted with two periscopes each, having only monocular vision with no night vision/low light vision capability and rudimentary ergonomics. Limitations in these periscopes have an adverse impact on the safety and efficiency in the operations of submarines. In pursuance of the Indian Navy's minimum critical requirement (April 2008) for replacement of one periscopes each on all Sindhughosh class submarines with new periscopes having night vision/low light vision and integrated radar and communication support measures, a contract was concluded (October 2011) with M/s Kollmorgen, USA at MUSD 39.74 (₹184.33 crore)⁵⁶. The scheduled delivery of first periscope system was in October 2013, second in April 2014 and remaining eight by December 2016 at an interval of four months. The contracted delivery schedule of the periscopes was in sync with the scheduled refit programme of the submarines as the periscopes could be installed on the submarines only during their refits.

In February 2012, M/s Kollmorgen was taken over by M/s L-3 Communication, which sought (November 2012) consent of Indian Navy for transfer and assignment of the contract (October 2011) in its entirety to the

⁵⁶ @1 USD= ₹46.38

firm under Article-27 of the contract. The matter was referred (January 2013) to the Ministry by Integrated Headquarters, Ministry of Defence (Navy) {IHQ MoD (Navy)} seeking their approval for amendment to the contract. The Ministry in turn forwarded the case to Legal Adviser (Defence)⁵⁷ {LA (Def)} and Judge Advocate General (Navy)⁵⁸ {JAG (Navy)}. While, LA (Def) opined (April 2013) that transfer of rights and obligations under the contract by M/s Kollmorgen Corporation to M/s L-3 KEO was in contravention to the provisions under Article-27 of the contract, the JAG (Navy) recommended (May 2013) that a supplementary agreement to the contract be signed between Indian Navy and L-3 KEO, for effecting necessary amendments in the contract and obtain an Indemnity Bond from M/s L-3 KEO to meet all the responsibilities and obligations under the contract. The requisite amendment to the Contract was made in May 2014, *i.e.*, after 16 months from the date of proposal (January 2013) for amendment to the contract and 12 months from the date of receipt of advice from the Judge Advocate General.

A case for delivery period (DP) extension was also initiated by IHQ MoD (Navy) in October 2014. Meanwhile, IHQ MoD (Navy) further apprised (November 2014) the Ministry that even though the firm was progressing with the manufacture as per the contractual milestones, the delay (*i.e.*, in approval) would lead to a situation, wherein, all the multiple systems would be delivered at one go instead of staggered manner as stipulated in the contract and forfeiting the advantage of availing the warranty period and obviate the anticipated usage of Periscopes in the scheduled refits of the submarines. The delivery period extension with levy of Liquidated Damages (LD) was approved by the Ministry only in November 2015 *i.e.*, after a delay of 13 months. The firm supplied seven periscopes between March 2016 and

⁵⁷ Legal Advisor (Defence), a part of Ministry of Law & Justice, is the legal advisor of Ministry of Defence.

⁵⁸ Judge Advocate General (Navy) is internal legal advisor of the Indian Navy.

November 2016⁵⁹ and has been paid MUS\$ 31.40 (₹145.63 crore)⁶⁰ for supply of these seven periscopes after deducting applicable LD.

Audit observed (July 2016) that due to delay of more than 34 months in processing of the case for required amendment to the contract/DP extension, eight of the ten⁶¹ submarines had already completed their refits between December 2013 and May 2016 and one submarine is presently undergoing refit to be completed by January 2017. This will result in continued operations of submarine with the existing periscopes with its limitations impacting their safety, for at least 22 to 62 months till their next scheduled refits. Details of delay is as given in Table 3.9 below:

Table-3.9: Delay in installation of periscopes on Sindhughosh class submarines

Sl No	Name of the Submarine	Delay (in months)		Sl No	Name of the Submarine	Delay (in months)
1.	INS Sindhuraj	62		5.	INS Sindhukirti	22
2.	INS Sindhukesari	55		6.	INS Sindhuratna	54
3.	INS Sindhughosh	23		7.	INS Sindhudhvaj	22
4.	INS Sindhuvir	42		8.	INS Sindhuvijay	23

The Ministry, while admitting the delays in processing, stated (November 2016) that all Sindhughosh class submarines are fully operational and are being operated in a safe manner within the capability of existing equipment onboard the platform by ensuring submarine safety through alert watch-keeping, correlation with other sensors etc.

