Aviation Fuel Quality Control Manual

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NOTE : The Manual is in accordance with EI/JIG STANDARD 1530 and Conforms with DEF. STAN91 – 91 Issue 7, Amendment 3 and AFQRJOS Checklist Issue 28, March 2015.

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Chapter 1

Introduction

1.1 Purpose

Hellenic Petroleum (HEL.PE.) operates the Aspropyrgos Refinery, in which there are Jet A-1 facilities dedicated for pipeline transfer {by Athens Airport Fuel Pipeline Company (AAFPC)} to OFC Aviation fuel Services (OFC) located at the Athens International Airport (AIA).

- HEL.PE. owns and operates the Jet A-1 tanks and the piping up to the inlet of AAFPC pump station.
- AAFPC owns and operates the Pipeline facilities from pump station up to receiving station at OFC, including the pipeline pressure release system (PRV) and the connection of the pig trap to OFC slop tank.
- OFC owns and operates the Airport Tank Farm and Hydrant Refuelling System.

It is essential to mention that above facilities are operated via automation systems, which are interconnected. Specifically, the OFC system checks and ensures that OFC is safe to receive fuel and provides the "Ready to receive signal" to AAFPC system continuously. Any abnormality or emergency observed by the automation systems immediately shut-off the fuel transfer.

The purpose of this quality control Manual is to ensure that:

a) The fuel is meeting the applicable specification (latest issue of Aviation Fuel Quality Requirements for Jointly Operating Systems, published by JIG (Joint Inspection Group) in all phases of the transfer, e.g. from HEL.PE. to OFC.

b) The requirements on fuel quality control and operating procedures of all facilities involved from Refinery to the Airport Tank Farm are followed by HEL.PE. AAFPC and OFC as per latest issue of Guidelines for Aviation Fuel Quality Control and Operating Procedures for Supply and Distribution Facilities

The delivery of aviation fuel into aircraft tanks is the last link in the chain of storage and handling. It is not only necessary to ensure that the prescribed precautionary measures are taken at this stage but also to be able to provide at all times a complete history of all fuel movements and quality control reports.

The content of this document is endorsed by HEL.PE., AAFPC and OFC shareholders, each one for its area of operations, as described above.

The fuel quality specifications shall also be incorporated in all agreements, by reference to the current issue of the Fuel Quality Control Manual.

1.2 Scope

The following chapters in this document give standards for the design of joint storage and handling systems, where relevant to quality control considerations, and for the operating and quality control procedures to be used in such systems. Corresponding standards applicable to joint airport depot operations and joint into-plane fuelling services may be found in the following separate documents:

(a) Aviation Fuel Quality Control and Operating Standards for Airport Depots and hydrants. (JIG 2).
(b) Aviation Fuel Quality Control and Operating Standards for Joint Into-Plane Fuelling Services.(JIG 1).

1.3.1. Definition of Joint Venture

A JIG Joint Venture is an aviation fuel handling operation where there is a minimum of two Guarantor Member companies from the list below, operating to this Standard.

Eni	Kuwait Petroleum
BP	Shell
Chevron	Statoil
Exxon Mobil	Total

An inspection report shall be issued by the inspecting company not later than six weeks after inspection completion. Inspection Report shall be distributed by the Inspecting Company directly to the HEL.PE., AAFPC and OFC Managers.
Mandatory requirements in this Standard are designated by the word "shall". Recommendations and best practices are designated by the word "should". Optional items are designated by the word "may".

1.3.2 Application to Joint Ventures.

A JIG Joint Venture as described above shall operate to the entirety of this Standard. Detailed procedures based on this Standard shall then be prepared and incorporated in, or appended to, the signed operating agreement covering the system, to make them formally binding to all participants. If company participation is different between the supply and storage operations, airport depots and the into-plane fuelling arrangements, separate agreements and procedures shall be prepared for each independent operation.
The fuel quality specifications shall also be incorporated in all operating agreements, by reference to the current issue of the JIG Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS) Check List, or other mutually agreed approved aviation fuel specification.

1.4 Staff Responsibilities and Inspection Requirements

It is the responsibility of the HEL.PE., AAFPC and OFC management to ensure that the facilities design and operating procedures as set out in manuals and other directives conform to acceptable industry standards and to all the relevant requirements of government authorities with respect to safety, security, fire prevention and environmental protection. For this purpose AAFPC is encouraged to visit its facilities located in both HEL.PE. and OFC to ensure proper, safe and reliable operations, including maintenance requirements.

The prime responsibility of AAFPC is to ensure that all consignments of fuel are received and maintained in complete conformity with the requirements of the agreed specifications, and that they are delivered in a safe and satisfactory manner to the airport.

The Managers of HEL.PE., AAFPC and OFC have overall responsibility for all aspects of the operations under his control, and is responsible for ensuring that all operations are carried out in accordance with the agreed procedures, and with all generally accepted standards of safety and good practice.

HEL.PE, AAFPC and OFC facilities shall be inspected annually by one of the pipeline Users (Fuel Suppliers) on a rotation basis, not less than twice a year, at least one of these inspections being carried out with an international group inspector. All these inspections shall be made to ensure compliance with the Guidelines for Aviation Fuel Quality Control and Operating Procedures for Supply and Distribution Facilities. No deviations are allowed which reduce the requirements of the Guidelines.

Before leaving the location, the inspector shall discuss the recommendations to be made in the report with the HEL.PE, AAFPC and OFC Managers. Where these recommendations cover deviations from procedures laid down in the operating and quality control manuals of the system concerned, corrective action shall be implemented by the Manager.

Items of a serious nature shall be immediately communicated to all Users.

An inspection report shall be issued by the inspecting company not later than six weeks after inspection completion. Inspection Report shall be distributed by the Inspecting Company directly to the HEL.PE., AAFPC and OFC Managers.

All Users shall be also provided with a copy of the inspection reports by the inspecting company. HEL.PE, AAFPC's. and OFC Managers have to prepare a status (follow-up) report, relevant to the actions required, within 3 months. It is the responsibility of the Users to initiate and co-ordinate the required corrective action recommended in the report, and to provide all Users with a report within three months of all actions taken. It is the responsibility of the inspecting company to ensure that recommendations made are then acted upon. If recommendations are not implemented they shall be addressed by the inspecting company to the Airport Fuelling Committee.

1.5 Joint Venture Staff Responsibilities and Inspection Requirements

1.5.1 Staff Responsibilities

It is responsibility of the joint venture management (i.e. the operating company board of directors or the operating committee) to ensure that the facility design and operating procedures as set out in manuals and other directives conform to acceptable industry standards and to all the relevant requirements of government authorities with respect to safety, security, fire prevention and environmental protection.
The prime responsibility of joint supply facilities staff is to ensure that all consignments of fuel are received and maintained in complete conformity with the requirements of the agreed specifications and that they are delivered in a safe and satisfactory manner to the airport and to the satisfaction of all participants.

The Manager of joint supply facilities shall have overall responsibility for all aspects of the operations under his control and shall be responsible for ensuring that all operations are carried out in accordance with the agreed procedures and with all generally accepted standards of safety and good practice.

1.5.2 Inspection Requirements

International inspections shall be carried out at joint supply facilities once per year. However, the frequency of these international inspections may be increased or decreased at certain locations by unanimous agreement of the international participant companies.

The inspections are made to ensure compliance with the locally prepared joint procedures. No deviations which reduce the requirements of the Guidelines should be made without the unanimous approval of international participants. The locally prepared (site specific) joint procedures manual shall include an updated list of any approved deviations, a copy of which (in English language) should be made available to international inspectors.

Before leaving the location, the international inspector shall discuss the recommendations to be made in the report with the Manager.

Where these recommendations cover deviations from procedures laid down in the manuals of the system concerned, corrective action shall be implemented by the Manager.

Items outside the scope of the manuals and/or Manager's authority shall be referred by the inspecting company to the International Participants for resolution. Items of a serious nature shall be communicated to the local Manager and all participants.

