NATO STANDARD

AOP-62
IN-SERVICE SURVEILLANCE OF MUNITIONS GENERAL GUIDANCE

Edition A Version 1
FEBRUARY 2017

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED ORDNANCE PUBLICATION

Published by the
NATO STANDARDIZATION OFFICE (NSO)

INTENTIONALLY BLANK

NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

27 February 2017

1. The enclosed Allied Ordnance Publication AOP-62, Edition A, Version 1, IN-SERVICE SURVEILLANCE OF MUNITIONS GENERAL GUIDANCE, which has been approved by the nations in the AC/326 CNAD AMMUNITION SAFETY GROUP, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 4675.

2. AOP-62, Edition A, Version 1, is effective upon receipt.

4. This publication shall be handled in accordance with C-M(2002)60.

Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

INTENTIONALLY BLANK

RESERVED FOR NATIONAL LETTER OF PROMULGATION

INTENTIONALLY BLANK

RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

INTENTIONALLY BLANK

RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

INTENTIONALLY BLANK

TABLE OF CONTENTS

CHAPTER 1 IN-SERVICE SURVEILLANCE OF MUNITIONS – GENERAL GUIDANCE 1-1
1.1. ABBREVIATION 1-1
1.1.1. List of Abbreviations and Acronyms 1-1
1.2. SCOPE 1-2
1.3. RELATED DOCUMENTS 1-2
1.4. GENERAL 1-4
1.4.1. Introduction 1-4
1.4.2. Purpose 1-4
1.4.3. System Complexity 1-6
1.4.4. Initial Service Life – National/Service Policies 1-6
1.5. THE ISS FRAMEWORK 1-7
1.5.1. The ISS Framework 1-7
1.5.2. In Service Experience 1-7
1.5.3. In Service Proof 1-8
1.5.4. Condition Monitoring 1-8
1.5.5. In Service Monitoring 1-8
1.5.6. Predictive Testing 1-10
1.6. PLANNING FOR ISS 1-10
1.7. ISS PROCESS AND DOCUMENTATION 1-12
1.7.1. Process Description 1-13
1.7.2. Roles and Responsibilities 1-14
1.8. ISS PROCESS 1-22
ANNEX A SYSTEM PROGRAM PLAN A-1
A.1. FOR AN EXAMPLE SYSTEM/PROGRAM A-1
A.2. CONTENTS A-2
A.3. MANAGEMENT OVERVIEW A-2
A.4. INTRODUCTION A-3
A.5. ISS PROGRAMME OBJECTIVES A-5
A.6. ROLES AND RESPONSIBILITIES A-6
A.7. INTERFACE WITH OTHER PROGRAMME A-7
A.8. DEVELOPMENT PHASE A-7
A.9. EXECUTION PHASE A-9
A.10. TESTING A-10
A.11. ANALYSIS, REPORTING & RECOMMENDATION A-11
APPENDIX 1 – SYSTEM DESCRIPTION 1-A-1
APPENDIX 2 – REFERENCE LIST 2-A-1
ANNEX B ITEM TEST PLAN B-1
B.1. FOR AN EXAMPLE ITEM FROM THE EXAMPLE SYSTEM B-1
B.2. CONTENTS B-2
B.3. INTRODUCTION B-2
B.4. OBJECTIVES B-3
B.5. ISS PROCESS FOR THE ITEM B-4

APPENDIX 1 – DETAILED DESCRIPTION OF SYSTEM & ITEM 1-B-1
APPENDIX 2 – TEST METHODS, DESCRIPTIONS, LIMITATIONS AND APPLICATIONS OF RESULTS 2-B-1
APPENDIX 3 – POINTS OF CONTACT 3-B-1
APPENDIX 4 – DETAILED JUSTIFICATION SHEET 4-B-1
APPENDIX 5 – TEST REPORT OUTLINE 5-B-1
ANNEX C ITEM IMPLEMENTATION PLAN C-1
C.1. FOR SYSTEM NAME, ITEM NAME C-1
C.2. CONTENTS C-2
C.3. INTRODUCTION C-2
C.4. OBJECTIVE C-2
C.5. ROLES AND RESPONSIBILITIES C-2
C.6. ITEM TEST READINESS AND ISS PROCESS REVIEW C-2
C.7. POINTS OF CONTACT C-4

CHAPTER 1 IN-SERVICE SURVEILLANCE OF MUNITIONS – GENERAL GUIDANCE

1.1. ABBREVIATION

1.1.1. List of Abbreviations and Acronyms

ALARP	As Low as Reasonably Practicable
AOP	Allied Ordnance Publication
APM	Acquisition Programme Manager
AUR	All Up Round
BTCA	Breakdown Test and Critical Analysis
CM	Condition Monitoring
ECP	Engineering Change Proposal
EDL	Environmental Data Logger
EM	Environmental Monitoring
EMD	Engineering and Manufacture Development
EMP	Environmental Monitoring Plan
EOSL	End Of Service Life
FSE	Field Support Engineer
IIP	Item Implementation Plan
FMECA	Failure Modes Effects Criticality Analysis
ISE	In Service Experience
ISM	In Service Monitoring
ISP	In Service Proof
ISS	In Service Surveillance
ITP	Item Test Plan
LAT	Lot Acceptance Tests
LCEP	Life Cycle Environmental Profile
PM	Project Manager
PT	Predictive Testing
RCM	Reliability Centred Maintenance
SOP	Standard Operating Procedures
SOW	Statement of Work
SPP	System Programme Plan
SRP	Safety, Reliability and Performance
SSE	System Support Engineer
S3	Safety and Suitability for Service
TLPM	Through Life Programme Manager
TOC	Total Ownership Cost
TP	Test Plan
WLA	Whole Life Assessment

1.2. SCOPE

1. This AOP and its annexes provide basic guidance on ISS including, why it is necessary, when it should be implemented and the key personnel and documentation required. This AOP will also cover the association between ISS and maintenance, the different requirements for safety and reliability and will also provide basic guidance regarding the use of environmental data loggers.

2. **Operational Imperative statement:** This document is relevant to program managers and service personnel who require information on surveillance and need basic guidance on planning a surveillance program.

1.3. RELATED DOCUMENTS

AECTP-100	Environmental Guidelines for Defence Material
AECTP-200	Environmental Conditions
AECTP-300	Climatic Environmental Tests
AECTP-400	Mechanical Environmental Tests
AECTP-600	The Ten Step Method for Evaluating the Ability of Material to meet Extended Life Requirements
AOP-7	Manual of Tests for the Qualification of Explosive Materials for Military Use
AOP-15	Guidance on the Assessment of the Safety and Suitability for Service of Munitions for NATO Armed Forces
AOP-46	The Scientific Basis for the Whole Life Assessment of Munitions
AOP-48	Explosives, Nitrocellulose based Propellants, Stability Test Procedures and Requirements using Stabilizer Depletion
AOP-4682	ENERGETIC MATERIALS, TEST METHODS FOR INGREDIENTS
AOP-63	In-service Surveillance of Munitions, Sampling and Test Procedures
AOP-64	In-service Surveillance of Munitions, Condition Monitoring
STANAG 4110	Definition of Pressure Terms and Their Interrelationship for Use in the Design and Proof of Cannons and Ammunition
STANAG 4115	Definition and Determination of Ballistic Properties of Gun Propellants Definition of Pressure Terms and Their Interrelationship for Use in the Design and Proof of Cannons and Ammunition
STANAG 4123	Methods to Determine and Classify the Hazards of Ammunition
STANAG 4147	Explosives: Chemical Compatibility of Ammunition Components with Explosives and Propellants (Non-Nuclear Applications)
STANAG 4157	Fuzing Systems: Test Requirements for Assessment for Safety and Suitability for Service

STANAG 4170	Principles and Methodology for the Qualification of Explosive Materials for Military Use
STANAG 4178	Test procedures for assessing the quality of deliveries of nitrocellulose from one NATO Nation to another
STANAG 4324	Electromagnetic Radiation (Radio Frequency) Test Information to Determine the Safety and Suitability for Service of EEDs and Associated Electronic Systems in Munitions and Weapon Systems
STANAG 4370	Environmental Testing
STANAG 4487	Explosives, friction sensitivity tests
STANAG 4488	Explosives, shock sensitivity tests
STANAG 4489	Explosives, impact sensitivity tests
STANAG 4490	Explosives, electrostatic discharge sensitivity
STANAG 4491	Explosives, Thermal Sensitiveness and Explosiveness Tests
STANAG 4506	Explosive Materials, Physical/Mechanical Properties Uniaxial Tensile Test
STANAG 4515	Explosives, Thermal Characterization by Differential Thermal Analysis, Differential Scanning Calorimetric and Thermo Gravimetric Analysis
STANAG 4525	Explosives, Physical/Mechanical Properties, Thermomechanical Analysis (TMA) for Determining the Coefficient of Linear Thermal Expansion
STANAG 4540	Explosives, Procedures for Dynamic Mechanical Analysis (DMA) and Determination of Glass Transition Temperature
STANAG 4556	Explosives, Vacuum Stability Test
STANAG 4581	Explosives, Assessment of Ageing Characteristics of Composite Propellant containing an Inert Binder
STANAG 4582	Explosives, Nitrocellulose based Propellants, Stability Test Procedure and Requirements using Heat Flow Calorimetry
STANAG 4666	Explosives, Assessment of Ageing of Polymer Bonded Explosives (PBXs) Cast-Cured Compositions using Inert or Energetic Binders
STANAG 4675	In-Service Surveillance (ISS) of Munitions

1.4. GENERAL

1.4.1. Introduction

1. It is almost impossible to keep munitions in an environment where they will not degrade. It is therefore generally accepted that almost all munitions have a finite life. Nations which implement AOP15 have agreed that before being accepted for service use, munitions must demonstrate Safety and Suitability for Service (S3). In assessing S3 it is necessary to assign some form of service life to the item. This is a prediction of the amount of environmental stress the item can take before it degrades to an unreliable or unsafe state. These predictions are less likely to be valid the longer an item stays outside of a controlled storage environment as the environment becomes more variable. In Service Surveillance (ISS) provides the means by which initial service life estimations can be confirmed, or even extended, to ensure safe and reliable use throughout the required service life. ISS can also be used to assess the continued safety of unserviceable items, during storage and transportation, pending disposal.