The contention of the Ministry that there was no adverse impact on the operational capability of the submarines is not tenable as the procurement of periscopes was itself undertaken in view of the fact that the existing periscopes lacked night vision/low light vision capability and had only rudimentary

⁵⁹ IHQ MoD (Navy) letter No.- MQ/3700/PERIS dated 14 March 2017 addressed to O/o Principal Director of Audit (Navy).

⁶⁰ @1 USD= ₹46.38

⁶¹ One Sindhughosh class submarine had met with accident/sunk in sea on 14 August 2013 and decision on installation of periscope would be taken subsequent to salvage of the submarine.

ergonomics and monocular vision, which seriously limited the overall effectiveness of the periscopes and put excessive strain on the personnel operating the periscope. The procurement/installation of the new periscopes would have helped in overcoming these limitations onboard the submarine fleet.

Thus, undue delay of 34 months in issuing of necessary approvals by the Ministry led to delay in installation of periscopes onboard the submarines during their planned refits. Consequently, the Indian Navy was forced to exploit the Sindhughosh class of submarines with the existing periscopes with its limitations for at least 22 to 62 months till their next scheduled refits.

3.5 Non-installation of a mandatory system compromising the flight safety of aircraft

Non-availability of a critical flight safety equipment onboard the Indian Navy's and Coast Guard's aircraft, has impacted their safe operation for the past 12 years. The situation would persist for another four years due to asynchronous timelines for delivery of the equipment and its installation onboard the aircraft. Further, failure to take cognizance of de-induction of one of the aircraft fleet, resulted in excess procurement of ten equipment worth ₹5.58 crore.

Traffic Collision Avoidance System (TCAS) is a standalone system that provides collision avoid information to the pilot.

A case for procurement of 61 TCAS was initiated (July 2009) by Integrated Headquarters, Ministry of Defence (Navy) {IHQ MoD (Navy)} and Acceptance of Necessity (AoN) was accorded by the Defence Acquisition Council (DAC) to "Buy Global"⁶² with integration by M/s Hindustan Aeronautics Limited (HAL). Bids of two out of three vendors received in response to the Request for Proposal (RFP) (December 2010) viz., M/s ACSS,

⁶² Buy Global- Acquisition (under the Defence Procurement Procedure) covered under the 'Buy decision'. Buy would mean an outright purchase of equipment. Based on the source of procurement, this category would be classified as 'Buy (Indian)' and 'Buy (Global)'. 'Indian' would mean Indian vendors only and 'Global' would mean foreign as well as Indian vendors. 'Buy Indian' must have minimum 30 *per cent* indigenous content if the systems are being integrated by an Indian vendor

USA and M/s Honeywell International Inc., USA, were accepted (August 2011) as technically compliant. M/s Honeywell, USA emerged (January 2012) L-1. Contract with the firm was concluded (April 2013) for supply of 61 TCAS and accessories at a cost of MUSD 7.14 (₹38.22 crore⁶³). As per the contract, the supply of 61 TCAS was to be commenced from September 2013 and was to be completed within 44 months (*i.e.*, December 2016). The firm had supplied 46 sets of TCAS by August 2016⁶⁴.

Consequent on finalisation of the firm for supply of the equipment, a commercial RFP was issued (November 2012) to M/s HAL for integration of 51 TCAS (excluding 10 spare TCAS sets) onboard the Indian Navy and Indian Coast Guard aircraft. The equipment to be integrated were reduced during commercial negotiation (November 2013) as the inventory holding of Tu-142M aircraft was reduced to four against seven due to de-induction on completion of their total technical life. A contract was concluded (November 2015) with M/s HAL for integration of 48 TCAS on 24 aircrafts each of Indian Navy and Indian Coast Guard at a cost of ₹45.84 crore, to be completed within 50 months (January 2020).

Audit examination (June 2016) revealed the following:

- The case for installation of TCAS was initiated on the basis of the International Civil Aviation Organisation (ICAO) guidelines (September 1999), which made installation of TCAS mandatory onboard the aircraft of certain categories. Acceptance of Necessity (AoN) for procurement of TCAS was accorded (February 2004) by DAC and RFP was issued (November 2004) to four firms for supply and installation. However, the commercial bids of two technically qualified vendors were rejected by Contract Negotiation Committee (CNC) as the bids did not meet the requirements of the RFP and the CNC recommended retendering, which was approved (December 2008) by the Competent Financial Authority (CFA). The Ministry of Defence took 58 months (February 2004 to December 2008) for processing the case in the first instance, *vis à vis* 19-28 months stipulated in Defence Procurement Procedure (DPP),

⁶³ @ 1 USD=₹53.50

⁶⁴ IHQ MoD (Navy)'s letter No. AH/1408/COLLISON dated 11 August 2016

thereby, resulting in a delay of 30 months. Further, Ministry took another 52 months from decision of CFA for re-tendering (December 2008) till the contract conclusion (April 2013) *vis à vis* 12-15 months stipulated in DPP, resulting in a further delay of 37 months. The case for procurement of a critical mandatory equipment, therefore, got delayed by 67 months⁶⁵.