An inspection report shall be issued by the inspecting company not later than six weeks after inspection completion and distributed to the participants and the Facility Management. The JIG Website should be used for this process.

It is the responsibility of the Facility Management to initiate the required corrective action recommended in the report, and to provide all participants with a Status Report within 3 months of all actions taken. Further Status Reports should be issued as necessary until all required corrective action has been taken (or until the issue of the next international inspection report). Status Reports should be uploaded to the JIG Website by the Facility Management. Any matters of contention shall be referred to the International Participants for resolution.

All locations shall regularly be reviewed by one of the local participants with the objective of ensuring that any outstanding international inspection recommendations are implemented.

1.5.3 Standards Variance Approvals at JIG Joint Ventures.

No variances that modify the requirements of the Standards shall be approved without the unanimous approval of International Head Offices of the JIG Joint Venture participants. The approval process shown below shall apply to all JIG Joint Venture locations included on the JIG Inspection Programme:

1.A Variance Approval Certificate shall be prepared and agreed by the local technical/ management/board, without delay.

2.The Joint Venture manager submits the Variance Approval Certificate as an email attachment to the JIG Administrator (trowjeta1@aol.com), requesting approval within a

specified deadline. The JIG Administrator will coordinate a review by the international participant companies.
3.Participant JIG Operations Committee representatives reply to the other participant Operations Committee members, copy to the JIG Administrator ((trowjeta1@aol.com),giving their approval or outlining their reasons for not agreeing to the proposed variance.
4.The JIG Administrator informs the Joint Venture (copy to participants) when approval is complete, retains copies of all approved Variance Certificates and brings items of general interest to the attention of the relevant JIG Committee.
5.Where a proposed variance is not approved, the JIG Administrator informs the Joint Venture Manager.

Approved Variance Certificates shall be reviewed annually by local management and at least every three years by the international participant companies.
Approved Variance Certificates shall show an expiry date that shall be the minimum time required for comliance. Any extension shall be reviewed by the relevant JIG council members.

Where applicable national or regional legislation requires compliance with a standard that differs from this Standard, this shall be clearly documented using a Variance Approval Certificate. (Note the Head Office approval section is not required in this case).

Chapter 2

Sampling and Testing

2.1 General

At appropriate stages during the handling and storage of Jet A-1, samples will be required for laboratory or visual examination in order to establish that products meet the requirements of the relevant specifications, or to detect contamination or deterioration.

2.2 Sampling

Sampling is undertaken by competent, trained personnel using correct procedures and apparatus. This is to ensure that the sample obtained is truly representative of the material from which it has been drawn.

Sampling is in accordance with the latest requirements of the following procedures or other approved standard or equivalent:

(a) ISO 3170 (IP Petroleum Measurement Manual, Part VI, Sampling Section 1, Manual Methods, Second Edition, July 1986).
(b) American Society for Testing and Materials (ASTM), Standard Practice for Manual Sampling of Petroleum and Petroleum Products. (D4057)

For detailed sampling procedures, not covered herein, reference should be made to the above publications.
Sampling equipment fabricated from copper or its alloys shall not be used for sampling Jet fuels. Refer to ASTM D4306 for suitable materials.

2.2.1 Basic Requirements

(a) Samples are drawn from a gauge hatch or other suitable opening giving direct and unrestricted access to the bulk of the liquid.

(b) Containers must be as specified in Section 2.2.3., “Sample Containers”.

(c) Prior to sampling, the apparatus and the container are flushed and rinsed thoroughly at least three times with the product to be sampled and allowed to drain before use.

(d) No sample container shall be completely filled with liquid. Approximately 5% ullage must always be left to allow for expansion.

(e) Containers are sealed and labelled immediately after filling. The label attached to the sealed container should bear the following relevant information where applicable:

Sample No.:
Date and Time:
Taken by:
Place:

Type of Sample:
Tank No./Vehicle Compartment No./or location:
Batch No.:
Grade or Specification:
Test Required / Performed:
Inspector / Sampler Mark:

(f) Records are maintained of all samples taken.

(g) If samples are required by User of OFC or other authorised party, a duplicate is taken and retained until clearance is obtained.

2.2.2 Sampling Terminology

Upper Sample
A sample obtained from the middle depth of the upper third of the tank contents.

Middle Sample
A sample obtained from the middle depth of the tank contents.

Lower Sample
A sample obtained from the middle depth of the lower third of the tank contents.

Single-tank Composite Sample
A sample obtained by blending Upper, Middle and Lower samples. For a vertical tank of uniform cross-section, the blend consists of equal parts of the three samples.

Multiple-tank Composite Sample (MTC) (ships, barges, etc.)
This is a mixture of individual Composite Samples from the several compartments each of which contains the same grade of product. The mixture is blended in proportion to the volume of material in each compartment. It is permissible to combine up to five compartment samples into a single MTC. (For road and rail tank cars the maximum permitted compartments for composite samples is three).

Bottom Sample
A sample obtained from the material on the bottom surface of the tank or container at its lowest point.

Drain Line Sample
A sample obtained from the water draw-off or drain point of a storage or vehicle tank or filter body.

Line Sample
A sample obtained from a line sampling point, drawn while the product is flowing.

Hose End Sample
A sample obtained from a fueller or hydrant dispenser delivery hose-end coupling or nozzle.

2.2.3 Sample Containers

(a) Laboratory Sample Containers

Glass or metal, or specially approved plastic containers for laboratory testing or for retention samples are new or provided by the laboratory in a clean condition (see ASTM D 4306 for suitable container).

Metal containers shall be of an approved design, preferably internally lined with a suitable epoxy coating. Plastic containers may be used only after examples of the constructional material have been checked for compatibility with the product(s) to be stored.

Containers, even when new, should be carefully rinsed at least three times with the product to be sampled; this is critical, particularly in the case of MSEP testing.

(b) Field Sampling Containers

Clear, clean glass jars of 1 litre capacity with wide necks and screw caps should be used for product examination in connection with the Appearance and Visual Check procedure. Closed sampling clear glass containers or visijars may also be used. Where, in addition, buckets are used, these should be manufactured from good quality stainless steel or lined with white enamel. The enamel lining shall be no thicker than 2mm (0.08") in order to allow static charges to dissipate. Buckets shall be equipped with an effective bonding cable and clip.

(c) Packaging for Air Transport

Containers for the transportation of samples by air shall be of an International Civil Aviation Organisation (ICAO) approved design and shall be dispatched in accordance with the latest edition of the "ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air" and "IATA Dangerous Goods Regulations".

2.3 Sample Testing

2.3.1 General

Testing shall be accomplished in accordance with the latest requirements of the following approved standards or equivalent:

(a) IP Standard Methods for Analysis and Testing of Petroleum and Related Products (latest edition).
(b) Book of ASTM Standards (latest edition).

The analysis of aviation fuel shall be carried out only by national accredited laboratory.
Laboratory participation in a Cross Check Programme is particularly important where an airport depot is supplied direct from a refinery and no recertification tests are performed at the airport.

2.3.2 Definitions

(a) **Refinery Certificate of Quality**

The Refinery Certificate of Quality is the definitive original document describing the quality of an aviation product. It contains the results of measurements, made by the product originator's laboratory, of all the properties listed in the latest issue of the Aviation Fuel Quality Requirements for Jointly Operated Systems Check List, or other equivalent specification. It also provides information regarding the addition of additives, including both type and amount of any such additives. In addition, it includes details relating to the identity of the originating refinery and traceability of the product described. Refinery Certificates of Quality shall always be dated and signed by an authorised signatory.

(b) **Certificate of Analysis**

A Certificate of Analysis is issued by independent inspectors and/or laboratories and contains the results of measurements made (downstream of the refinery) of all the properties included in the latest issue of the Aviation Fuel Quality Requirements for Jointly Operated Systems Check List. It cannot however include details of the additives added previously.

It shall include details relating to the identity of the originating refiner and to the traceability of the product described. It shall be dated and signed by an authorised signatory.