2. The through life implementation of S3 and ISS techniques is often referred to as Whole Life Assessment (WLA).

1.4.2. Purpose

1. Nearly all materials can degrade in some way over time and at an increased rate when exposed to increasingly harsh environments. Casings and canisters can be eroded; protective surfaces can be attacked by mould or other biological species; seals and energetic materials can react chemically with moisture, light or heat changing their chemical or physical make up; or structures can crack and break apart through vibration and shock induced stress. If these changes cannot be tolerated then it is essential to monitor and test for them.

2. Initial Qualification and Safety and Suitability for Service testing will identify the degradation that is most likely for the chosen design. They may even give some indication of the possible rate of degradation. It is unlikely that it will have been practical to test for all eventualities and combinations of environments. By inspecting items periodically, or following a particular deployment or training programme, it is possible to check the effects of the actual environment and therefore improve overall confidence in the safety, reliability and performance of those items.

3. The purpose of ISS is to provide the information required to ensure that munitions remain safe, reliable and perform correctly throughout the period of their intended life. By complying with this AOP, nations should be able to:

   a. Provide evidence that the risk from munitions in service, regardless of age, will remain tolerable and As Low as Reasonably Practicable (ALARP) for the life cycle of the munitions.

b. Provide sufficient evidence that pre-owned munitions for loan, sale (at the point of sale), or contracted disposal are currently safe and serviceable and will remain so for an agreed duration with the receiving nation/organisation.

c. Provide evidence that munitions continue to function correctly and reliably throughout their period of use.

d. Enhance predictions of a munitions end of safe life.

e. Reduce the risk of exceeding the safe life of munitions.

f. Enhance maintenance and component replacement plans.

g. Identify/Support role changes to munitions.

4. STANAG 4675, which includes this AOP, provides methods for ensuring continued safety, reliability and performance of material within the extreme conditions defined in the Life Cycle Environmental Profile (LCEP). This AOP describes the basic process and documentation required to conduct a successful munitions ISS and outlines the reasons why it is necessary.

5. Using ISS techniques to extend service life or to extend the LCEP beyond its initial boundaries should be considered in conjunction with AECTP 600.

6. There are various levels of ISS. The following lists some of the primary functions of ISS and offers estimated levels of inspection required:

a. <u>Continued safety in storage</u>
Checking on the stability and if necessary, other properties of explosive materials.
Agreed go/no go criteria – refer to System Support Engineer (SSE) (Subject Matter Expert).

b. <u>Continued safety in service</u>
Breakdown and critical analysis of “fleet leaders” (see AOP 63)
In Service Monitoring (ISM)
Safety review panel – refer to SSE

c. <u>Continued reliability or performance in service</u>
In service proof and functioning data (including electronic test sets)
Calculate statistics and quality levels
Reliability review panel – refer to the Co-ordinator

d. <u>Planning for maintenance and/or component replacement</u>
In service proof and functional data (including electronic test sets)
Checking on the stability and other properties of explosive materials
Calculate statistics and quality levels
Safety review panel – refer to SSE

e. <u>Extended safety or reliability in service</u>
S3 assessment of “fleet leaders” – including environmental stressing
Breakdown and critical analysis of environmentally stressed “fleet leaders”
Safety review panel – refer to SSE

1.4.3. System Complexity

1. The basic principle of assessing components that are degrading remains for all types of munitions. The programmes for complex munitions, having multiple energetic sub-components (i.e. complex missile systems, torpedoes, etc.), will necessarily differ from simpler munitions (i.e. gun ammunition, grenades, etc.). The complex munitions programme will likely require coordination of multiple disciplines and many more personnel in assessing the munitions as a system and in its component parts. Test sampling plans may necessitate extraction of component samples or be driven by the most critical or life-limiting subcomponent.

2. For documentation, the programme for simple munitions will likely require only simplified, short documents and plans, while the complex system will need a master programme plan with numerous annexes/sub-plans for individual components. The analysis of system reliability and performance will also require more complexity, as reliability and performance at a system level is more complex than a simple summation of the capabilities of the components. Where it is necessary to manage multiple sub-programmes for system components, in order to maintain an accurate service exposure history, it is critical for the procuring nation to have access to an accurate database recording configuration of the munitions to at least that component level.

1.4.4. Initial Service Life – National/Service Policies

It has been noted that different nations have different basic practices for initial service life. Some countries policies establish a long service life and fully expect to retire their systems at the end of that life. Others establish a shorter initial life and continue to extend service life of their systems until data, inventory depletion or operational necessity provides the impetus to remove the system from service. ISS is an essential component in both approaches. There are inconsistencies in making long term assessments that can lead to inaccurate life estimation. If the plan is comprehensive in both instances then the programme objectives can be met without the commitment of resources and time at the outset to conduct a long initial service life assessment. The nation/service preparing the System Programme Plan (SPP) should fully explain their service life policy and how ISS is to be used within it.

1.5. THE ISS FRAMEWORK

1.5.1. The ISS Framework

ISS is a modular process that combines information from a number of sources to construct the overall framework. This framework is presented pictorially in figure 1 below:

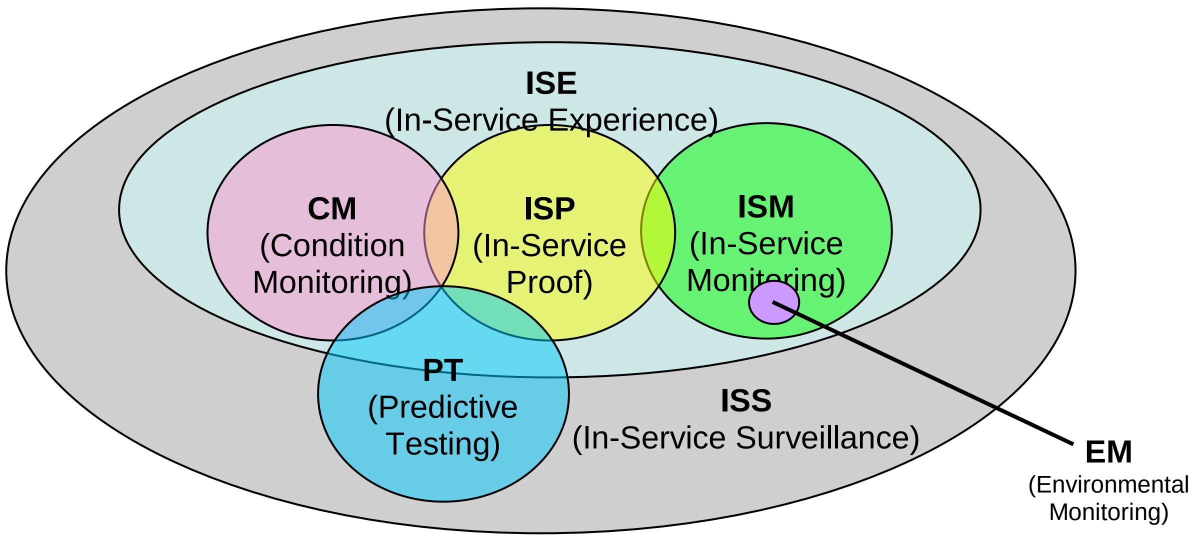

Figure 1 - ISS Framework

1.5.2. In Service Experience

In Service Experience (ISE) is the collective term used to describe a number of different methods of testing and monitoring munitions and gaining useful data regarding their condition throughout their life cycle or service life. Typical reporting methods include: Functional, Proof and Training Reports; Accident and Defect Reporting.

a. In Service Reporting

Reporting is an important source of information for reliability monitoring and logistic control, and provides a useful source of information to support removal from service decisions in the case of munitions. This reporting can provide early identification of potential life-limiting degradation/failure modes. This should not be considered a reliable source of information since not all failures are likely to be reported.

1.5.3. In Service Proof

In-Service Proof (ISP) is simply additional proof (sometimes known as batch/lot acceptance) tests that are carried out throughout the service life of munitions system. This can be conducted at system level (i.e. all-up-round), sub-system or component level. No matter which of these is used, each would include visual inspection followed by function of the item. Data gathered can vary from visual observation to detailed performance evaluation. The latter will provide safety, reliability and performance data. Typical methods include:

a. Service Firings

Service firings are carried out for operational or training purposes, but they can also be used to provide data on performance and reliability if monitored effectively. Successful service firings can give a numerical confidence in the current status of the munitions. Inconsistent reporting procedures and the lack of objective evidence means that this data should not be relied upon for predicting the future safety of munitions.

1.5.4. Condition Monitoring

Condition Monitoring (CM) is one of the most important aspects of ISS. It is usually destructive testing as typified by Breakdown Test and Critical Analysis (BTCA) where the system is dismantled into its sub-systems and/or components. Usually, this incorporates chemical analysis (e.g. composition, stability), determination of mechanical properties (e.g. tensile, hardness, modulii) and/or explosive hazard properties (e.g. response to impact, friction). Further information on CM is contained in AOP 64.

1.5.5. In Service Monitoring

In-Service Monitoring (ISM) is typically non-intrusive and non-destructive testing such as routine visual inspection and/or using test sets to interrogate the electronic hardware/software of a munitions system. Since the system is not dismantled it can be used for further testing if required or returned to the stockpile for service use.

a. <u>Environmental Monitoring</u>

(1) Environmental monitoring (EM) can be considered as a subset of ISM whereby ‘real-world’ data is gathered throughout the storage and/or deployment of a munitions system. In its simplest form this can be temperature and humidity data manually recorded in depot, or meteorological data recorded in theatre, through to analysis of data recorded during trundling/field trials or by Environmental Data Loggers (EDL).

(2) For safety reasons the predicted environment used in basic failure/degradation models is usually (but not always) pessimistic. EM provides service data to replace the predicted service environment used in these models with an actual service environment. EM is also very closely linked to CM and is essential to making accurate predictions of the remaining life for munitions. In very basic terms, degradation models involve comparing the stresses experienced and survived by test items during predictive testing with the actual stresses experienced during service use. Provided in-service stresses remain below those experienced during testing, the in-service items can be expected to survive as comfortably as the test items. Therefore in many cases EM can lead to an increase in service life through more accurate modelling of the environment and associated degradation.