- The contract for integration of TCAS was concluded by the Ministry with M/s HAL only in November 2015, by when 40 TCAS were also scheduled to be delivered as per the contract (April 2013) for supply of TCAS. Thus, Ministry failed to synchronise the delivery of equipment with the contract for integration of TCAS onboard the aircraft. This in turn would delay the installation of TCAS by 37 months (December 2016 to January 2020).
- Out of 61 TCAS, Indian Navy procured 10 TCAS for five Tu-142M aircraft. Out of the five⁶⁶ Tu-142M aircraft, one aircraft was de-inducted in October 2013; another three aircraft were planned to be de-inducted by 2017 and remaining one aircraft in mid-2018. Further, the contract for integration was concluded (November 2015) for only four Tu-142M aircraft. Improper estimation of requirement coupled with delay in processing the case resulted in excess procurement of 10 TCAS worth MUSD 1.04 (₹5.58 crore).

In their reply, IHQ MoD (Navy)/Directorate of Aviation Projects Management accepted (August 2016) the delay in conclusion of contracts and non-synchronisation in the delivery of TCAS and their installation onboard the aircraft and stated that the spare TCAS sets procured for Tu-142M fleet would be utilised for IL-38SD aircraft, as these are interchangeable. They further stated (January 2017) that in view of the fact that the installation of equipment onboard Tu-142M aircraft would not have been completed by March 2017 *i.e.*, the planned date for phasing out of the aircraft fleet, the integration of TCAS on Tu-142M aircraft was put on hold to avoid unfruitful expenditure. IHQ

⁶⁵ 1st phase [30 months (58 - 28)] + 2nd Phase [37 months (52 - 15)] = 67 months

⁶⁶ Eight Tu-142M aircraft were inducted during 1987-88 and subsequently three aircraft were de-inducted between June 2006 and 2012.

MoD (Navy) also accepted (January 2017) that Indian Navy and Indian Coast Guard aircraft not fitted with TCAS were managed by Air Traffic Services, in a manner so that they did not hazard the other compliant aircraft and presence of such aircraft, not fitted with TCAS, in the airspace imposed restrictions and limitations towards efficient management of air traffic.

The contention of Indian Navy regarding utilisation of excess TCAS systems for IL-38SD fleet is not convincing as these aircraft are also due to be phased out by 2025 and the required quantities of TCAS for IL-38SD aircraft have also been procured from M/s Honeywell, USA.

Thus, apart from the delay of 67 months in processing the case for the procurement of TCAS, there was an additional delay of 37 months due to non-synchronisation between the delivery and integration of TCAS onboard the aircraft of Indian Navy and Indian Coast Guard. Resultantly, the aircraft fleet of Indian Navy and Indian Coast Guard have operated for the past 12 years without a flight safety aid mandated by the ICAO norms of 1999 and aircraft would be constrained to operate with the limitation till 2020. Further, failure to take cognizance of the de-induction plan of the Tu-142M aircraft, resulted in an avoidable procurement of ten TCAS, worth ₹5.58 crore.

The matter was referred to the Ministry (October 2016); their reply was awaited (March 2017).

3.6 Fleet tankers rendered vulnerable due to delay in fructification of offset obligation

Non-availability of the defence systems onboard the fleet tankers, since their delivery in 2011, rendered them vulnerable to external threats. Further, non-linking of payment with the supply/installation of vital defence systems catered for under offset clauses of the contracts for two fleet tankers, resulted in premature payment of ₹26.73 crore to the foreign vendor.

Kavach system is a part of armament onboard the fleet tanker, which helps in defending the tanker against incoming shells and missiles, thereby adding teeth to the defensive cover of the tanker.

Ministry of Defence concluded two contracts in April 2008 and March 2009⁶⁷ with M/s Fincantieri, Italy, with an offset clause, for construction of two fleet tankers for Indian Navy, at a cost of Euro 138.55 million each. In addition to the main contracts, two offset contracts⁶⁸ at 30 *per cent* of the main contracts amounting to Euro 41.563 million each were also signed with M/s Fincantieri, wherein the firm was to purchase from the Unique Vendor *i.e.*, Ordnance Factory Board (OFB), AK-630M (Gun) and Kavach Mod-II systems, to be fitted on the fleet tankers. M/s Fincantieri, in turn, concluded (November 2009) a contract with OFB for the supply of two Kavach systems at a cost of ₹26.73 crore.