NOTE: A Certificate of Analysis must not be treated as a Refinery Certificate of Quality.

(c) **Recertification Test Certificate**

This document contains the results of the Recertification Test (see 2.3.4 (b) below) and confirms that the product is satisfactory. It shall be dated and signed by an authorised signatory.

(d) **Periodic Test Certificate**

This document contains the results of the Periodic Test (see 2.3.4 (c) below) and confirms that the product is satisfactory. It shall be dated and signed by an authorised signatory

(e) **Release Certificate**

This document supports any transfer of product, confirming compliance with the JIG Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS) Check List or with an agreed equivalent specification, and contains at least the following information:

- Date and time of loading or transfer
- Grade of fuel

- Batch number and batch density (at 15^{o}C) of the product in the tank from which it originated
- "Water Free" Certification

If required by any one of the participants, the density and the temperature of the product after loading should also be recorded.
The Release Certificate shall be dated and signed by an authorised signatory.

2.3.3 Test Requirements

Where product can be positively identified by documentary evidence as belonging to a particular batch, covered by a related Refinery Certificate of Quality, then it is only necessary to conduct such additional tests as are required to prove that product quality has not changed.

The results of such tests shall be compared with the results of the last tests, as well as reviewed for compliance with specification.

If any test results indicate that the sample does not comply with the applicable specification, or that contamination has occurred, the product shall be immediately quarantined and remain under quarantine until further testing has established that the quality is "Accepted for Aviation Use" by all participants.

2.3.4 Testing Terminology

(a) Certificate of Analysis Testing

This covers all tests required by the latest issue of the Aviation Fuel Quality Requirements for Jointly Operated Systems Check List.
FAME (Fatty Acid Methyl Ester) concentration shall be tested by an approved method, wherever Jet fuel has been transported in multi-product transport systems that also carry gas oil/diesel fuel or non-dedicated storage that may have contained gas oil / diesel fuel. FAME may be present due to carryover or cross contamination within the common unsegregated distribution system for fuels. Therefore, this limit shall be applied at the first point where Jet fuel is within a segregated and dedicated Jet fuel supply system following transportation and/or storage in multi-product distribution systems known to present a risk of FAME contamination (see Annex G of Defence Standard 91-91 for further guidance).

Sample quantity required:
Jet A-1 2 litres minimum. (An approved sample container as specified in sub-section 2.2.3. shall be used).
An approved sample container as specified in 2.2.3 shall be used.

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(b) Recertification Test

This test is carried out to verify that the quality of the aviation fuel concerned has not changed and remains within the specification limits, for example, after transportation in ocean tankers or multi-product pipelines, etc.

The results of all Recertification Tests must be checked to confirm that:-

- the specification limits are met
- no significant changes have occurred in any of the properties

This check shall be made by comparing the recertification results with the corresponding values shown on the last previous analysis made on the fuel (e.g. with a Refinery Certificate of Quality or previous Certificate of Analysis or previous Recertification Test Certificate). Only by checking that the determined properties have not changed can it be safely assumed that the remaining unchecked specification properties have also not changed significantly and remain satisfactory.

The check shall be carried out by recording all relevant details on forms of the type shown in Appendix A2. Acceptable differences are given for guidance on the forms. If one or more of the results exceeds these values then the product must not be released until an adequate explanation is found, or until it is confirmed that the product meets the remaining unchecked specification properties.

There may be occasions where contamination significantly affects more than one of these results, but the differences remain within the acceptable differences. Detailed advice on how to identify and deal with such instances should be provided for inclusion in the particular operating manual.

In circumstances where more than one new batch is received into a tank:

- where facilities and circumstances permit, the tank contents should be circulated to ensure the homogeneity of the product prior to sampling;
- additional columns must be introduced on the forms so that a separate column is used for each batch and for any stock which was in the tank;
- the comparison shall be based on calculated values taking into account the amount of each batch in the tank;
- if more than three new batches are received into a tank, the comparison becomes difficult and possibly meaningless, and therefore the contents of the tank shall be tested against all the requirements of the Specification.

Test requirements are:

	Jet A-1	Avgas
Appearance/Colour	X	X
Saybolt Colour	X	-
Distillation	X	X
Flashpoint	X	-
Density @ 15^{o}C	X	X
Reid Vapour Pressure	-	X

Freezing Point	X	-
Corrosion (copper)	X	X
Existent Gum	X	X
Lead Content	(1)	X
Knock Rating (Motor Method) Lean	-	X
Conductivity and temperature	(2)	-
MSEP	X	-
Thermal Stability (JFTOT)	(3)	-
FAME	(4)	-

Sample quantity required:

Jet A-1 : 2 litres minimum.
Avgas : 4 litres.
An approved sample container as in sub-section 2.2.3 shall be used.

(1) If contamination with leaded fuel is possible.
(2) To be carried out on bulk stock in storage, or immediately after taking a sample from bulk storage.
(3) Where, contrary to recommended practice, Jet A-1 is received from ships equipped with copper pipework in their cargo tanks, this test shall be performed.
(4) FAME (Fatty Acid Methyl Ester) concentration shall be tested by an approved method, wherever Jet fuel has been transported in multi product transport systems that also carry gas oil/diesel fuel or non-dedicated storage that may have contained gas oil/diesel fuel.
FAME may be present due to carryover or cross contamination within the common unsegregated distribution system for fuels. Therefore, this limit shall be applied at the first point where Jet fuel is within a segregated and dedicated Jet fuel supply system following transportation and/or storage in multi-product distribution systems known to present a risk of FAME contamination. (See Annex G of Defence Standard 91-91 for further guidance).

(c) Periodic Test

This test is carried out to certify that product which has been in static storage for more than 6 months conforms to the relevant specification and that the quality of the product has not changed since the last tests were carried out.

Samples for periodic tests should be taken from each tank which has contained product and which has had no product receipts for 6 months. Samples should also be taken from each tank in which less than half of the product has been replaced during the 6-month period.

The results of all periodic tests should be checked carefully against previous analysis reports to confirm that no significant changes have

occurred, taking note of the comments under item 2.3.4 (b) above in respect of recertification tests.

Test requirements are:

	Jet A-1	Avgas
Appearance/Colour	X	X
Saybolt Colour	X	-
Distillation	X	X
Flashpoint	X	-
Density @15^{o} C	X	X
Reid Vapour Pressure	-	X
Corrosion (copper)	X	X
Existent Gum	X	X
Lead Content	-	X
Knock Rating (Motor Method) Lean	-	X
Conductivity and temperature	(1)	-
MSEP	X	-
Thermal Stability (JFTOT)	X	-

Sample quantity required:
Jet A-1: 2 litres minimum.
Avgas: 4 litres
An approved container as specified in sub-section 2.2.3 shall be used).

(1) To be carried out on bulk stock in storage or immediately after taking a sample from bulk storage.

(d) Appearance Check (Clear and Bright)

This check is a field test to confirm that aviation fuel meets the appearance requirement of the specification. Aviation fuel shall be of the correct colour and be visually clear, bright and free from solid matter and undissolved water at normal ambient temperature. Samples for Appearance Check shall be drawn into scrupulously clean clear-glass jars or visijars (see 2.2.3 (b), Field Sampling Containers).

Test requirements are:

	Jet Fuel	Avgas
Appearance/Colour	X	X
Particulate Contaminant (Visual)	X	X
Water-visual	X	X

Sample quantity required: 1 litre after flushing sampling line.

The following should serve as a guide to the Appearance Check of fuel samples:

(i) Colour. The various grades of aviation gasoline are dyed to aid recognition while the colour of aviation jet fuels may vary, usually in the range from water white to straw colour.

(ii) Undissolved water (free water) will appear as droplets on the sides, or as bulk water on the bottom of the sample jar. In Jet fuel it can also appear as a cloud or haze (suspended water).