(3) It is also possible to control the environment, an example of which is to use thermally controlled ISO Containers for the transport and storage of munitions. This can slow down the degradation of munitions. The use of a controlled environment does not allow a munitions manager to ignore the effects that the surrounding environment could cause. In field conditions air-conditioning can fail quite frequently and carrying out repairs quickly is not always possible. Even in controlled environments monitoring should still be considered.

b. <u>Environmental Data Loggers</u>

(1) Environmental Data Loggers (EDL) is the title given to any device that will provide data about the environment the munitions experience. The term EDL is mostly associated with independent electronic devices that record and store temperature and humidity data. EDL is a generic term covering all devices that improve knowledge of the environments experienced by an item. This can range from simple chemical devices that change colour at certain temperatures, to health usage monitoring systems (HUMS) that can record temperature, humidity, shock, vibration, and pressure over many years.

(2) EDL can also range in position from a loose association with

munitions, such as using platform based data or placing EDL outside munitions containers, to being fully embedded within the munitions. If the EDL is not fully embedded then initial assessment and analysis regarding the placement of the EDL should also include the derivation of a transfer function that can translate the data recorded by the EDL to the position on the monitored item where degradation is most likely.

(3) As EDL technology advances, this technology should be incorporated into the ISS Plan. The more that is known about the environment actually experienced by items in service the more that testing can be focused on areas of concern. A fully monitored fleet of missiles or munitions would allow 'fleet leaders' to be easily identified and tested and where environments are less extreme than predicted could even allow for less frequent removal of test items for inspection.

1.5.6. Predictive Testing

1. Predictive Testing (PT) is used to investigate the degradation modes likely to be found during service use as a result of environmental stressing. This typically involves a degree of environmental stressing prior to examination and/or function of the item under investigation.

2. It must be remembered that a number of assumptions have to be made regarding the life cycle of the item, both in terms of how it will be stored/used and those failure/degradation modes likely to be encountered. A good example would be the activation energy used during thermal ageing calculations. ISS can help validate (or invalidate) those assumptions that were made during initial PT and can lead to modifications to the models, test severities and assumptions commonly used.

3. PT is likely to help determine those items that are more likely to degrade/fail early in life which can act as a focus for ISS activities. It must also be considered that other degradation/failure modes may exist that become more critical as time progresses.

4. The need for additional PT during ISS increases with age and therefore energetic materials that are intended to be kept in service well beyond their initially predicted or "guaranteed" life should undergo PT during ISS, if adequate confidence in the system safety is to be maintained. This is particularly true for munitions carried externally on fast jets where it is more difficult to model the actual stresses experienced by the energetic materials.

1.6. PLANNING FOR ISS

1. An ISS Item is that unit/section/component/sub-component or assembly whose features are susceptible to degradation over time and could affect the safety,

reliability and/or performance of the system. How the system is defined and then sub-divided into items will depend on various factors including the resources available and the practicality of assessing items independently.

2. The following section on Process and Documentation describes in detail how to plan and conduct a programme for munitions of any size and complexity. Below are some of the basic planning decisions to be made throughout this process:

a. Do I need ISS?
In principle, any system or item containing energetic materials must undergo ISS throughout its service life to ensure safety during handling, storage and operation. Only non-safety critical items that pose no risk to personnel, equipment or operational effectiveness may be considered for exemption from some or all aspects of ISS. Consideration must also be taken of National laws that detail requirements for specific testing regimes associated with energetic materials / substances.

b. What requires ISS?

(1) *Energetic materials and components containing*:
Pyrotechnics.
High explosives.
Propellants.
Thermal batteries.

(2) *Casings/pressure vessels*:
Thermal protection.
Sealing.

(3) *Electronics*:
Sealing.
Function.

(4) *Packaging*:
Sealing.
Shock attenuation.
(supporting documentation)

c. When Shall ISS Take Place?
Throughout the life cycle but should be reviewed:
(1) Periodically.
(2) After operational deployment.
(3) During training.
(4) When ISM data indicates a possible cause for concern.

d. What Testing is required?

An analysis should be done based upon expert judgement. Guidance is given in AOP 63 and AOP 64 on how to structure the programme and select appropriate tests.

All munitions should be considered for periodic testing including:

(1) Non-destructive testing – electrical test sets, inspection.

(2) Destructive testing – examine structural, chemical and physical properties.

(3) Environmental monitoring – EDL and other records of the environments experienced.

(4) Functioning – Gather reliability and performance data over time.

e. When should ISS stop?
Only on disposal. Even if munitions are no longer required, they cannot be left in store awaiting disposal for long periods without continued monitoring.

f. What Assets are required for ISS?

(1) For sample size guidance refer to AOP 63

(2) Pre-selected samples can be set aside for basic surveillance

(3) “Fleet Leaders” should be selected for any life assessment during surveillance

(4) Consider whole systems - All Up Rounds (AUR) - where environmental predictive testing is required and vibration environments are significant

1.7. ISS PROCESS AND DOCUMENTATION

1. This section provides the recommended process and required documentation for a successful In Service Surveillance programme and describes the role and responsibilities of the essential functions within an ISS programme. Ideally each function should be carried out by an independent individual or organisation. In practice, one individual or organisation may be responsible for more than one function.

a. Acquisition Programme Manager.

b. System Support Engineer.

c. Co-ordinator.

d. Programme Manager.

e. Test Engineer.

f. Field Support Engineer.

2. This section also describes the role and the format of the documentation. In this AOP the description of the documentation is comprehensive. For ISS programs for smaller or less sensitive munitions this documentation may be less substantial. However, each element of the documentation is needed.

a. System Programme Plan (SPP) – ANNEX A

b. Item Test Plan (ITP) – ANNEX B

c. Item Implementation Plan (IIP) – ANNEX C

d. Environmental Monitoring Plan. (EMP)

e. Progress Reports.

1.7.1. Process Description

1. The process of ensuring In Service Safety and Suitability for Service (S3) ideally begins during the munitions development phase, when the system developers should conduct an analysis to establish the expected/potential failure modes for the system, along with an assessment of the potential severity of the failures. This sort of analysis is often known as a Failure Mode Effects and Critical Analysis (FMECA). This tool provides the designers and in-service agents the key for selection of components and failure mechanisms to focus on when selecting parameters to study in their analyses of degradation. This information regarding failure mechanisms and components should then be used to generate a conceptual System Programme Plan. The final SPP should be completed and signed by the appropriate acquisition authority for the procuring national service as specified later in this document.

2. Prior to the procurement process the Explosive Materials must be Qualified in accordance with STANAG 4170 and AOP7 and assessed for S3 in accordance with STANAG 4315 and AOP46. During this qualification and assessment, evidence of the initial factors for stability and robustness of the munitions must be gathered and analysed to provide the baseline for future comparison. Before the munitions enter service, a Co-ordinator and primary SSE should be assigned to finalise and maintain the SPP.

3. Once the SPP has been completed the Co-ordinator will assign Programme Managers and SSE to develop Item TP for each Item identified as requiring surveillance in the SPP. The Programme Managers will also be responsible for identifying TE and Field Support Engineers (FSE) to conduct any testing and monitoring identified in Item TP. They will then prepare an IIP.

4. The Test Engineers and FSE will report progress to the Programme Managers at intervals agreed in the IIP. The Programme Managers will then discuss these results with the appropriate SSE and prepare a status report for the Co-ordinator. After each reporting period the Co-ordinator will convene a review panel to assess whether the system remains Reliable, Safe and Suitable for Service. The review panel will consist primarily of the Co-ordinator, the Programme Manager and the primary SSE. TE and other SSE may be called upon as required.

5. Once the panel has made their recommendations the Co-ordinator will decide whether the programme continues as planned or whether any of the ITP and IIP require amendment. The Test and Implementation Plans may be amended to increase/decrease periods between surveillance, change testing requirements or implement additional field monitoring. In some cases testing may be suspended if found to be inappropriate. Eventually the Co-ordinator in conjunction with the review panel will recommend that an item is withdrawn from service. The item should then enter a disposal phase. Where the item is withdrawn for safety reasons the Co-ordinator should recommend a maximum disposal period by which time all items must be disposed of before they become unsafe. If the item is withdrawn for reasons other than safety (e.g. poor performance) then disposal may not be a priority and it may still be necessary to continue some surveillance activities until the items final disposal.

6. The SPP also needs to consider if any specific test equipment or procedure is needed for the testing of the System/Sub-components/Items/Materials. The plan should identify where this test equipment will be needed and when. Most of the test equipment should have been developed during S3 and Qualification and the SPP need only identify the continued requirement and where it is to be stored and/or installed. This may include:

a. Special handling equipment for large missile systems.

b. Inert components and Makeweights.

c. Pressurisation Equipment for airtight containers.

d. Stands and fixtures for static performance tests.

e. Jigs and fixtures for environmental tests such as vibration.

f. Tooling for disassembly/assembly of components.

g. Electronic Test sets for electrical systems such as guidance sections.

h. Environmental Data Monitoring Equipment (e.g. EDL or Instrumented Monitoring Vehicles (IMV)).

i. Any bespoke Accelerometers, Pressure transducers, Strain gauges or other recording equipment.

j. Databases and data storage requirements.

1.7.2. Roles and Responsibilities

The following is an introduction to the key functions needed for a successful programme. How each role is fulfilled may differ depending upon the nation and availability of personnel, and may change throughout the process. In some cases, where the programme is small, or resources are limited, some individuals or organisations may fill multiple roles. At each stage throughout the life of the munitions under surveillance, someone with the appropriate resources and level of responsibility must fulfil the requirements for each of the following roles, to ensure the surveillance is successful.

a. Acquisition Program Manager (APM)

The APM is responsible for integrating program assessments, recommendations, and decisions into the maintenance and quality improvement efforts of the program. The APM is responsible for funding what would typically be the pre-service In Service Surveillance program development. This includes SPP/ITP/IIP documentation, samples (spares), test equipment, Engineering and Test Engineering participation, aging, type life studies, and predictive model development. The APM is also responsible for in-service DA/PM participation as required and the planning for and acquisition of ISS samples. The roles of the APM are detailed as follows:

(1) Provides resources for the development of the initial: Program Plan, Item Test Plans, Item Implementation Plans, characterization studies, aging or predictive models, and testing procedures.