The main contracts, *inter alia*, provided that in case OFB fails to fulfil their commitment for the supply of items, then M/s Fincantieri would deliver the tankers without these items and would be absolved of the warranty period and any outstanding liability thereof, on installation of the items to be supplied by OFB.

M/s Fincantieri delivered (January 2011 and September 2011) both fleet tankers to Indian Navy as scheduled without Kavach MOD-II system due to inability of OFB to supply the same. Accordingly, payment of ₹26.73 crore for supply and installation of Kavach system was made (January & June 2012) to M/s Fincantieri in absence of provision in the contracts to withhold the stage payment for non-supply of the Kavach system.

In response to an audit query (May 2015) regarding acceptance of fleet tankers without Kavach systems, Integrated Headquarters, Ministry of Defence (Navy) {IHQ MoD(N)} stated (September 2015) that the development of Kavach system was under progress at the time of conclusion of contracts and in the event of delay in delivery of the system by OFB, linking of Kavach system to any of the milestones would have had an adverse effect on the payment to

⁶⁷ The contract in March 2009 was concluded under option clause of the contract concluded in April 2008.

⁶⁸ In case of outright foreign purchase of ₹300 crore and above, foreign suppliers are required to procure products at least 30 *per cent* of the contract value from the Indian firms. The offset contracts were concluded in April 2008 and in March 2009.

M/s. Fincantieri and the ship production schedule, thus stalling the overall construction of the ship.

Audit further observed (October 2015) that lacunae in the contracts (April 2008 and March 2009) wherein payments were not linked with the supply and installation of Kavach systems, resulted in release of ₹26.73 crore to M/s Fincantieri, which made a payment of ₹12.03 crore⁶⁹ to OFB only in August 2015 and the balance of ₹14.70 crore was still held by the firm. The fleet tankers were also rendered vulnerable to security threats from enemy ships for over four years due to non-installation of Kavach systems.

IHQ MoD (Navy) stated (January 2017) that installation of Kavach system onboard one fleet tanker had commenced and was likely to be completed by March 2017, whereas it was likely to be installed on another fleet tanker within the scheduled refit of the ship between January and September 2017.

In sum, the fleet tankers remained vulnerable to security threat from enemy ships for over four years. Besides, lacunae in contractual provisions resulted in premature payment of ₹26.73 crore to M/s. Fincantieri, a part of which (₹14.70 crore) was still with the firm.

The matter was referred to the Ministry (September 2016); their reply was awaited (March 2017).

3.7 Deficient small arms practice firing by Naval Officers in Delhi Area

All Indian Navy personnel are required to have working knowledge of handling all types of small arms. It was noticed that the coverage of Naval Officers in practise firings was meagre in Delhi Area creating concerns about their ability to handle small arms.

All Indian Navy personnel are required to have working knowledge to handle all types of small arms. Integrated Headquarters Ministry of Defence (Navy) {IHQ MoD (Navy)} had instituted (May 2010) measures like continuation of training, additional training on simulators for small arms training and grading

⁶⁹ Being 90 *per cent* of one system delivered and balance 10 *per cent* to be paid on Set To Work (STW) and Harbour Acceptance Trials (HAT)

at training schools and establishments. The Commands were to take up cases for necessary infrastructure augmentation, wherever necessary.

The Annual Practice Allowance (APA) for small arms during *ab initio* training and for ships and establishments was notified by Naval Headquarters in December 1978 as amended in July 2011, whereby, each Naval Officer is required to perform a practice firing of 65 rounds of 5.56mm Ball ammunition and 40 rounds of 9mm Ball ammunition in a year.

Station Commander (Navy), Delhi Area (INS India) is responsible for conduct of small arms firing of all Officers and Sailors posted in Delhi Area.

In response to an audit query (November 2014), INS India stated (September 2015) that there is no dedicated firing range of Indian Navy in Delhi due to constraints of land and the Navy is fully dependent on Army for use of firing range.