(iii) Solid matter (particulate matter), generally consisting of small amounts of rust, sand, dust, scale, etc, suspended in the fuel or settled out on the bottom of the jar.

(iv) The terms "Clear" and "Bright" (C&B) are independent of natural colour of the fuel. "Clear" refers to the absence of sediment or emulsion. "Bright" refers to the sparkling appearance of fuel having no cloud or haze.

If any water/dirt is observed, the sampling procedure shall be repeated until a Clear and Bright sample is obtained.

(e) Visual Check

A Visual Check is an Appearance Check for Jet fuel with the addition of a chemical water check (see 2.3.3 (i)). Use a Velcon Hydrokit, Shell Water Detector, or an alternative IATA approved type such as the POZ-T or CASRI Detector.
Samples for a Visual Check shall be drawn into scrupulously clean, clear glass jars or "visijars" (see 2.2.3 (b), Field Sampling Containers). At supply and distribution facilities Visual Checks are not normally required

(f) Control Check

This is an Appearance Check plus fuel density determination. This check is frequently made to confirm the correct grade and unchanged quality of fuel stocks by comparison of the result with the value shown on the documentation. If these two figures (corrected to standard temperature conditions) differ by more than 3 kg/m^3 then contamination should be suspected and the matter shall be investigated before the aviation fuel is accepted for use.

(g) Membrane Filtration Test

This test shall be carried out and evaluated in accordance with joint ASTM D2276/IP216 Standard Test Methods and Colour Standards incorporated in these methods. Colour shall be recorded on a wet and dry basis.

Double (matched weight or preweighted) 0.8 micron membranes are used for gravimetric tests. Colorimetric tests are normally performed with a single membrane. Double (unweighed) colorimetric membranes may also be used in certain circumstances as described in Appendix A6.7 of the Standards for Airport Depots, for movements directly to airport service tanks, see 3.4.1 (As stated in ASTM D 2276, "the colour rating method is useful for system monitoring purposes"). The quantity of fuel passed through the membranes used in both colour and gravimetric determinations shall be 5 litres.

(h) Conductivity Test

This test shall be carried out in accordance with ASTM D2624 or IP274 procedures, using a Maihak, Emcee or similar approved conductivity meter.

(i) Principle of Application of Chemical Water Detectors (CWDs)

The primary field check for suitability of aviation fuel is the Appearance Check. This may be confirmed by the use of a Chemical Water Detector test for Jet fuel to indicate the presence of free water in the sample. The application of the CWD is mandatory for samples that can be considered representative of into-plane fuel quality, although it may also be used in other sampling applications where it is considered appropriate to have a verification of free water status.

(j) Tests for Microbiological Growth

The fundamental method for assessing the presence of microbiological growth in storage tanks and filters is the daily clear and bright test on a sump sample. Presence of discoloured water (brown or black), a lacy interface between the fuel and water layers or organic debris in the fuel or water layer are all indications of likely microbiological activity requiring immediate further investigation and appropriate expert advice.

The investigation shall include an on-site assay test for microbiological activity carried out on Drain Line Samples of jet fuel using the Microbmonitor 2, Merck ATP test or other test kit approved by international participants and checking filter membrane colour test history for any rising trend. Internal inspection and investigation of filter vessels may also be required.

Warning and Action (quarantine) limits should be defined with reference to the IATA Guidance Material on “Microbiological Contamination in Aircraft Fuel Tanks” and following advice from appropriate experts in the use of field testing kits and the interpretation of results.

Chapter 3

Depot Facilities-Design Requirements for Pipeline Tanks

3.1 General

The observance of certain fundamental practices in the design of these facilities is considered essential to ensure that product quality is maintained and safety and environmental requirements are met.

3.1.1 Any new installation or alteration, or extension of the existing facilities shall be previously approved by the participants at that facility. Commissioning procedures should be in accordance with recognised industry standards.

3.1.2 Each storage depot shall include a schematic piping diagram, identifying the valves, etc. This diagram shall be posted where it is easily available for reference. Instructions for performing the product receipt and delivery/filling operations shall also be clearly displayed for reference by the persons operating the equipment.

3.1.3 All facilities utilised for handling Jet A-1 are fully grade-segregated, and provide segregation between batched/unbatched materials. This requirement may be relaxed only in the case of initial pipe work used for the discharge of mixed cargo, coastal/inland waterways vessels, or for receipts from multi-product pipelines, and then only provided the system is so designed to facilitate the detection and appropriate down grading of product interfaces.

3.1.4 No copper or cadmium alloys, cadmium plating, galvanised steel or plastic materials are permitted for main piping nor shall zinc rich internal coatings be used for piping or tankage.

3.1.5 Jet A-1 Pumps J-6501 A/B start / stop switches at HEL.PE.'s Pump-station Site and depot emergency shut down buttons should be safely accessible and clearly identified.

3.1.6 Fuelling vehicle parking, road/rail discharge and fueller loading areas shall be constructed of a low-permeability material that permits the dissipation of static charges to the ground. The surface areas shall have a positive slope and drainage to an oil/water interceptor.

3.1.7 Tank bunds shall meet the requirements of local legislation and have a capacity of at least 110% of the storage capacity of the largest tank contained within a bund wall.

3.2 Tankage (Tanks P-8713 A, P-8713 B and P-8714A) hereinafter referred to as

Pipeline Tanks

One out of the 3 tanks shall be switched to Jet A-1 during maintenance of the rest two.

3.2.1 The number and size of tanks are sufficient to provide adequate working capacity (6000m3 each tank), taking into account peak period airport requirements, supply replenishment arrangements and emergency stock coverage. Allowance has also be made for settling, testing and tank cleaning requirements.

3.2.2 Jet A-1 should be stored in suitably bonded horizontal or fixed roof vertical tanks (or fixed roof vertical tanks with an internal floating roof / cover if required by local legislation). Tank top walkways should have non-slip surfaces, handrails and kick plates. New tanks are constructed and installed to avoid ingress of water and dirt, and to provide a positive low point to collect water and sediment for ease of removal. To achieve this, horizontal tanks should be installed with a minimum slope of 1:50, and vertical tanks should have a cone-down bottom with a minimum slope of 1:30 to a centre sump. This is realised in tanks P-8713 A and P-8713 B. P-8714A tank has almost flat bottom with more than one sump so to draw off any water or sediment.

3.2.3 Tanks are fitted with:

(a) Free vent devices are recommended for Jet A-1 storage. Screens to prevent the ingress of foreign bodies shall have a coarse mesh with approximately 5mm (0.25 inch) holes.

(b) A low point sump with a drain line and suitable valve for the draining of water and sediment. The drain line should preferably be of a non-rusting material, selected to avoid galvanic action created by dissimilar metals (for example between stainless steel and mild steel), of approximately 50mm diameter and fitted with an in-line sampling valve. In the case of above-ground vertical tanks, the drain line should lead to a large capacity stainless steel or internally lined sample receiving vessel, provided with a self-closing (spring-loaded or equivalent) quick-acting valve at entry, a cone-down bottom with drain valve, and a suitable motor driven product return system. This receiving vessel should be at least 200 litre capacity. There will be instances where it will need to be significantly larger depending on, e.g., the storage tank size or mode of delivery of product to the storage tank. The design shall ensure that it is not possible for water to accumulate in the drain lines (where it could freeze and prevent draining in cold weather conditions). Other tanks should be cleared by gravity draining or by a thief suction pump. In the case of large underground tanks, an electric drain pump is desirable to enable water or sediment to be removed by rapid withdrawal of a large sump sample.

In HEL.PE. tanks, there are no receiving vessels by the tanks, but provisions are made for taking a running sample from the tank drain line.
The running sample should be simultaneously accessible to allow for one-man operation. An example of a suitable design is shown in Appendix A4.
The running sample may be taken into an open container (such as a glass jar or stainless steel bucket), or a suitable glass closed system.

(c) Separate product inlet and outlet connections. Inlet pipes discharge near the bottom of the tank through a diffuser to minimise turbulence. In the case of horizontal tanks, the inlet pipe should be at the high end, directing flow towards the low-end sump.