(2) Provides test Item spares including sample acquisition resources; e.g. weapon disassembly and shipment of test items to test engineers.

(3) Provides peculiar or unique test equipment, fixtures and facilities.

(4) Establish the initial Service Life criteria and safety, reliability, and performance thresholds for the inventory.

(5) Ensures participation of the relevant SSE (e.g. Munitions Safety Engineers, Environmental Engineers, Design Engineers and Materials Ageing Scientists) in the program development and in-service phases.

(6) Include the data requirement clauses in the contract for specified data and funding to acquire this data.

(7) Include an ISS support clause in the prime contract, as appropriate; to allow Design and Manufacturing attendance to meetings, to resolve action items, to review and comment on test plans and reports as requested.

(8) Provide for Government resources to collect and maintain pre-production and production; design, lot acceptance, and maintenance data.

(9) Provides resources to support the analysis of production data to determine initial inventory strata.

b. APM ISS Representative

Where the acquisition or product management personnel are independent of the through life management personnel, the APM may or may not wish to assign an APM Representative to work with the Coordinator. Where there is no APM Representative their roles and responsibilities should be shared between the APM and the

Coordinator. The roles of the APM Representative are detailed as follows:

(1) Point of contact for integrating programme assessments with decisions on the maintenance or quality improvement of the system during the Acquisition life cycle Review of the Program Plan, approval of Item Test Plans, and Item Implementation Plans, and aging and characterization studies.

(2) Point of contact for storage and release of test item spares and direction and resource of sample acquisition requirements; e.g., disassembly and shipment of test items to test engineer.

(3) Point of contact for direction and resources for peculiar test equipment.

(4) Point of contact for System Support Engineering participation in the development and implementation phases.

(5) Co-Chair of system level Working Group meetings as appropriate.

(6) To ensure that all ISS related acquisition and maintenance data (Lot Acceptance Testing, First Article Testing, Functional Testing, production acceptance testing, etc.) are available.

(7) Notifies the PM on APM actions taken on ISS results and recommendations, including the preparation and promulgation of the revised service life expiration dates under APM signature.

c. The Through Life Program Manager (TLPM)

TLPM, in cooperation with APM, shall provide the required resources to execute the ISS Plan. In some cases the APM and TLPM may be the same person. Roles of the TLPM are further detailed as follows:

(1) Plans, programmes and budgets for execution of the programme after introduction to service.

(2) Reviews and endorses, as appropriate, ISS Plan test and evaluation results, assessments, and recommendations before they are forwarded to APM for information and action.

(3) Provides resources for the update or modifications of the initial: Programme Plan, ITP, IIP, characterization studies, aging or predictive models.

(4) Fosters improvement to testing and procedures.

(5) Submits periodical summary/status reports to APM and the End User as appropriate.

(6) Provides funds for the SSE participation in the programme development and in-service phases and for ISS unique tasking.

d. ISS Coordinator

The assigned Coordinator interfaces with the APM, or representative if nominated, as the primary point of contact for all programme level issues including overall coordination of Programme Management, work plans, and execution, programme documentation, progress reports, and reviews. Other Coordinator responsibilities include:

(1) Prepare and maintaining the Programme Plan.

(2) Ensure annual and multi-year plans are developed and submitted to TLPM for approval.

(3) Coordinate the annual ITP.

(4) Review and approve predictive model development efforts.

(5) Coordinate reviews to determine adequacy of test and analysis documentation, assessing test results, and reviewing test reports prior to forwarding reports to TLPM for review and subsequent transmittal to APM and other programme participants.

(6) Participate in the development of the ITP and IIP.

(7) Recommend working groups to the TLPM for development of documents and for resolving technical issues as required.

(8) Co-Chair ISS Working Groups.

(9) Overseeing sample acquisition process to assure timely receipt of test items.

(10) Provide yearly budget requirements to APM for sample acquisition.

(11) Include breakdown requirements, sample identification, quantity and sample acquisition manager requirements.

e. System Support Engineer (SSE)

The System Support Engineer roles and responsibilities include participation in development and maintenance of documentation, program planning and execution processes, integration of test item requirements and results and serving as a conduit for incorporating test item requirements and results into various technical groups, programs and design reviews. They could be design engineers representing the design authority/agent, technical safety specialists, reliability and performance engineers or surveillance experts. It is normal for the primary SSE to have a level of independence from the specific ISS process in order to remain more objective about the assessment of the results.

Roles are further detailed as follows:

(1) Participate in programme planning and working groups.

(2) Provide inputs and recommendations for test item candidates.

(3) Provide inputs and recommendations concerning the test item annual and multi-year plans.

(4) Collection, analysis and distribution of data from various sources including industry. Such data may include design & qualification reports, waivers, deviations, failure analysis reports, FMECA reports, etc.

(5) Provide the initial technical input to the proposed programme including inventory stratification and rationale.

(6) Provide inputs and recommendations concerning test year specific sample requests.

(7) Provide inputs and recommendations for test methods, critical characteristics, test parameters, evaluation criteria, operational and/or specification requirements.

(8) Provide inputs and recommendations for data collection across and integral to all programme components, analysis techniques and monitoring methods.

(9) Participate in the development and review of test documentation: Test Plans, Implementation Plans, and other ISS documentation and processes.

(10) Review and comment on test item test results.

(11) Integrate test item requirements and results into assigned activity, including serving as a conduit for test item requirements in various programme and design reviews.

(12) Notify the Coordinator and Programme Managers of impending acquisition or design related test and/or exercises.

(13) Participate in development and verification of predictive models.

f. Program Manager (PM)

The PM is assigned for each test item (e.g., rocket motor, warhead, battery, etc.). The PM is responsible for planning, testing, evaluating and reporting test item test programs. The PM designs the execution for each test item to monitor the conditions of the inventory to establish aging trends of the critical characteristics of the test item. The PM is responsible for the planning and co-ordination of the surveillance for a particular item. They will be responsible for the ITP and ensuring the IIP and EMP are followed. For some situations it is conceivable that the Co-ordinator and PM are the same person.

Roles of the PM are further detailed as follows:

(1) Develop and maintain ITP and IIP; coordinates development and changes with Coordinator, SSE, and TE.

(2) Review and analyse data from all test sources as it becomes available, analyse it, and provide summary of impact on system safety, reliability, and performance to Coordinator.

(3) Provide design, production, lot acceptance test, etc. data requirements to Coordinator for APM inclusion in procurement contracts.

(4) Identify to the Coordinator spares requirements for APM replacement of test items to be destroyed during life of the programme.

(5) Develop and provides test item programme plans, rationale and requirements.

(6) Plan and budget for TE tasking (including any disposal costs of test residuals).

(7) Develops detailed task or Statement of Work (SOW) for TE execution.

(8) Review TE operating procedures and test equipment and approvals for execution of testing.

(9) Provide test item sample requirement profiles.

(10) Discuss ISS Test Items test results with System Support Engineers and ISS Coordinator.

(11) Submit test reports to the ISS Coordinator after review by appropriate SSE.

(12) Provide inputs to design and In-service programme reviews and working groups.

(13) Recommend the TE include alternatives and supporting analyses when capital investment is required from either PM or a redundant test capability is being considered or established.

(14) Select the TE from either the public, private, or foreign sector.

(15) Explore and document any related efforts by other services/users of the item or similar items collecting data for use in analysis as part of the report/analysis process.

(16) Select/develop and verify predictive models and analytical techniques to be used to evaluate test items.

(17) Plan and submit budgets for the development/acquisition of test and evaluation technologies, equipment, models, simulations as necessary.

(18) Report progress to Coordinator.

(19) Test reports submitted at completion of test and evaluation/analysis cycle

(20) Attend working group meetings and APM programme reviews as required.

g. Test Engineers (TE)

TE can be individuals or organizations from, the public, private or foreign sector. They may change over the life cycle of the program. Full documentation, verification, validation and accreditation of all test procedures and equipment will be required from all TE. The TE may conduct both destructive testing and non-destructive testing on test items and report results as specified in tasks or Statements of Work (SOW). They may participate in Test Plan development working groups at the direction of the individual engineer. TE shall provide cost estimates to execute test plans, maintain internal operating procedures, equipment calibration, and certification etc. as directed by the ISS Engineer. The TE may be from the procuring government, the vendor government, the design authority or from an independent commercial organisation.

h. Field Support Engineer (FSE)

Where the plan calls for evidence of the environment, through monitoring in the field or through field testing, it is the Field Support Engineer who will ensure the calibration and correct placement of the monitoring equipment, and manage the retrieval of the data. Their responsibilities are similar to those of the TE but they will necessarily have a closer relationship with the Items End User or Platform SSE. In some circumstances, where operational data is required, they may have to be serving military personnel.

i. Data Management

The APM should ensure that an appropriate agency is tasked and resourced for receipt and maintenance of all ISS and associated data for the life of the system. This agency is then responsible for the overall coordination and management of data.

Roles of data management agencies are further detailed as follows:

(1) Organize and coordinate all data collection, validation and analysis.

(2) Develop and maintain data information system.

(3) Perform analysis as required, including comparisons with baseline data.

(4) Develop standard ISS related data manipulation tools to provide routine ISS related data reports.

j. Sample Management

The TLPM should ensure that an appropriate agency is tasked and resourced for getting requested samples out of inventory and to the test engineer in a timely fashion.

Roles of sample management agencies are as follows:

(1) Budget for storage and maintenance of test items and/or replacement items.

(2) Record movement of test items and replacement Items.

(3) Give munitions managers sufficient warning regarding removal of test items from service.

(4) Supply test items to the TE.

(5) Integrate sample acquisition into APM maintenance workload planning process.

1.8. ISS PROCESS

The program process is comprised of two main phases:

a. Development Phase.

b. Execution Phase.

Typically the introduction to service milestone separates the two phases. Figure 2 identifies these two phases along with the primary process elements for ISS.