Audit examined (August 2016) implementation of revised APA, in respect of Naval Officers in Delhi Area during the period from 2012-13 to 2015-16 and found deficient participation of officers as well as deficient practice firing by the participating officers, as given in Table 3.10 below:

Table-3.10: Details of practice firing at Delhi area

Sl. No.	Period	Borne strength	Officers participated	Deficiency (in per cent)	Details of firing by the participating Officers					
					5.56 mm Ball ammunition			9 mm Ball ammunition		
					Rounds required to be fired	Rounds actually fired	Deficiency (in per cent)	Rounds required to be fired	Rounds actually fired	Deficiency (in per cent)
A	B	C	D	E	F	G	H	J	K	L
1	2012-13	1,167	02	99.83	130	80	38.46	80	20	75.00
2	2013-14	1,226	16	98.69	1,040	172	83.46	640	672	-5.00
3	2014-15	1,240	56	95.48	3,640	536	85.27	2,240	715	68.08
4	2015-16	1,261	106	91.59	6,890	935	86.43	4,240	730	82.78

APA for 5.56 mm = 65 rounds
APA for 9 mm = 40 rounds

An analysis of the data tabulated above reveals the following:

- Deficiency in participation of Officers for practice firing in Delhi Area,

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during the years 2012-13 to 2015-16, ranged between a staggering 91.59 *per cent* and 99.83 *per cent*;

- The practice firing of 5.56 mm Ball ammunition by the participating officers was deficient. The deficiency ranged between 38.46 *per cent* and 86.43 *per cent*; and
- Deficiency in practice firing of 9 mm Ball ammunition by the participating officers ranged between 68.08 *per cent* and 82.78 *per cent*. However, during 2013-14, the practice firing of 9 mm Ball ammunition was performed by the participating officers as per the scales prescribed.

INS India stated (September 2016) that they had neither any small arms simulator for practice firing nor any case was projected by them for augmentation of necessary infrastructure in the past. INS India cited constraint of space as a reason for not proposing the case for augmentation of necessary infrastructure. They, however, added that the number of officers participating in the firings have increased over the years.

The explanation offered by INS India is not tenable because in their capacity as Station Commander (Navy), Delhi Area they are responsible for conduct of small arms firings of all officers posted in Delhi Area and no justification was provided for their inaction as to the availability of simulator/infrastructure to enable the requisite firing as mandated in the APA. Reasons for deficiency in practice firing by the participating officers *vis à vis* the scales were also not clarified. Further, though there has been increase in officers participating in the firings over the years, deficiency in coverage of Naval Officers was still (2015-16) above 90 *per cent*.

Thus, small arms practice firings by Naval Officers was meagre *vis à vis* as mandated in the APA and may impact the ability of Naval Officers to handle small arms.

The matter was referred to the Ministry (December 2016); their reply was awaited (March 2017).

3.8 Unwarranted procurement of aero-engines for a helicopter fleet

Indian Navy, while placing the order for procurement of four aero-engines for two helicopters damaged in an accident, did not take into consideration one helicopter which was declared Beyond Economical Repairs (BER) before the conclusion of the contract and 16 aero-engines received post-overhaul. Although, these excess engines were absorbed in subsequent procurement of five helicopters, BER declaration of another helicopter resulted in inventory holding of three aero-engines more than its authorisation and unproductive expenditure of ₹16.62 crore on the procurement of these three excess aero-engines.

The Indian Navy inducted nine KA-31 helicopters (IN 561 to 569) between April 2003 and May 2004. Each helicopter is fitted with two aero-engines. Indian Navy had an inventory of 27 aero-engines for these helicopters, including one aero-engine per helicopter being maintained as reserve.

Of the nine KA-31 helicopters held in the inventory of the Indian Navy, three helicopters (KA 562, 564 and 566) suffered damages to the airframes/aero-engines in different accidents between July and November 2008 and four of the aero-engines fitted onboard helicopters (KA 562 and 564) were declared (December 2009) Beyond Economical Repairs (BER).

Thereafter, one of the helicopters (KA-564) was also declared BER in October 2010. Integrated Headquarters Ministry of Defence (Navy) {IHQ MoD (Navy)}/Directorate of Naval Air Material (DNAM), in November 2010, projected the requirement to the Ministry for undertaking repairs/overhaul of two helicopters. Based on the cost analysis, one more helicopter (KA-562) was declared BER in August 2012, while the case for repair/overhaul of the third helicopter (KA-566) is still in progress with the Ministry (January 2017). During the period between March 2012 and August 2012, five more KA-31 helicopters were inducted into Indian Navy with ten aero-engines installed and two aero-engines as reserve.