(d) Manholes to facilitate entry for gas freeing and cleaning.

(e) Gauge hatches to provide means of sampling and tank dipping.

(f) Floating suction arms, bonded to the tank shell, with position indicators and/or check cables bonded to the tank shell shall be specified for new tanks supplying direct to airport. Existing tanks supplying direct to airport should be fitted with floating suction arms. For effective bonding of check cables they shall be installed with permanent metal to metal contact with the tank shell. Position indicators should be used for large above-ground vertical tanks. Where floating suctions are not provided, suction via stand-pipes at least 40cm above the tank bottom circumference is acceptable.
NOTE: Where legislation requires the installation of internal floating roofs/covers it is critical to ensure that the floating suction will not interfere with the operation of the floating cover.

(g) As a minimum, the bottoms and the first meters of the walls of all new tanks shall be coated internally with a light-coloured epoxy material, approved as being compatible with aviation fuels.

(h) Tanks are prominently numbered and marked with grade stored, (EI 1542 designation) and, as a minimum, show the date of the most recent internal inspection and cleaning.

(i) All tanks (including product recovery tanks which are not fitted with spring-loaded self-closing inlet valves) shall be fitted with high-level alarm systems and the systems shall be routinely tested (see 6.1.4). Low level alarm systems should be specified where pump cavitation has to be avoided.
At locations supplied by vessel or pipeline or by multiple simultaneous discharge of road tankers or rail tank cars, storage tanks shall be fitted with a high level audible alarm and a separate "high-high" level system that shuts down the fuel flow when a predetermined level of fuel in the tank is reached.
For locations supplied by single discharge of road tanker or rail tank car, an audible high level alarm or a single shut down device is the minimum requirement.

3.3 Pipework

3.3.1 Each grade of aviation fuel shall be handled in a completely segregated system. There are no inter-connecting lines between pipelines, which handle different products. Pipelines which handle tested and untested products are physically and positively segregated using one of the following methods:

- Double block and bleed (DBB) valve arrangement. This can either be a single DBB valve with two independent seals and a cavity between them or two valves with a drain arrangement in a pipe spool between them. (When the valves are in a closed position the cavity or drain spool shall be checked to confirm no product is passing, see 6.1.8);
- Removable distance (spool) piece;
- Spectacle blind or equivalent

A valve with a single sealing arrangement is not acceptable.

3.3.2 Long pipelines shall incorporate means for water and sediment drainage at low points. A designated low point in a pipework system is defined as a drain point in a pipeline where significant quantities of particulate/water would accumulate if the position was not flushed on a regular basis. Where pipelines are in turbulent flow conditions, it is unlikely that significant quantities of particulate /water will accumulate.

3.3.3 All pipework receipt and loading facilities are clearly marked in accordance with API product name and colour coding, and with flow direction arrows.

3.3.4. Road bridger and rail car receipt and loading connections should be fitted with couplings of a size and type chosen to give maximum practical degree of grade security.

3.4 Filtration

3.4.1 Filters of at least 200mesh /linear inch (60 microns) shall be installed at road or rail tank car loading points and at entry into lined delivery pipelines.

3.4.2 Microfilters meeting EI 1590 or filter separators meeting EI 1581 shall be installed as the minimum filtration requirement at loading points or entry into delivery pipelines for movements directly to airport service tanks.

3.4.3 For new installations filter separators meeting EI 1581 shall be installed at loading points or entry into delivery pipelines for movements directly to airport service tanks; existing installations shall meet this requirement by 31/12/2015.

3.4.4 All new filter vessels shall meet the requirements of EI 1596.

3.4.5 All filtration and water separation equipment is maintained and checked regularly as detailed in Appendix A1.

3.4.6 Static charge dissipater additives are widely used for reducing static electricity hazards. If such additives are not used, either adequate relaxation time (30 seconds minimum) must be provided between the filter and the inlet to the storage tank, or reduced (50%) filling rates observed.

A suitable record for filtration details is included as Appendix A1.7

Chapter 4
Receipt Procedures for Pipeline Tanks

4.1 Documentation

4.1.1 Any transfer of product to and from the Pipeline Tanks is supported by a Release Certificate.

4.1.2 A Refinery Certificate of Quality, and a Certificate of Analysis if relevant, covering the batch showing the fuel grade and confirming that it meets the relevant specification or the latest issue of the Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS) Check List, together with a copy of the latest Recertification Test Certificate where applicable must accompany each receipt of aviation product. Batch number, density and other relevant information may be communicated by fax, email or other devices pending mailing of the original Refinery Certificate of Quality duly signed by an authorised person of HEL.PE.

A record is maintained of the Release Certificate etc, and batch number, quantity and receiving tank(s), together with the results of all tests carried out.

The Pipeline Operator must have original Refinery Certificates of Quality and volume data for all batches entering the system so that the authenticity of Jet A-1 can be assured.
The records and documents are retained for a minimum of one year.

4.2 Receipt - General

4.2.1 Pipeline Tanks handle only Jet A-1, received via Jet A-1 segregated lines by Jet A-1 dedicated HEL.PE. tanks, which are released only after satisfactory Refinery Certificate of Quality (see 2.3.2.a).

4.2.2 Aviation fuels shall only be received via white products cargo lines. Jet fuel should be received via lines reserved for middle distillates.(Kerosene, gas oil, automotive diesel, etc. but note FAME issues detailed in 2.3).

4.2.3 Wherever possible, product to product pumping should be adopted, without the introduction of water to separate products or to clear lines handling Jet A-1. If lines handling Jet A-1 have to be left full of water, it should not be sea water but should be fresh or suitably buffered water.

4.2.4 Jet A-1 should not be left in multi-product lines between receipts.

4.2.5 When receiving multi-product cargoes the discharge sequence should be arranged to minimize the effects of interface contamination of the aviation grades. Loading and trailing grade interfaces shall be diverted into non-aviation storage or slop tanks.

4.2.6 One or more tanks shall be segregated for receipt of product, checked for water, and any water removed before receipt begins.

4.3 Fuel transfer from HEL.PE. Aspropyrgos Refinery Jet A-1 storage tanks to the Pipeline Tanks.

4.3.1 Jet A-1 is transferred from Jet A-1 tanks to Pipeline Tanks through Jet A-1 dedicated lines and Filter Water Separator system

4.3.2 During receipt of the product, samples shall be drawn from the Filter Water Separator (FWS) drain line at the commencement, middle and end of the transfer, and at any change of batch. These samples should be checked according to the Control Check and also ensure satisfactory FWS function (no sediment observed and no large amount of water observed).

4.3.3 Should water, solid contaminants or abnormal density be noted, the flow shall be stopped if possible, or diverted to a slop tank, and the pumping station of the pipeline notified.

4.4 Static Dissipator Additive

To ensure that acceptable levels of conductivity are achieved downstream at airport depots it is necessary to add static dissipator additive to Jet A-1 during receipt via an injection pump. The minimum acceptable conductivity level should be established by the Manager taking into account the typical reduction in conductivity experienced between the facility and the airport, so that conductivity at OFC receiving station is not less than 100pS/m with a maximum of 600pS/m.

4.4.1 The conductivity should be checked on a sample drawn at the commencement of the receipt and after the static dissipator additive is added.

4.4.2 Written procedures for quality control, documentation and safe handling procedures must be prepared and applied. Items normally covered would be:

(a) Additive received to be clearly identified as a grade approved in the controlling fuel specification. Each receipt shall be accompanied by documentation verifying identity.

(b) The additive batch documentation to be checked for validity before release for blending.

(c) Released additive to be held in a clearly designated storage area. Storage and handling procedures to be in accordance with manufacturers recommendations.

(d) Only qualified operators to decant additive, refill the blending equipment and/or adjust the injection rate. The addition rate, taking account of any pre-dilution of the additive, to be monitored at regular intervals.