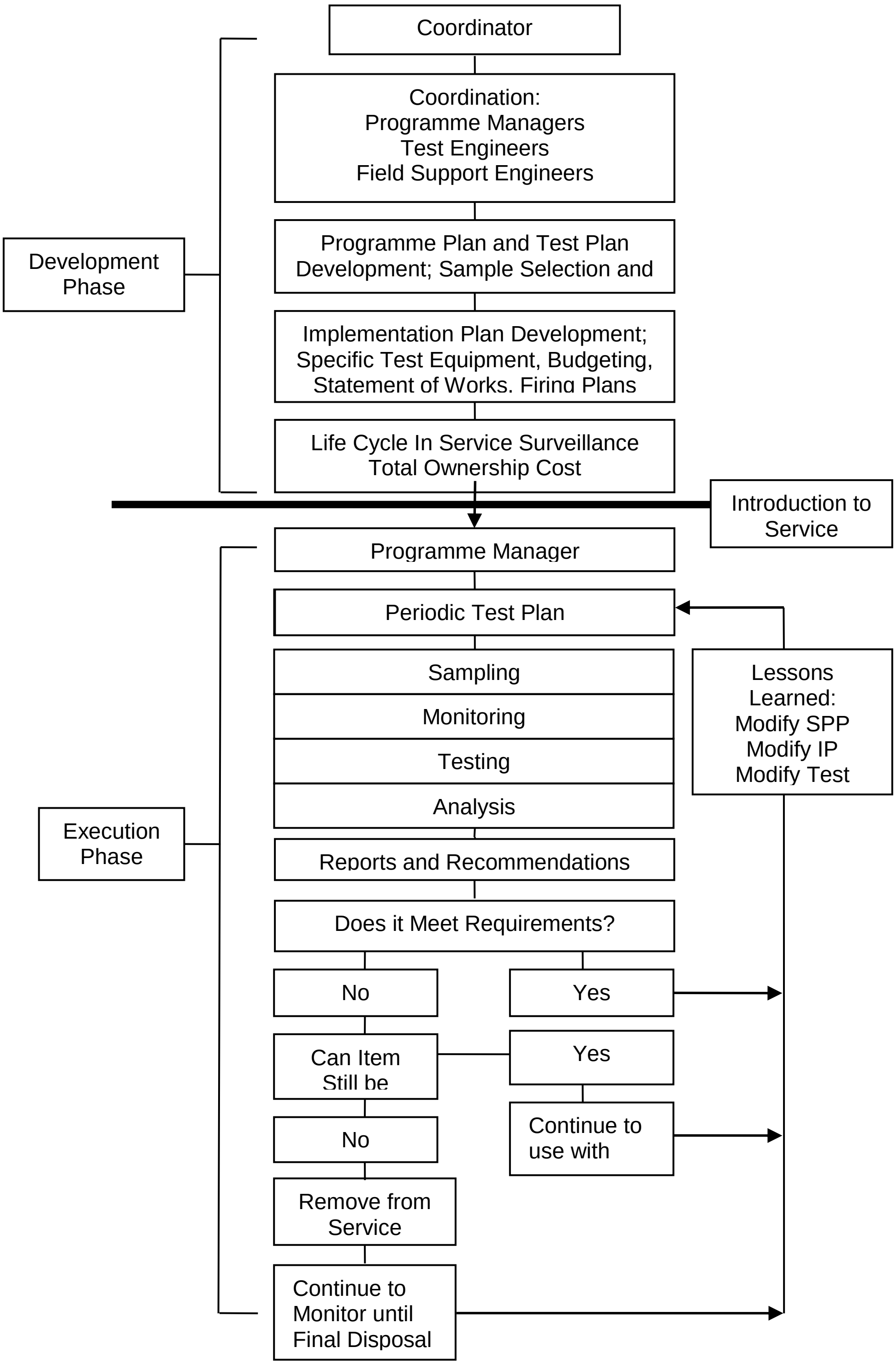

Figure 2 – ISS Program Process Flowchart

ANNEX A SYSTEM PROGRAM PLAN

A.1. FOR AN EXAMPLE SYSTEM/PROGRAM

This Program Plan and Program development guide is in the recommended Program Plan format. This document includes typical language, questions to promote thought, and/or examples of required information for most sections, for an “Example” program. As there is no such program as the "Typical Program", any and all specific Program Plans should be tailored to meet the needs and requirements of the individual programs. The goal of this document is to foster thought and facilitate documentation of ISS planning for munitions systems.

Cover Sheet:

.

This may Include Logos or other Identification of the Project and/or System. Consider Providing a Picture.

This Document should be Agreed and Signed by:

The Coordinator

The Acquisition Program Manager (or Representative)

The Through Life Program Manager

Design - System Support Engineer

Safety - System Support Engineer

Quality - System Support Engineer

A.2. CONTENTS

A SYSTEM Program Plan should include the following sections:

Section	Heading
1	MANAGEMENT OVERVIEW
2	INTRODUCTION
	Including
	System Overview
	Program Purpose
	Maintenance Intervals
	Configuration Control
	Data Sources
3	ISS PROGRAMME OBJECTIVES
4	ROLES AND RESPONSIBILITIES
	Roles and Responsibilities for Each Test Item
5	INTERFACE WITH OTHER PROGRAMMES
6	DEVELOPMENT PHASE
	Development Phase Responsibilities
	Development Phase Working Groups
7	EXECUTION PHASE
	Execution Phase Responsibilities
	Sampling Plan
8	TESTING
9	ANALYSIS, REPORTING & RECOMMENDATION
APPENDIX 1	SYSTEM DESCRIPTION
APPENDIX 2	REFERENCE LIST

A.3. MANAGEMENT OVERVIEW

Good procurement managers will ensure that aging and in service surveillance programmes exist for all degradable items (especially munitions) that are being developed or acquired. The initial planning and development of the ISS System Programme Plan is an acquisition phase requirement of the (Insert appropriate organization name) in accordance with STANAG 4675

National Instructions provide further policy and guidance regarding ISS programmes to ensure that weapons and ordnance safety, reliability, and performance does not degrade in the in-service environment.

The Plan will assess the SYSTEM NAME for aging trends that influence the safety, reliability, and performance of the SYSTEM NAME system and will be documented. The Acquisition Programme Manager (APM) and the Through Life Programme Manager (TLPM) jointly share responsibility for this programme. The APM agrees to provide resources to support the development and acquisition phase of the SYSTEM NAME as appropriate. The TLPM agrees to provide resources required to support the in-service phase of the SYSTEM NAME as appropriate. The APM, agrees to provide resources to provide engineering support, logistics support, and prepared samples for the execution phase as appropriate.

A.4. INTRODUCTION

1. System Overview

In this section is provided an overview of what mission the system was developed to perform (what platform, how, when, where, etc.). If necessary, a detailed description of the system shall be provided in Appendix A of this System Programme Plan (SPP). It may also be necessary to reference all pertinent development requirements (e.g. The System or User Requirements Documents) and relevant production documentation (e.g. Proof Schedules and Batch/Lot Acceptance Data Reports).

2. Programme Purpose

a. Munitions and their components undergo changes in safety, reliability, and performance with time and exposure to environmental stress. These changes are attributed to material properties and/or design and production processes and are affected by logistic and deployment environments and may become limiting factors that could restrict the service life of the system. It is essential that the critical characteristics and/or parameters of the system and components be identified and evaluated in relation to age and environmental stress exposure to ensure the highest state of safety, reliability and performance available. The SPP is established to evaluate this age and environmental exposure/stress related data and provide stockpile management recommendations.

b. ISS is a cooperative effort that provides practicality and cost effectiveness through minimum staffing and synergy with other test, evaluation, and analysis efforts or programmes, training exercises, school training, and maintenance and deficiency data reporting and collection programmes, as appropriate. The appropriate participants are involved in planning, testing, analysis, and reporting.

3. System Programme Plan Purpose

a. This SPP defines and describes the in service surveillance requirements for SYSTEM NAME. It identifies the objectives of the programme, roles and responsibilities of the participants, evaluation approaches at a system level and it identifies the items to be evaluated (e.g. Warhead, Rocket Motor, Batteries, etc). The details of each item such as critical characteristics/parameters, sample requirements, test requirements, costs, and procedures will be specified in the respective Item Test Plans (ITP) and Item Implementation Plans (IIP). Descriptions and requirements for each of these documents are detailed in ANNEXES B and C to this AOP.

b. System safety, reliability, and performance comprise the main ISS concerns for the SYSTEM NAME system. The SYSTEM NAME ISS programme evaluates the critical characteristics/parameters that have been identified by the Design Authorities, In-Service Support Engineers, and Safety, Reliability and Quality evaluation communities. These critical characteristics/parameters are those attributes that potentially change with age and/or environmental exposure and consequently may affect the safety, reliability, or performance of the system. Identifying the critical characteristics and/or parameters for each Test Item is not within the scope of this SPP and shall be provided in the appropriate ITP.

4. Maintenance Interval

The SYSTEM NAME recertification interval or maintenance period will be discussed in this section. The potential life limiting factors for the SYSTEM NAME as identified by the SYSTEM NAME technical community will also be discussed in this section. It should be recognized that maintenance data will affect the programme and, data will affect the maintenance programme; and as a result, this synergy may recommend End of Service Life (EOSL) and Reliability Centred Maintenance (RCM) intervals. You must address these issues here, as appropriate.

5. Configuration Control

The SYSTEM NAME SPP applies to SYSTEM NAME, variant(s) X, Y and Z in use. It includes developing a programme concept, specifying the conduct of aging and characterization studies, and providing inputs to the design process such as lessons learned, data extraction capability, documentation development and execution planning. Additionally, inputs must be made into the planning, programme and resource management process for spares procurement and logistics/maintenance funding to provide for sample removal from the inventory at the appropriate time and place. Address configuration control issues for this SPP in terms of known or anticipated configurations and variants of the items or variations in test or evaluation philosophy or processes that will be required to be covered. If necessary treat different configurations as separate Test Item populations.

6. Data Sources

The ISS baseline will be established from data derived during Engineering and Manufacturing Development (EMD), qualification tests, Lot Acceptance Tests (LAT), service firings, accelerated aging studies, predictive models, maintenance data, and engineering assessments. The SYSTEM NAME ISS will combine physical and functional data with component testing to identify changes that might affect safety, reliability, or performance.

A.5. ISS PROGRAMME OBJECTIVES

1. The objectives of the SYSTEM NAME ISS programme are to assess and evaluate (through test, evaluation, and data analysis) that the SYSTEM NAME will remain in a safe, reliable, and serviceable condition and that it will meet its operational performance requirements during its service life. This SPP implements national policy of the Nation undertaking in-service surveillance and assigns responsibility for the Programme.