IHQ MoD (Navy)/DNAM initiated (December 2009) the procurement of four aero-engines against the four aero-engines of two KA helicopters (KA 562 and 564) declared BER (December 2009). Thereafter, a contract was concluded (April 2011) with M/s Rosoboronservices (India){ROS (I)} for the supply of four aero-engines at a total cost of ₹22.62 crore. These four aero-engines were delivered in December 2011. Of these, two aero-engines worth ₹11.31 crore were lying idle for periods ranging from 34 to 44 months viz., up till October 2014 and August 2015 respectively.

Meanwhile, IHQ MoD (Navy)/DNAM also placed (March and November 2009) two repair orders on M/s ROS (I) for undertaking overhaul of 17 aero-engines at a total cost of ₹17.57 crore. Against these, sixteen aero-engines were received back between December 2010 and February 2011 and one aero-engine was withdrawn from service due to severe damage.

Audit noticed (July 2016) that IHQ MoD (Navy)/DNAM, before conclusion of the contract (April 2011), for procurement of four aero-engines for the two damaged helicopters, overlooked the fact that one helicopter had already been declared BER in October 2010. Further, the OEM specialists were assessing the damage to the other two helicopters also. Moreover, Indian Navy had received sixteen aero-engines post-overhaul between December 2010 and February 2011. However, no action was taken to stall the procurement of the four new aero-engines. Audit also noticed that though IHQ MoD (Navy)/DNAM is the nodal directorate⁷⁰ for all the activities relating to repair, overhaul of aircraft/helicopters, aero-engines; procurement of spares and rotables for the aircraft in service with the Indian Navy, yet they failed to appreciate the fact that the procurement of four new aero-engines would have had hardly any impact on improving the flight worthiness of damaged helicopters as these had suffered extensive airframe damages. Though, Indian Navy required 36 aero-engines (24 onboard plus 12 as reserve) for optimum exploitation of 12 helicopters (two were declared BER in October 2010 and

⁷⁰ DNAM was trifurcated on 1st August 2013 into three different entities with different sets of duties.

August 2012, from the original fleet of nine helicopters), it is holding 39 aero-engines (January 2017), thereby, exceeding the inventory by three aero-engines.

The Ministry justified (January 2017) the procurement of four aero-engines (during the period April 2011 to December 2011) on the grounds that Indian Navy held 13 helicopters, which had a requirement of 39 aero-engines. The Ministry's contention is not convincing because, as of October 2010, Indian Navy was holding only eight helicopters (nine procured initially in 2003-2004 less one helicopter declared BER in October 2010) including the one awaiting decision on BER/repair. Since the contract for four aero- engines was entered into in April 2011, there was scope for Indian Navy to take into account declaration of one helicopter as BER in October 2010 and accordingly reduce the size of the order by three engines. By August 2012, the fleet was reduced to seven due to one more helicopter having been declared BER. However, in the same month, five new helicopters along with two reserve aero-engines (keeping in view the three engines that had been rendered surplus due to declaration of one helicopter as BER) were inducted making the total inventory of helicopters to 12. However, since, around this time another helicopter was under the process of being declared as BER reducing the requirement of engines by three, Indian Navy could have avoided procuring two aero- engines for reserve. For operational exploitation of 12 helicopters, Indian Navy had an authorisation of 36 aero-engines (24 onboard and 12 as reserve), however, Navy was holding 39 aero-engines, thereby, exceeding the inventory by three. Such situation emerged due to avoidable procurement of three out of four new aero-engines ordered in April 2011. This situation could have been partly mitigated by not ordering two reserve engines while ordering five helicopters, but this was not done.

Thus, while placing the order for four new aero-engines, Indian Navy failed to take into cognizance BER helicopter (October 2010). This in turn resulted into inflated inventory of aero-engines to the extent of three engines worth ₹16.62 crore. Of the four aero-engines procured against BER helicopters, two aero-engines worth ₹11.31 crore were lying idle for the periods ranging from 34 to 44 months up till October 2014 and August 2015 respectively.

3.9 Avoidable procurement and installation of Mobile Satellite Service Terminal for an aircraft

Failure of the Indian Navy to take cognizance of the de-induction plan of Tu-142M aircraft fleet, resulted in procurement of an excess Mobile Satellite Service (MSS) terminal for an aircraft at ₹0.95 crore. Further, de-induction of another three aircraft by 2017 would render installation of MSS terminals on these aircraft, largely unfruitful.

The Long Range Maritime Reconnaissance (LRMR) requirements of the Indian Navy were met by five IL-38SD and five⁷¹ Tu-142M aircraft inducted in 1977 and 1987 respectively.