(e) Effectiveness of static dissipator additive blending to be verified by taking Upper, Middle and Lower samples for conductivity check.

4.4.3 The amount of static dissipator additive required should be determined carefully, taking into account the maximum cumulative concentration permitted by the latest issue of the Aviation Fuel Quality Requirements for Jointly Operated Systems Check List and the amount of additive already introduced upstream, as the case maybe. The amount added to each batch of Jet A-1 should be recorded on the Refinery Certificate of Quality.

4.4.4 Introducing additive into depot tanks from the top should be avoided for safety reasons. However, additive may be introduced into the bottom of tanks prior to vessel discharge by lowering a caged bottle sampler from the top or by back pumping from a tank side sample receiving vessel. Further guidance can be found in ASTM D4865, Standard Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems.

Chapter 5
Quality Control in Pipeline Tanks

5.1 Procedures After Discharge

5.1.1 After product has been received into Pipeline Tanks, the stock must be quarantined and a batch number assigned. Tank isolation shall be achieved in an effective way (see 3.1.3 and 3.3.1). Where tank isolation is achieved by means of block and bleed valves, and where the bleed valve in the body bleed system must remain closed for environmental reasons, routine checks shall be carried out as defined in 6.1.7. If the bleed checks indicate that one of the block valves does not seal completely or has been opened in error then the possibility must be considered that contamination of the new batch has taken place, either into or out of the tank.

5.1.2 A Refinery Certificate of Quality must be carried out (see 2.3.2.a and 2.3.4.a).

Allow the tank contents to settle for at least 30 minutes before obtaining Upper, Middle and Lower Samples and checking:

- density of each sample to establish homogeneity within the tank;
- freedom from visual sediment and suspended water.

(a) When Upper, Middle and Lower Samples are free of sediment and suspended water but the densities indicate layering i.e. density differences between samples exceed 3kg/m^3 then the following tests should be carried out on each sample.

- Density, Flash Point, Initial Boiling Point, End Point

(b) If Upper, Middle and Lower Samples are homogeneous, or after taking samples for testing in line with 5.1.2 (a), a Composite Sample shall be prepared for Refinery Certificate of Quality Test.

(c) After satisfactory Refinery Certificate of Quality Test results have been obtained, the product may be released for transfer to airport storage via the Pipeline. If the results are not satisfactory the batches must remain quarantined until further testing has established that the fuel is acceptable.

(d) Where layering has occurred and the Refinery Certificate of Quality is satisfactory, there will have to be local written instructions to cover the problem of releasing product, which has significant density differences between layers.

(e) Record all results.

5.2 Product Settling

5.2.1 After product has been received into Pipeline Tanks and tank isolation achieved by means of block and bleed valves, or other means of positive segregation, a "settling" sign shall be positioned at the outlet valve until product release is approved.

5.2.2 Minimum settling times before release are:

3 hours per metre depth of fuel or 24 hours, whichever is less.

5.2.3 After settling, drain off any water which has collected at the bottom of the tank.

5.3 Six-monthly flushing

HEL.PE. and AAFPC shall flush all dead-ends in their facilities in no less than every six months, including PRV piping to Tanks TK-1 and TK-2, and scraper connection to OFC slop tank, so to eliminate the need for periodic test (see 2.3.4.c).

5.4 Pig operation

Pipeline is pigable. Pig operation shall be mutually agreed between HEL.PE., AAFPC and OFC. AAFPC is responsible for its operation. It is very important for the protection of fuel quality that specific procedures shall be followed by AAFPC to ensure that only on-spec product shall be transferred to OFC after the completion of the pig operations. Procedures shall also satisfy OFC, before their application. Pig scraper line to OFC slop tank shall be thoroughly flushed with Jet A-1. OFC slop tank shall be emptied and cleaned by AAFPC.

Chapter 6
Storage Procedures

6.1 Routine Checks

To ensure that product quality is satisfactorily maintained whilst in storage, the following procedures must be applied:

6.1.1 Keep tanks entirely free from water by routine draining. Draining is normally required on a daily basis, but longer intervals (up to weekly) may be adopted after extensive experience has shown that water does not accumulate. Water draining shall be made before release (Control Check & Appearance Check) and daily when deliveries continue. (Appearance Check).

6.1.2 The correct operation of floating suction arms shall be checked monthly, with records kept. When a tank has been emptied, for example for maintenance or internal cleaning, procedures for refilling the tank shall ensure that the floating suction arm is filled with fuel and that any contained air is removed. Where air elimination is not built into the design this may require back-filling until the floating suction inlet is fully submerged in fuel.

6.1.3 Condition of free vents and mesh screens to be checked quarterly, or more frequency as dictated by local conditions. Pressure/vacuum relief valves (PRV) where fitted, should be checked and serviced in accordance with the manufacturer's recommendations.

6.1.4 The correct operation of all high level alarm systems shall be checked at least annually in accordance with written procedures and more frequently if required by local regulations or recommended by manufacturers.
A monthly functional check of high (but not "high-high") level alarms should also be performed where possible.
Tanks should not be filled to the level at which the high level alarm is activated except during test procedures.

6.1.5 Where period between product receipts into a tank exceeds one month, conductivity and temperature of Jet A-1 to be checked monthly and recorded.

6.1.6 When tanks are consistently replenished via fully segregated systems and dedicated transport, no laboratory testing of product on receipt is necessary.

6.1.7 Static stock (i.e., stock to which no product has been added) shall be sampled (Composite Sample) for Periodic Test after six months for Jet Fuel. Thereafter, static stock shall be sampled and tested every three months. If the results are unsatisfactory, the tanks must be quarantined and a Composite Sample taken from each tank for Certificate of Analysis testing, which must prove satisfactory before the stock can be released.

6.1.8 Where storage tanks are fitted with double block and bleed valves, the block valves shall be drained after receipt or transfer of product, and checked immediately prior to transfer by opening the bleed valves and draining any product into a suitable container. These checks shall be recorded. If the checks release a significant quantity of product or if there is a continuous flow of product indicating a leaking block valve, then appropriate measures including additional product sampling and testing must be taken to ensure that the quality of the product is satisfactory before the batch is released.

6.2 Tank Cleaning

6.2.1 Lined or partially lined Jet fuel tanks shall be visually inspected annually from outside through a suitable manhole. Jet fuel tanks shall be internally inspected and cleaned within 12 months of commissioning and subsequently in accordance with the table below, taking account of the safety precautions outlined in section 11.2.4. Inspection and cleaning frequencies for Jet fuel tanks directly supplying airport storage, detailed in the table below, may be extended by the application of a Variance approval Certificate provided that:

- the tanks met the design requirements of section 3.2
- historic tank cleaning and inspection records show that only small amounts of contamination have been found.
- for internal visual inspection without entry, the tank internal surfaces can be adequately inspected (i.e. views of the floor and sump are not obstructed by internal baffles, floating decks or blankets, etc.)
- A satisfactory annual microbiological contamination test result being available for every year following the most recent date of internal inspection/cleaning.
-The immediate downstream filter water coalesce elements show a history of lasting 3 years or a minimum of 10 million litres per typical 44 inch element (averaged across the downstream filters).

	Maximum Intervals (years) for JET FUEL	
	Visual inspection from outside	Internal inspection & cleaning[a]
Normal frequency	1	Cause[b] or 3
When conditions stipulated are met[c]	2	Cause[b] or 5

NOTES: [a] 12 months after commissioning, internal inspection and cleaning is required.
[b]. "Cause" for Aviation Fuel Tanks is defined as:
-Tank internal surfaces are dirty, i.e. the inspection reveals microbial growth or build up of sediment exceeding approximately 20% of the tank bottom surface.
-Fuel quality downstream indicates the presence of excessive contamination, e.g. short filter life, poor Millipore results or high particle counts.(e.g. 18/16/14).
-The condition of the water drain samples shows the systematic presence of excessive rust, other debris, microbiological growth or surfactant contamination.
"Cause" shall require more frequent tank cleaning than the maximum limits shown.