Objectives include:

a. Determine the current condition, identify trends, and predict the future condition of the SYSTEM NAME inventory in terms of safety, reliability and performance.

b. Determine causes of decreased quality levels. Identify and evaluate factors affecting the current condition of the stockpile including those originating from design, production, maintenance, storage, and deployment and those resulting from combat systems interfaces.

c. Make End of Service Life recommendations to the APM/TLPM based on actual environmental conditions/stress. Provide feedback to APM/TLPM and the SYSTEM NAME Design Authority/Agent (DA) including any findings that may be design and warranty related.

d. Determine the effects of SYSTEM NAME programme stockpile improvement and/or maintenance decisions or actions on the safety, reliability and performance of the in-service stockpile.

e. Provide system and component level evaluations based on tests, modeling, simulations and other technical and statistical factors as appropriate. Identify components and/or replaceable assemblies (e.g. missile sections) requiring replacement during refurbishment maintenance periods; with sufficient advance notice to permit orderly planning and budgeting for the necessary maintenance and logistics actions.

f. Integrate findings into the acquisition process to improve design evolution and inform future product improvement processes.

g. Determine causes and effects of weapon failures, anomalies, and degradation trends.

h. Provide recommended corrective actions as appropriate.

2. STANAG 4439 tests that are performed during development assess the initial insensitive munitions hazards of the system. ISS tests, evaluation, and analyses are performed to detect changes in the properties of the energetic components. If testing (full scale or small scale) identifies changes in the mechanical, thermal, and chemical properties of the explosive from the design baseline, further tests may be proposed to investigate the explosiveness of the material. These tests should be proposed when there is reason to believe that system characteristics have changed from the original baseline.

A.6. ROLES AND RESPONSIBILITIES

Details of roles and responsibilities can be found in AOP 62 main text.

Key personnel and/or organizations should be identified in this section for each role/responsibility stated in AOP 62. In particular a responsible and empowered organization or individual must be identified for each of the following roles:

Coordinator
Acquisition Programme Manager (APM)
The Through Life Programme Manager (TLPM)
System Support Engineer (SSE)

Test Item Roles and Responsibilities

TEST ITEM	CORDINATOR	APM	TLPM	SSE e.g. Design Authority and/or Safety Authority
ITEM 1 e.g. Warhead Section				
ITEM 2 e.g. Propulsion Unit				
ITEM 3 e.g. Arming & Ignition				
ITEM 4 e.g. Guidance & Control				

Table 1 - SYSTEM NAME Item & Organization Assignments

A.7. INTERFACE WITH OTHER PROGRAMME

1. The coordinator shall coordinate joint use of test equipment from other programmes (where appropriate) and identify SYSTEM NAME test equipment requirements. These requirements shall be provided by the Coordinator annually to TLPM and the APM ISS Representative for review and consideration. APM is responsible for the initial acquisition of SYSTEM NAME unique test equipment and the TLPM is responsible for the acquisition and replacement of generic test equipment utilized by multiple test programmes.

2. Joint evaluation efforts and sharing of common data with other programmes will be pursued to the fullest extent possible. It is necessary to name and discuss the various inter-relationships with other programmes (National and International), including the sharing of funding, test equipment/facilities, comparison to data from other systems and memoranda of understanding.

A.8. DEVELOPMENT PHASE

1. This phase includes the up-front planning for the SYSTEM NAME ISS programme. It is in this phase where the programme concepts, Test Items (TI), technical approach, critical characteristics, test strategy, sampling approach/criteria, peculiar test equipment, aging & predictive models, and budget requirements need to be identified, planned and documented. The SYSTEM NAME programme must be carefully planned and budgeted as part of the Total Ownership Cost (TOC) of the SYSTEM NAME system programme. Programme development documentation includes the SPP, Item Test Plans (ITP) and Item Implementation Plans (IIP). Each is important and covers different levels of the ISS process. Detail descriptions of each of these types of documents are identified as follows:

a. System Programme Plan (SPP). This is a top-level document, which includes system level objectives, scope, description, roles and responsibilities. It explains the programme process and identifies the Test Items. The SPP is the master document, which umbrellas the ITPs and IIPs.

b. Item Test Plan (ITP). This document explains what is going to be executed during In Service Surveillance for each Test Item. An ITP is required for each TI identified in the SPP. It includes TI level objectives, scope, description, sampling concept, and critical characteristics. It is recommended that the initial ITP is prepared three years prior to the first In Service Surveillance of that particular TI.

c. ISS Item Implementation Plan (IIP). This document explains how the In Service Surveillance for a particular Test Item will be executed. It includes organizational roles, development & proofing of SOW, cost estimates for testing, milestones/timeline, storage issues, test equipment requirements, training requirements, test readiness review checklists, and budget requirements.

d. Development Phase Funding Responsibility. The SYSTEM NAME Acquisition Programme Manager (APM) will provide initial funding and ensure the resources required for ISS are included in the programme costs.

e. ISSP Development Working Groups. In the development phase, the Coordinator plays an important role in bringing the various communities together for the SYSTEM NAME programme development by use of working groups. The working groups may include Design Authorities, Engineers, Safety/Reliability/Performance Engineers, Acquisition Engineers, Test Engineers, and other members of the technical community. The issues that need to be addressed by the working group(s) during the initial planning stages include the following:

(1) Item Description. Obtain or provide a clear understanding of configuration, physical, electrical, mechanical, and explosive components, theory of operation, and application.

(2) Commonality. Investigate components and explosives common to other weapons systems. Investigate failure and aging history of those common components and explosives in order to determine what lessons learned can be applied to the SYSTEM NAME ISS Programme.

(3) Production History. Determine production profile. Determine who are the manufacturers and sub-contractors and what years of production are planned. If an item is already in production, investigate and track waivers, deviations, and Engineering Change Proposals (ECP). These may influence preliminary sample selection.

(4) Design Concerns. Determine which design elements are concerns to the Programme Manager regarding safety, reliability, and performance of the SYSTEM NAME system and TIs. Consider which design features are susceptible to malfunction or failure during extreme storage conditions and deployment environments.

(5) Critical Characteristics/Parameters. Critical characteristics are those elements that change with age and environmental stressing that may affect safety, performance, and reliability within the nominal life cycle of the SYSTEM NAME. The SPP needs to determine what the critical characteristics are not only at the TI level, but also how they interface at the sub-assembly and system level. It also, needs to determine what are the operational limits and should develop a good understanding of the aging accelerating conditions. The SPP should also

investigate and recommend methods for testing and evaluating the critical characteristics and for collecting data including baseline information.

(6) Sample Strategy. The SPP shall develop a sampling strategy. This includes determining whether special samples need to be produced or if samples will be taken from the inventory, or a combination of both. The SPP should determine the initial sampling construct. This is usually based on manufacturer, year of manufacture, waivers, deviations, ECPs, and other factors which may result in production variations. Final ISS sample constructs for a particular test cycle are dynamic and can change depending on the particular test objective(s) for that test cycle. Logistics, maintenance, and in-service condition/policies shall also be considered.

A.9. EXECUTION PHASE

1. This phase includes the test and evaluation cycles of the weapon system and its components. It takes place after the system is in service and is comprised of the “traditional” ISS elements, which include sample requisitioning, testing, analysis, and reporting and recommendations.

2. Execution Phase Responsibility

a. The PM is responsible for programme execution. This includes performing test and evaluation, maintaining documents (i.e., SPP, ITP, and IIP), drafting Test Plans, and modernising, replacing, and upgrading test technologies and equipment.

b. Sampling Concept (see AOP 63 for more detail in this area). The sampling concept may vary for each TI depending on availability, design sophistication, and production quantities. Further details of sampling can be found in AOP-63. Samples are selected on the basis of manufacturer, year of manufacture (age), production lot, production variations (i.e., waivers, deviations, and ECPs) and previous experience with similar production populations and fleet exposure.

The initial goal is to collect data from a broad age group that is weighted toward older samples (See AOP 63 for a description of fleet leaders). If testing yields unusual results then additional samples are taken from the same lot or population to further investigate the proliferation or consequences of the unusual features. Any potentially unsafe conditions must be reported to the SSE and a safety assessment conducted immediately.

Samples will be selected from various groups within the inventory with the goal to develop a "focused" sample that will allow evaluation and analysis of any suspected issue/problem. Spares to replace assets pulled out from the inventory shall be planned as needed and included as part of production planning.

A.10. TESTING

1. Testing the SYSTEM NAME TIs fall under four main categories:

   a. Functional destructive testing.

   b. Non-functional destructive testing.

   c. Functional non-destructive testing.

   d. non-functional non-destructive testing.

2. Destructive tests include arena/static fire type tests, detail teardown or dissection, explosive analysis, and sub-component function test. Non-Destructive testing includes visual inspection, physical dimensions, non-destructive electrical measurements, and radiographic, ultra-sonic, or other spectral examinations and inspections. One or a combination of destructive and non-destructive type testing may be used to evaluate a particular asset. The type of evaluation depends on the type of inspections and tests required to meet the test objectives and may vary from test cycle to test cycle for a particular TI.

3. Test Readiness Review

Test Readiness Reviews (TRR) are required prior to performing testing to ensure that test objectives are clearly defined and can be met by the test methodology/equipment. The following should be checked during a TRR:

   a. Test objectives and requirements are clearly defined.

   b. Test methodology capable of supporting objectives.

   c. Test equipment can meet the requirements.

   d. Test equipment is documented, validated, verified and accredited.

   e. Supporting equipment and facility in place.

   f. All necessary documentation prepared and approved (i.e., Hazard Classification).

   g. Material movement procedures in place.

   h. Scheduling.

   i. Personnel available, authorised and suitably trained (qualified and experienced).

A.11. ANALYSIS, REPORTING & RECOMMENDATION

1. During the analysis of the data, root causes for anomalies are investigated. It is necessary to determine if anomalies are caused by production, design, handling, aging, or a combination of these factors. Other data sources such as other testing, aging studies, explosive characterization, lot acceptance testing and qualification testing are utilized to determine trends and the effect they have on the asset in terms of safety, reliability, performance, and service life.