In order to augment the existing communication facility for securing data communication on these aircraft, Indian Navy concluded (December 2012) a contract with M/s Avantel, Hyderabad for ten Mobile Satellite Service (MSS) terminals at a unit cost of ₹0.95 crore. The technical life of MSS terminals is 10 years and all 10 MSS terminals were delivered (January 2013) well within the scheduled delivery period *i.e.* by December 2013.

Audit observed (August 2016) that one Tu-142M aircraft was de-inducted in October 2013; another three Tu-142M aircraft were planned to be de-inducted by 2017 and remaining one aircraft by mid-2018. Further, one MSS terminal costing ₹0.95 crore remained idle in stock since its receipt (January 2013).

The Ministry stated (January 2017) that out of the total five MSS terminals procured for five Tu-142M aircraft, one aircraft was to undergo overhaul in 2013-14 with life extension up to 2018-19. The aircraft was, however, drawn down from service in October 2013 and there was no firm de-induction plan formulated at the time of processing the case for procurement of MSS terminals. Hence, there was no overlooking of de-induction plan of Tu-142M fleet while procuring MSS terminals. The Ministry further stated that the combined factors of increased cost, reduced operational time availability of aircraft post overhaul and induction of P8-I aircraft as replacement, contributed towards decision to withdraw the proposal for overhaul of the Tu-142M aircraft. The Ministry also added that the fifth terminal earmarked

⁷¹ Eight Tu-142M aircraft were inducted during 1987-88 and subsequently three aircraft were de-inducted between June 2006 and June 2012.

for the Tu-142M aircraft would be effectively utilised as float for IL-38SD aircraft as they will remain operational till 2022-23.

The reply of the Ministry is not convincing because any procurement decision for Tu-142M aircraft should have been taken once overhaul/life extension of the aircraft was confirmed. Moreover, the item was easily available with the Indian firm as is evident from completion of supply within one month against scheduled delivery period of 12 months provided in the supply order. Further, the justification regarding use of the excess terminal as float is not tenable as procurement proposal did not envisage for float, as per the laid down norms. Besides one excess MSS terminal worth ₹0.95 crore, the fact that three Tu-142M aircraft are likely to be de-inducted by 2017 renders the procurement of terminals for the aircraft fleet, at the fag-end of its residual life, largely unfruitful.

3.10 Procurement of weather radars for Dornier aircraft

Non-supply of a critical component viz., display units, as part of procurement of weather radars impacts the operational exploitation of the Dornier aircraft fleet.

The weather radar enables the pilot to avoid bad weather by detection of clouds and clutter in adverse weather conditions. This is a critical role equipment, which has to be available in full serviceable state on all aircraft. In order to obviate any AOG⁷² situation, the serviceability of weather radar system is considered essential.

Based on INS Hansa, Goa requirement (September 2009) for replacement of existing obsolete and unsupportable weather radars on 15 Dornier aircraft along with five radars as float⁷³, the Directorate of Naval Air Material (DNAM) {now renamed⁷⁴ as Directorate of Air Logistics Support (DALSS)}, Integrated Headquarters Ministry of Defence (Navy) {(IHQ MoD (Navy))

⁷² AOG-Aircraft on Ground

⁷³ Float – Reserve held for maintaining unserviceable Radars

⁷⁴ DNAM- Erstwhile DNAM was trifurcated on 01 August 2013 into three different Directorates viz., Directorate of Air Logistics Support (DALSS), Directorate of Aircraft System Engineering (DASE) & Directorate of Air Projects and Plan (DAPP).

placed (March 2010) a supply order (SO) on M/s Hindustan Aeronautics Limited (HAL), Kanpur for procurement/installation of 15 weather radars onboard 15 Dornier aircraft and five radars as float at a cost of ₹8.14 crore.

M/s HAL completed (between August 2010 and January 2014) fitment of 15 weather radar systems on these 15 Dornier aircraft. However, one of the aircraft (IN-222) was signaled out in September 2013 without display unit. The deficiency of the aircraft (IN-222) was made good only after a serviceable display unit was retrieved from another Dornier aircraft, whereas one display unit fitted on another Dornier aircraft was rendered Beyond Economical Repairs (BER) in November 2013. HAL, Kanpur requested (October 2015) IHQ MoD (Navy) that five display units valuing ₹0.19 crore, forming a part of five sets of floats, be deleted from the SO, as they were not in a position to supply the item. DALS IHQ MoD (Navy) submitted (May 2016) a proposal for deletion of the item from the SO and the decision was pending (August 2016)⁷⁵.