6.2.2. No chemicals, or cleaning materials that could adversely affect the aviation fuel to be stored in the tanks, shall be used unless required for decontamination of the tank. A variance Approval Certificate shall be required. If it was found necessary to use a cleaning chemical or if repairs were carried out, or if required by one of the participants, a composite sample shall be taken for a Periodic Test before product release.

6.2.3 A detailed record of the types and quantity of sediment found and of the condition of the tank interior fittings and coatings shall be maintained. A suitable tank inspection form is shown in Appendix A4. The dates of the most recent tank inspections and cleaning should be marked on the tank shell.

6.2.4 Where no chemicals or cleaning materials shall be used and no repairs to the tank internal components have been carried out, the product release procedures shown in section 7.1 are applicable after refilling.

6.2.5 Product Recovery Tanks shall be inspected without entry quarterly for cleanliness and condition. An IATA endorsed microbiological growth test on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection. Cleaning and repairs to internal lining shall be carried out as necessary. "Cause" for aviation fuel tanks is defined as:

- Tank internal surfaces are dirty, i.e. the inspection reveals microbial growth or build up of sediment exceeding approximately 20% of the tank bottom surface.

-Presence of microbiological contamination, excessive dirt, rust or other debris in water drain samples.

-Fuel quality downstream indicates excessive contamination, e.g. short filter life, poor Millipore results or high particle counts.

6.2.6 Tank side fast flush tanks shall be kept clean and empty when not in use for draining and sampling.

6.3 Change of Grade in Storage Tanks

After any change of grades has been made, HEL.PE. should conform to their own decontamination procedures. After filling with the new grade of product, a Refinery Certificate of Quality Test shall be carried out on a Composite Sample which must be satisfactory before the tank contents may be released (see 2.3.2 (a) and 2.3.4 (a)).

Where product change is from a leaded to unleaded grade, or from any other non-aviation fuel grade, additional safety and quality protection measures are necessary and advice should be obtained from appropriate sources.

AAFPC shall notify OFC well in advance on HEL.PE. Plans to switch one of the Pipeline Tanks (see 3.2) from any other product to Jet A-1 and also provide the provisions for contamination elimination. Product from this tank shall be transferred to OFC via AAFPC only after OFC satisfaction on fuel quality protection. OFC shall be entitled to inspect HEL.PE. to be satisfied on procedures to be applied.

6.4 Testing for Microbiological Growth

Where microbiological growth has been confirmed as being above acceptable levels (see 2.3.4 (h)) remedial action is required. As a minimum, this shall include on-site assay tests for microbiological activity carried out on Drain Line Samples of jet fuel using either the Microbmonitor 2 or Merck ATP test at least every 6 months for a period of 2 years.

Where three successive on-site assay tests have shown that MBG levels are at a satisfactory level, the testing intervals can be relaxed or even discontinued provided there are no other contra-indications of microbiological activity.

Note: Fuel samples from storage tanks for on-site assay testing shall be drawn from low point drains and allowed to settle to remove any traces of water. To ensure consistency of test results, sampling should be performed after tank settling and immediately before tank release. Contamination of the sample for testing should be avoided by strict observance of the test kit manufacturer's guidance on cleanliness. The use of alcohol wipes to clean sample points prior to sampling is recommended. The sample point shall then be flushed with jet fuel to remove traces of alcohol prior to taking the sample for testing. If a positive result is obtained then the test should be repeated. If the result is confirmed, seek guidance.

Chapter 7
Product Release and Pipeline Delivery to OFC

7.1 Documentation

7.1.1 Any transfer of product shall be supported by a Release Certificate (see 2.3.2 (e)).

7.1.2 A copy of the Refinery Certificate of Quality covering the original batch must accompany the initial delivery of product being delivered from an installation or a refinery together with a copy of the latest Recertification Test Certificate where applicable.

7.2 Product Release Procedure

Product may not be released from Pipeline Tanks to AAFPC facilities for pipeline transfer to OFC, until the following requirements have been met:

7.2.1 Product has been settled in accordance with 5.2 and properly tested (see 5.1.2).

7.2.2 Tank sumps have been checked and any water and/or sediment collected at the bottom of the tank has been drained off, until a satisfactory Visual Check is observed (clear and bright sample and negative Shell Water Detector).

7.2.3 All required tests and checks have been completed and results recorded.

After satisfactory completion of the steps above, a Release Certificate (see 2.3.2 (e)) shall be prepared and approved by an authorised person and the sign "settling" shall be replaced by "released" or "for delivery". The operation shall be recorded.

If conductivity of Jet A-1 is below an acceptable level it may be necessary to add static dissipator additive during product transfer.

Where recertification testing is required (Tanks supplied by non-segregated system), 5 litre Composite retention samples shall be prepared for each tank after settling. Retention periods: One month. As a minimum, samples for each tank should always be available for the current and previous product batch. Suitable containers, clearly labelled with the date, tank and batch number should be used.

7.3 Product Transfer

7.3.1 As mentioned in 1.1, product transfer to OFC by AAFPC is fully automated by the utilisation of PLC in both AAFPC and OFC. Functionality of Automation Interconnection is provided in Appendix A2. Should one or both automation systems fail, the defaulting Company shall advise the other and apply contingency procedures, should pipeline transfer has to be realised before automation malfunction repair.

7.3.2 PRV piping is connected to OFC RC tank. Gate Valve GV-62041 is 100% open and C.S.O. Valve GV-62040 to TK-1 is C.S.C. The Level of the RC Tank should always be L<1500mm. In case L>1500mm a Tank Interlock is activated, the signal “OFC READY TO RECEIVE” became false and the Pipeline shut Down procedure is started automatically.

7.3.3 Prior to pipeline transfer, OFC shall check the receiving tank for free water and any found drained away.

7.3.4 The FWS, the air eliminator and the strainers of the HEL.PE. metering station shall be checked by AAFPC for free water, and any found drained away.

7.3.5 The air eliminator, the strainers and the micro-filters at OFC receiving station shall be checked by AAFPC for free water, and any found drained away.

7.3.6 The trickling tank (auto-sampler) and the manual sampling glass jar (Aljac) at OFC receiving tank shall be emptied by OFC.

7.3.7 AAFPC shall ensure that that product at OFC receiving station shall meet following requirements by carrying out the relevant tests:

- Latest issue of the Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS) Check List (currently Issue 28, March 2015)
- Density measured shall not differ more than +/- 3Kg/m3.
- Conductivity shall be between 100 to 600 pS/m (see 4.4)
- Colorimetric membrane test results shall not exceed A4, B4 or G2 (Dry), performed downstream the micro-filter in operation.
- Gravimetric membrane test result shall not exceed 0.2 mg/lt, performed downstream the micro-filter in operation.

OFC shall terminate the fuel transfer, should one of abovementioned requirements is not met.

7.3.8 HEL.PE delivers to AAFPC and AAFPC checks the Refinery Certificate of Quality and the Release Certificate (2.3.2.a and e) to ensure that all requirements in both Certificates as per clauses 2.3.2.a. and e. are fully met. Both Certifications shall be duly signed by authorised person and clearly state that ***"This product meets all specifications of AFQRJOS Check List for Jet A-1, Issue 28, March 2015"***. AAFPC shall also deliver the same Certificates to OFC by fax for its own check. Upon OFC check and approval, OFC shall check its facilities if are ready to receive and transmit the "Ready to receive" signal to AAFPC via the automation interconnection (see Functionality in Appendix A2).

7.3.9 Flowrate shall be at 200m3/hr (to be increased up to 300m3/hr after the installation of a 3rd pump at AAFPC pump station. AAFPC shall ensure that fuel shall be transported to OFC at no less than 200m3/hr at a pressure no less than 3 bar. Should these requirements are not fulfilled, OFC shall terminate the fuel transfer.

7.3.10 During receipt, running samples shall be drawn subject to Control Check (2.3.4 (e)) at the commencement, middle and end of the transfer, at HEL.PE. Refinery Pump Station and at OFC Receiving Station.