2. Data should always be presented in a way that the characteristics of stressed and unstressed test items can be compared with any noticeable differences clearly highlighted. Where it is the intention to treat any noticeable change in test item characteristics as acceptable without further action a full explanation of the reasoning behind such a decision must be given.

APPENDIX 1 – SYSTEM DESCRIPTION

A list of applicable specifications and drawings can be found in this APPENDIX.

1. Applicable Specifications:
   Item Proof/Performance Specifications
   Explosive/Hazard Data Sheets

2. Applicable Drawings:
   System Master Record
   System Marking Drawing
   System/Item Assembly Drawing

APPENDIX 2 – REFERENCE LIST

For larger projects an additional APPENDIX may be required for additional reference documentation.

a. System requirements documents or other requirement documents
b. Cost and operational effectiveness analysis applicable to the performance of the system
c. System level FMECA
d. System/Item Test and Evaluation Plan, especially critical parameters table
e. System Safety Plan.
f. System Integrated Logistics Support (ILS) Plan.
g. Any relevant engineering reports.
h. Accelerated aging of this unit
i. Technical evaluation reports
j. Operational evaluation reports
k. Production Reports
l. Prior Failure/Engineering Investigations
m. Security Classification Guide for the System
n. Aging Studies
o. Maintenance/Recertification Plan
p. Production contract/warranty clauses

ANNEX B ITEM TEST PLAN

B.1. FOR AN EXAMPLE ITEM FROM THE EXAMPLE SYSTEM

This Item Test Plan format and development guide is prepared in the recommended format of the actual document. This includes typical language, questions to promote thought, and/or examples of the required information for most of the sections, for an “Example programme”. As there is no such programme as the "Typical Programme", any and all specific programme Item Test Plans should be tailored to meet the needs and requirements of the individual programmes. The goal of this document is to foster thought and facilitate documentation of ISS planning for munitions systems.

Cover Sheet:

May Include Logos or other Identification of the Project and System from which the Item is taken.
Consider Providing a Picture of Your ISS Item.

This Document should be Agreed and Signed by:

The Coordinator

The Acquisition Programme Manager (or Representative)

The Through Life Programme Manager

Design - System Support Engineer

B.2. CONTENTS

An ITEM Test Plan should include the following sections.

Section	Heading
1	INTRODUCTION
2	OBJECTIVES
3	ISS PROCESS FOR THE ITEM
4	ITEM ISS PARAMETERS
5	EXISTING DATA SOURCES
6	EVALUATION TEST METHODS
7	EVALUATION TESTING
8	REPORTING AND PLAN REVISIONS
APPENDIX 1	DETAILED DESCRIPTION OF SYSTEM AND ITEM
APPENDIX 2	TEST METHODS, DESCRIPTIONS, AND APPLICATION OF RESULTS
APPENDIX 3	POINTS OF CONTACT

B.3. INTRODUCTION

1. The concept of the ISS programme for System Name is contained in System Programme Plan (SPP number xxx). The SPP provides the programme requirements, the roles and responsibilities of each member of the ISS team, and the planning processes required for execution of the programme. This Item Test Plan (ITP) provides the specific test and evaluation requirements for the System Name Component Name. It establishes the processes and procedures for evaluating the System Name Component Name for changes that could influence or impact system or user infrastructure safety, reliability and overall performance. The Component Name will be assessed to identify changes that may affect the mission capability of the System Name and to predict component or system level service life, maintenance intervals (i.e., reliability centre maintenance requirements), and/or storage requirements. These recommendations; i.e., service life changes or establishment, etc. will be submitted via the ISS Project Manager (PM) to the Acquisition Programme Manager (APM).

2. The introduction section will also include:

   a. An explicit statement in the ITP propagating the roles and responsibilities requirements from the applicable SPP.

   b. Mission Description. "What does the user need the thing to do and how will we know if it can do it. Example the XYZ widget must spin at 3200 RPM +/- 200 RPM for Z seconds with no more than 0.0Y seconds spool up time. This is a safety (or reliability or performance) requirement or multiple safety and reliability requirements. Is it reasonable and practical to measure this parameter? Reference the requirement documents that establish the need for the system/component and the parameters it is required to meet. Briefly summarise the mission in terms of objectives and general capabilities. Include a description of the operational and logistical environment envisioned for the system. No classified data is to be included in the ITP, but references to classified documents should be included to indicate where to find any classified information necessary.

c. Item Description. Briefly describe the item and how it fits into the overall system design. Define major subcomponents. Complete description of Item and System Design can be included in Appendices.

B.4. OBJECTIVES

Each of the items listed below should be addressed as an objective of the Component Name ISS effort. Detailed discussion of each of these is not necessary in this section; however each needs to be used in developing the specific component test, evaluation, and analysis processes.

a. Determine and evaluate changes in the Safety, Reliability and Performance (SRP) characteristics of the item and assess their impacts on in-service inventory/usage.

b. Identify changes related to age/environment/service use.

c. Determine the feasibility of establishing a predictive model that can be populated with ISS data; i.e., environmental, age, test, maintenance, usage, deficiency etc.

d. Provide end of service life or service use restriction predictions.

e. Develop contract data requirements (and justification/why) for lot acceptance data, as built configuration data, manufacturing processes data, etc. and forward to the Through Life Programme Manager (TLPM) or APM ISS representative for inclusion in acquisition contracts.

f. Provide recommendations for management of in service assets.

g. Provide feedback to engineering agencies for design related issues.

h. Determine causes and effects of weapon system failures, anomalies and degradation trends.

i. Provide recommended corrective actions for failures, anomalies, and degradation trends to APM.

B.5. ISS PROCESS FOR THE ITEM

1. To comprehend the system/component requirements that translate to the item test, evaluation and analyse requirements, the engineer must review all existing system and component documentation and data to fully understand the safety, reliability, and performance requirements the item is to meet. The SPP will include as a reference a comprehensive list of pertinent documentation and data sources that typically includes:

   a. System Development Documents – FMECA, test plans, logistics plan, system safety plans, maintenance and re-certification plans, aging studies, system security classification guide, etc.

   b. System Production Documents – Production contract and warranty clause, certificate of design, production specifications and drawings, production waivers/deviations, production failure/investigation reports, inspection and quality assurance results/data, production history homogeneity/stratification, etc.

   c. System In Service History Documents – Flight test data, environmental exposure, in service experience, depot repair data, etc.

2. From this documentation and data review the ISS team is prepared to outline the system requirements that become relevant to ISS of the Item.

3. The process the co-ordinator must follow to properly define the programme for the item, fits into three major categories; Planning, Execution, and Communication. The following process should be adapted to meet the objectives described above.

4. Item ISS parameters.

   List the critical parameters, characteristics and concerns for the ISS of this Item.

   a. List the critical parameters (including the source) – define the concern, outline its effect on safety, reliability, and performance, estimate its probability of occurrence (low, medium, high), and the technique to be used in evaluation. If an extended rationale is required include it as an appendix.

   b. Recommend frequency of testing (when will it be expected to become a problem and how will we be able to know sufficiently in advance to allow for orderly actions by the APM or users).

5. Existing Data Sources.

   List other programmes and data sources that will be used in the ISS of this Item.

   a. ISS of a similar systems or components.

b. Programmes conducted by other services or users.

c. System maintenance or re-certification programmes.

d. Other developmental data and existing information.

6. Evaluation Test Methods.

Outline the programme required for the Item.

a. Predictive modelling and non-destructive inspections.

b. Accelerated aging programmes.

c. Destructive testing and spares or replacements.

d. Equipment from other ISS efforts that is or will be common to this effort.

e. Inventory quantities and stratification.

f. Deficiencies in data (first article testing/lot acceptance testing/qualification) that needs to be addressed.

g. Required funding profiles, milestones and schedules.

7. Evaluation Testing.

Executing the test programme:

a. Develop Item Implementation Plans (IIP).

b. Propose/receive evaluation funding.

c. Order samples, receipt inspection, distribute to test agencies.

d. Conduct test readiness reviews (document - equipment calibration, correlation of system/item operation to the test, certify operation readiness).

e. Confirm first unit results and release remaining units.

f. Dispose of residuals and waste.

g. Collect data and analyse results.

8. Reporting and Plan Revisions.

a. Progress reports (monthly, quarterly, and annual) and notification of safety failure

b. Final (completion of ISS cycle) reporting of results, comparison to criteria (e.g. pass fail criteria, previous results, etc.), impact on service life goals or predictions, other inventory recommendations, aging trends. See Appendix E for an example of the report contents

c. Review and revise the IIP, ITP and SPP as required

d. Changes to evaluation methods, sample requirements, and ISS intervals as needed

APPENDIX 1 – DETAILED DESCRIPTION OF SYSTEM & ITEM

System Description

The detailed system description should include an overview of what mission the system was developed to perform (what platform, how, when, where, etc.). A list of key components and a diagram will be included. The detailed description of the system will be provided in the SPP.

APPENDIX 2 – TEST METHODS, DESCRIPTIONS, LIMITATIONS AND APPLICATIONS OF RESULTS

For each test, fill in the information for each of the 7 elements:

1. Test 1 - Name of Test

   a. Objective: Describe the objective of the test and what critical parameter it applies to.

   b. Method: Describe the test method or refer to an established method, e.g. ASTM, appropriate STANAGs/AOPs, National procedures, etc.

   c. Instrumentation and equipment: Detail any specific equipment required for the test.

   d. Data Obtained: List the data.

   e. Test requirements/environmental conditioning and controls: For example in a rocket motor firing this section would give the time out of chambers as a function of outside temperatures and insulation requirements to protect the asset until testing.

   f. Limitation: Give the limitations of the test and the data. i.e. what does this test not do for you.

   g. Application: Give the applicability of the data. i.e. what does this test do for you.

   h. Evaluation: Parameter Limits. Do you have end of life criteria? Specification only?

APPENDIX 3 – POINTS OF CONTACT

List of everyone involved (especially at the planning stage) including; area of responsibility, name, address, phone and e-mail

APPENDIX 4 – DETAILED JUSTIFICATION SHEET

Provide a detailed cost assessment and justification for the Item Test Plan. Include objectives, likelihood of success, the number of test items required and the population of Items covered by the results (e.g. Only Version 1 is covered or only Items in deep store are covered).