Audit scrutiny (October 2013/July 2016) of the procurement revealed that the procurement of 15 weather radars for installation onboard Indian Navy Dorniers and five radars as floats of IHQ MoD (Navy), in March 2010, was costlier by ₹0.76 crore *vis à vis* procurement made by Indian Coast Guard from the same firm in same period (June 2010). Further, M/s HAL fitted the display units, onboard seven Dornier aircraft of Indian Coast Guard (ICG) between February 2011 and September 2013 against the contract (June 2010) and also replaced, the initially fitted five Cat 'B' display units free of cost, on the Dornier aircraft of ICG with the Original Equipment Manufacturer (OEM) {*i.e.*, M/s Avidyne} made display units after a change order was issued to the contract (June 2010). However, five sets of floats supplied by HAL to the Indian Navy were without display units as the OEM had expressed (October 2015) their inability to supply the same. Thus, two Dornier aircraft of the Indian Navy (IN) were without dedicated display units, thereby, affecting the efficacy of Dornier aircraft.

⁷⁵ IHQ MoD (Navy) letter No.SM/09/A/D/C/4028 dated 1 September 2016.

The Ministry stated (March 2017) that the display units were highly reliable and common to other aircraft of the Indian Navy and the float were 'interchangeable' across Naval fleet. They, however, admitted that availability of float is definitely better to sustain high serviceability of aircraft fleet. The Ministry added that non-supply by M/s HAL was not due to any failure on the part of the firm as the item could not be supplied due to obsolescence and their non-availability in world market.

The reply of the Ministry is not convincing as one display unit was rendered BER (November 2013) even before completion of supplies (January 2014) under the Supply Order and two Dornier aircraft were without display units for which there was no float. Further, usage of a different display unit would require structural modification, involving additional time and cost elements which could lead to AOG situation.

Thus, unserviceability/non-availability of display units onboard two Dornier aircraft coupled with lack of float impacts operational exploitation of aircraft fleet, thereby defeating the purpose of creating float at a cost of ₹1.19 crore. Besides, the procurement (March 2010) by IHQ MoD (Navy) was costlier by ₹0.76 crore *vis à vis* the procurement made by the ICG from the same firm during the same period.

3.11 Avoidable expenditure on procurement of rice

In deviation from the existing policy on provisioning and procurement of dry rations, Indian Navy resorted to local purchase of rice for the naval contingent in Delhi Area, thereby, incurring extra expenditure of ₹0.89 crore in procurement of rice.

As per the extant policy, all units of three arms of the Defence Services have to obtain non-availability certificate (NAC) from the Army Service Corps (ASC) Depot before resorting to local purchase (LP) of dry rations. INS India is the base depot of the Indian Navy in Delhi and caters to ration requirements of entire naval contingent at Delhi Area through ASC Depot, Delhi Cantt.

Audit observed (July 2016) that INS India had proposed for delinking of provisioning and procurement of ration items from ASC for Delhi Naval

Station; akin to other Naval Stations viz., Mumbai, Visakhapatnam and Kochi. However, the proposal was not approved. Further, between 2011-12 and 2015-16, INS India indented and received 1,49,600 Kg rice from ASC Depot, Delhi Cantt. at ₹22.13 per Kg and locally purchased 4,80,000 Kg rice during the corresponding period, at an average price of ₹40.75 per Kg on the grounds that rice supplied by ASC was in sacks of 50 Kg against the requirement of 5 Kg pack. The local purchase of rice was resorted to without obtaining the requisite NAC from the ASC Depot, resulting in extra expenditure of ₹0.89 crore. The PIFA⁷⁶ (Navy) had been agreeing to the local purchase of rice without insisting on the NAC from ASC (Depot). Indian Navy stated (July 2016) that rice received from ASC Depot was in bigger packing and to get it repacked into small packing, as per the entitlement of personnel, was tedious, time consuming and unhygienic. They further reaffirmed (August 2016) that rice from ASC had always been received in 50 Kg bags rather than in 5 Kg packs.

The contention of Indian Navy is not tenable as the extant policy requires the Defence Services (*i.e.*, Army, Navy and Air Force) to meet their dry ration requirements through ASC in the first place. As such, provisioning of dry rations by the Indian Navy, in deviation from the extant policy, resulted in extra expenditure of ₹0.89 crore on procurement of rice.

The matter was referred to the Ministry (December 2016); their reply was awaited (March 2017).

⁷⁶ PIFA- Principal Integrated Financial Advisor