APPENDIX 5 – TEST REPORT OUTLINE

1. TITLE
2. CONTENTS
3. FOREWORD

   Point(s) of Contact including, Name, Activity, and telephone number

4. EXECUTIVE SUMMARY

   1 to 2 Paragraphs for a small item
   1 to 2 pages for a large or complex item

5. BODY OF REPORT

   a. Introduction

      (1) Scope: Provide a clear definition of the item, material, and processes covered by the report. Included are item/material descriptions in specific terms, the extent of the evaluation covered by the report and any limitations that have been imposed.
      (2) Objectives: State specific objectives of the evaluation, relating them to the objectives of system SPP, ITP, past findings, incidents, etc.
      (3) Background: This should be one or two paragraphs maximum (Reference the ITP as necessary).
      (4) Item Description: This should be a general description and usage of the item including the next level and the systems(s) that contain the item. Reference the ITP as necessary.
      (5) Production History: History of production of item including manufacturers of fully assembled item and major subassemblies, dates of production, and any material or process changes occurring during production of item. Provide numbers of items produced and number in current inventory.
      (6) Previous Test Results: General description of previous test and evaluations of item, including report number, date of test or evaluation, performing organisation, and general evaluation results and recommendations.
      (7) Service Life Parameters: Description of item characteristics, if any, that restrict usable life of item. Relate to ITP critical

characteristics. Provide total and remaining service life data of item and components.

(8) Processing Restrictions: Listing and general information on instructions or messages that provide item restrictions or unusual processing requirements.

(9) Deployment History: Listing those mechanical and climatic environments that the munitions have experienced this includes durations, temperatures, packaging configuration etc. This will help in the identification of ‘fleet leaders’.

b. Sampling

(1) Criteria: State specific criteria used in selecting evaluation samples to meet objectives. Include any in service monitoring data that may have led to that particular item being selected (e.g. longest air carriage hours or extended periods in high temperature surroundings).

(2) Stratification: Identify subpopulations present in current inventory of item.

(3) Test Sample Description: Detailed description of items evaluated by manufacturer, mark/modification, manufacturers’ lot numbers, serial number ranges, vendors, and other descriptive data.

(4) Inventory Represented: Subpopulations represented by the test samples.

c. Evaluation Criteria

(1) Overview: A brief description of basis for evaluation requirements, including controlling documents (ITP, specifications, etc.), organisations determining evaluation parameters, and specific tests and inspections performed.

(2) Operating Procedures: Include any standard Operating Procedures (SOP), processing manuals, or unique processing methods or procedures that have been established for the item evaluation.

(3) Evaluation Processes: A brief description of any test equipment and facilities used during the evaluation, including calibration / certification information as required, any required preconditioning of equipment or test items, and identification of any deviations from laboratory inspection and test plans. Identify any physical inspections performed, the parameters measured during testing and retesting performed. Specify if the retest was required by test

procedure or because of questionable results, and test item or equipment malfunctions.

d. Results

(1) This should give the results of the inspections and tests in both tabular and narrative form. The techniques used in test data analysis. Use of graphs, drawings and digital photographs is encouraged.

e. Data Analysis

(1) Present a narrative interpretation of the inspection and test results. Indicate any other data used in the analysis of inspection and test results; e.g., lot acceptance tests, qualification, preflight, flight, and transferable data from similar systems. Include results of previous inspections and tests as related to current results (e.g. trends to reinforce findings).

f. Conclusions

(1) The conclusions reached on the basis of inspection and test results and a discussion of evaluation results. Include comments/conclusions addressing safety, reliability and performance change indications.

6. OPERATIONAL RECOMMENDATIONS

Provide recommendations regarding the current safety, reliability and performance of the population the test items represent. If the safety or reliability is determined to be unsatisfactory, recommend actions to be undertaken such as change to training usage only, operational environment restrictions or specific maintenance operations.

7. RECOMMENDATIONS

Recommendations based on current evaluation results or evaluation programme requirements. These may include further or additional testing, modifications to the existing ITP and SOP (test frequency, sampling and test equipment) that the Coordinator needs to make, based on the change indicators or trends identified in paragraph 6.

8. OBJECTIVES STATEMENT

Statement on whether stated objectives identified in paragraph 1 were met and if not, why not. Are further tests or inspections required to meet objectives, or were objectives changed with joint community/Coordinator approval as a result of conditions found?

9. SAMPLE MANAGEMENT

Give the final disposition of evaluation samples including location and condition codes if applicable.

10. REFERENCE DOCUMENTS, DRAWINGS AND DETAILED TEST RESULTS

11. REPORT STAFFING PROCESS

a. External Review

The draft report shall be sent to the item, technical specialists and prime contractor, if applicable, for review and comments. This provides a fully staffed report to the PM and the APM instead of the PM and/or the APM having to start the review process.

b. Review Comment Incorporation

Review comments shall be incorporated into the report. A discussion on any areas of differences between engineers and reviewers together with proposed plans to resolve these differences shall be included in the report.

c. Final Review

After incorporation of community comments, report shall be submitted to the management chain for final review and sign-off:

Engineer or Report Author
System Support Engineer
Manager or APM or Designated management official for formal signature
Coordinator
Project Manager

12. REFERENCES

System ORD/MNS or other requirement documents

System Specification & Item Specification

System-level FMECA

System/Item Test and Evaluation Master Plan, especially critical parameters table

System Safety Plan

System Integrated Logistics Support (ILS) Plan

Drawings of the item

Any relevant engineering reports

Accelerated aging of this unit

Production Reports

Prior Failure/Engineering Investigations
Security Classification Guide for the System
Ageing Studies
Maintenance/Recertification Plan
Production Contract/warranty clause

ANNEX C ITEM IMPLEMENTATION PLAN

C.1. FOR SYSTEM NAME, ITEM NAME

This Item Implementation Plan format and development guide is in the recommended format. This document includes typical language, questions to promote thought, and/or examples of required information for most sections, for an “Example” programme. As there is no such programme as the "Typical Programme", any and all specific programme Implementation Plans should be tailored to meet the needs and requirements of the individual programmes. The goal of this document is to foster thought and facilitate documentation of ISS planning for munitions systems.

Cover Sheet:

May Include Logos or other Identification of the Project and System from which the Item is taken.
Consider Providing a Picture of Your ISS Item.

The IIP is a tool for communicating “How” the ISS for a test Item will be executed. It documents the process used in planning, conducting and communicating the evaluation of an Item. The IIP is the work agreement between the Acquisition Programme Manager and Test Agency (i.e. a Statement of Work)) and identifies the process for releasing to test (Test Readiness Review). The IIP can be tailored to meet the needs of a given programme; it can document either a single test, a sequence of tests, or a group of tests.

This Document is Agreed and Signed by:
The Coordinator
The Test Engineer

C.2. CONTENTS

An ITEM Implementation Plan should include the following sections.

Section	Heading
1	INTRODUCTION
2	OBJECTIVES
3	ROLES AND RESPONSIBILITIES
4	ITEM TEST READINESS AND ISS PROCESS REVIEW
5	POINTS OF CONTACT

C.3. INTRODUCTION

Item Description

Briefly describe the item and how it fits into the overall system design. Define major subcomponents or subassemblies. Provide a detailed description of how the item operates within the weapon system. Describe all features of the item that impact the safety, reliability and performance of the system.

C.4. OBJECTIVE

Determine and evaluate the response or reaction of the enter component name to enter name of test.

C.5. ROLES AND RESPONSIBILITIES

Identify all participants (organisation, name, phone number and email address) and their roles and responsibilities in the execution of work required by this Plan. Details of the roles and responsibilities can be found in AOP A.

C.6. ITEM TEST READINESS AND ISS PROCESS REVIEW

Paragraph 4 must be completed with sufficient detail to ensure thorough definition and understanding all elements of accomplishing the work. When completed, Section 4 provides a test readiness review checklist ensuring the test is ready to proceed.

1. Details of the Item and any Test History

    a. Provide historical summary of this item or similar items that have been subjected to this test. Provide relative level of concerns.
    b. Objectives and results of previous tests of this Item, ISS, evaluation trials, lot acceptance tests.
    c. Prior test results of similar items, as tested locally or by others.
    d. Identify Item failure modes.
    e. Test item configuration (S/N, lot, applicable waivers and deviations, in-service exposure). Include other developmental data and existing information.
    f. Identification of hazardous components and contents of each.

2. Data Requirements and Assessment

Provide a required Format for Data sheets, Electronic files, audio/video, or Photographs.

3. Shipping and Storage Requirements

Provide local stock numbers, interim or final Hazard Classification and identify any special handling or storage requirements.

4. Training, Test Procedures, and Equipment Requirements

    a. Define personnel training and qualifications requirements for this effort.
    b. Define methods for conducting the test (STANAG, AOP, SOP, National procedures).
    c. Specify test fixtures and unique tools required for the operation.
    d. Specify instrumentation and data acquisition systems to be used, and calibration requirements.
    e. Identify and document correlation methods. Compare proposed data and methods to previous test data and methods.

5. Test Start and Stoppage Criteria.

    a. Who must be present to start or must confirm first unit test results before proceeding.
    b. How many failures/successes before stoppage.

6. Expected Results and Pass/Fail Criteria

    a. Values (units and tolerance), mean, standard deviation.
    b. Determination and resolution of statistical outliers.

7. Supporting Analyses

Identify any other analyses required upon completion of the test. Particularly for defects or faults identified that were not expected as part of the original test regime.

8. System Safety Analysis

Provide for the Item as well as the test facility.

9. Management of Residuals and Waste

a. Define how

b. State by whom

10. Reporting

a. Milestone charts; provide progress report frequency and method, and final report requirements.

b. Document costs projected to accomplish each significant phase, such as an individual test or sequence of tests. Provide sufficient breakdown to identify ancillary costs such as packing, shipping, storage, and disposal.

11. Statement of Work/Standard Operating Procedure

A contract ready Statement of Work or a verified Standard Operating Procedure in accordance with applicable national safety requirements shall be created using the information developed in paragraph 4.

C.7. POINTS OF CONTACT

List including; area of responsibility, name, address, phone & e-mail

INTENTIONALLY BLANK

AOP-62(A)(1)