7.3.11 During transfer, AAFPC shall monitor the fuel density by in-line densitometer at Refinery metering station and ensure it is always between -+3kg/m3 compared with the batch density, as this is stated in Refinery Certificate of Quality (7.3.9 above). If density is out of the limits, fuel transfer must be terminated and AAFPC shall investigate the incident. Likewise, OFC shall also monitor the fuel density by using the in-line densitometer at Airport Receiving Station and terminate fuel transfer similarly, taking into consideration the pipeline volume.

7.3.12 During transfer, the differential pressure (dp) reading at FWS at HEL.PE. metering station and at micro-filter at OFC receiving station shall not exceed 15 psi (1 bar). AAFPC shall make all necessary arrangements to replace the

filter elements before high dp is reached. Should maximum dp is reached during the fuel transfer (implying high percentage of solid contaminants in the fuel), the fuel transfer shall be stopped by AAFPC or OFC, until elements are replaced with new ones.

7.3.13 Should large amount of water or solid contamination is observed in fuel samples described above, the fuel transfer shall be terminated and incident shall be investigated among OFC, AAFPC and HEL.PE. Re-start shall commence only after OFC Operations Manager approval.

7.3.14 Should PRV (see 1.1) is activated either by PRV proximity switch activation, or by pressure transmitter PT-62004 High Alarm (>5 bar) or by pressure transmitters PT-62022 or PT-62023 high alarms (>5 bar), then the automation system terminates the transfer. OFC, then, shall perform the Tank Release Test (see 7.4). Pipeline receipt shall only recommence after satisfactory results.

7.3.15 It is preferred that receipt volume shall fill in one OFC tank only. In case that it is essential to receive product in two OFC tanks, then OFC shall advise AAFPC to stop the transfer, OFC tanks shall be switched, OFC shall again transmit the "ready to receive" signal to AAFPC and pipeline transfer shall commence.

7.3.16 The volume in 15 degrees Celsius to be delivered to OFC shall be determined by the OFC receiving station custody transfer meter. In case that meter reading differs from the OFC receiving tank (s) volumetric tables, state approved, more than -+2‰, or in case of meter malfunction HELPE's custody transfer meter indications shall be used.

7.3.17 If receipt should continue overnight in consecutive months, the transfer shall stop before midnight and new receipt shall commence after midnight, for accounting purposes.

7.4 End of Receipt and Acceptance by OFC

A bottom sample of the receiving tank shall be tested according to OFC Tank Release procedure as follows:

- Control Check, including density comparison with Batch density (tolerance +/- 3kg/m3)
- Conductivity (accepted results 50 – 600 pS/m)

If all results are satisfactory, then received quantity is accepted by OFC for aircraft refuelling.

Otherwise, OFC shall quarantine the receiving tank, immediately notify AAFPC and commence joint investigation, starting by taking sample from both the OFC tank and the automatic sampler (trickling tank) at OFC receiving station, subject to Certificate of Analysis test (2.3.2.b and 2.3.4.a) in independent accredited Laboratory. If it is proven that sample does not meet all requirements as per 2.3.2.b and 2.3.4.a, due to AAFPC's responsibility then AAFPC is responsible to fully empty the OFC receiving tank and replenish it with on-spec product. Otherwise Users and/or HELPE are responsible to fully empty the OFC receiving tank and replenish it with on-spec product.

Chapter 8
Documentation

8.1 Records - Quality Control

The results of all significant checks and testing are recorded on documents, which are readily available, kept up-to-date and retained for a minimum of one year. The records include, but not be limited to, the following:

8.1.1 Daily product dips and tank contents checks, including date/time.

8.1.2 Details of incoming consignments with reference to Refinery Certificate of Quality/Certificate of Analysis and Release Certificate, quantity, including date and time.

8.1.3 Receipt tank details, settling and release checks.

8.1.4 Batching information and number allocated.

8.1.5 Product deliveries and transfers including date/time when tanks put in service.

8.1.6 Refinery Certificate of Quality or Certificate of Analysis and Release Certificates covering incoming consignments.

8.1.7 Recertification and Periodic Test Certificates.

8.1.8 Release Certificates covering outgoing consignments.

8.1.9 Daily Filter sump drains.

8.1.10 Daily Tank drains.

8.2 Records - Maintenance

8.2.1 Tank inspection and cleaning records.

8.2.2 Microfilter and filter separator differential pressure graphs and dates of element changes.

8.2.3 Details and dates of all maintenance work.

Tank cleaning and filter records shall be retained for at least 6 years; other maintenance records shall be retained for at least 1 year, or longer if still relevant to equipment condition (e.g. major repair work or extensions to facilities).

8.3 Signature

All records shall be dated and signed by the person responsible. For computer generated records, a password-protected access system, traceable to the individual

person, is acceptable as an alternative to a signature. A back-up system (at least weekly) is also required.

8.4 Records – Accident/Incident

A detailed record of accidents /incidents should be maintained for at least 5 years.

8.5 Document retention requirements

Aviation quality control documents shall be kept for certain minimum periods to provide adequate history and reference. The following guidelines below indicate minimum retention times, but local regulations or external quality assurance requirements may require longer retention periods. Records of all daily, weekly and monthly checks shall be retained for at least 1 year. Records of all less frequent routine checks, filter membrane test results and logbooks on all non-routine matters shall be retained for at least 1 year, or longer if still relevant to equipment condition (e.g., major repair work or extension(s) to facilities).

From 2012, the following document retention requirements shall apply.

- Supply and distribution depot logs – 12 months from last dated record.
- Laboratory quality control and product testing records and certificates – 10 years.
- Local and international inspections and follow-up – 3 years or until all recommendations have been closed out if longer.
- Filtration differential pressure and membrane filtration (Millipore) records – a minimum of either 3 years or current and previous change–out if longer.
- Storage tank cleaning and maintenance records – life of tank +6 years. If the tanks are buried underground, these records shall be kept indefinitely.
- Depot design, modification and major maintenance – life of depot + 10years
- Underground pipeline design, modification and testing records – life of installation + 10 years.

Chapter 9

Basic Requirements For Transportation Equipment

9.1 Pipelines

AAFPC Pipeline is dedicated to Jet A-1.

Chapter 10

Operating Requirements

10.1 Bonding - Drain Buckets

10.1.1 Bonding wire continuity to be checked over several revolutions of the reel (where applicable) whilst unreeling the bonding wire slowly. Bonding wires also to be checked for electrical continuity. (Typically there should be less than 25 ohms resistance).

10.1.2 Buckets and metal containers used for fuel draining must be bonded to the vehicle or tank pipework prior to and during the draining operation and to the receiving vessel/tank when decanting.

10.1.3 The use of plastic or galvanised containers is not permitted.

10.2 Hydrometers and Thermometers

10.2.1 Hydrometers and thermometers used for density quality control checks shall meet the requirements of the relevant ASTM/IP standards. Copies of documentation confirming compliance with the appropriate standard shall be available at the location. The relevant standards are BS 718: 1960 (types M50SP and L50SP, density at 15 degrees C) for hydrometers and IP 64C/ASTM E1 No. 12C for thermometers. Alternative equipment which meets the accuracy requirements of these standards may be used. Electronic densitometers shall meet IP 559 requirements.

10.2.2 Hydrometers and thermometers must not be left in direct sunlight or near heating appliances. Hydrometers should be stored vertically.

10.2.3 Before each period of use, hydrometers should be carefully examined to ensure that:

(a) the etched line on the hydrometer stem corresponds to the arrow (or line) at the top of the paper scale. A fingernail can be used to detect the etched line position.

(b) the bitumen weighting material has not flowed. This would cause the hydrometer to float in a non-vertical plane.

(c) the glass is intact.

Before each period of use, thermometers should be carefully examined to ensure that there is no gas bubbles trapped in the mercury column or bulb, the mercury column is unbroken and there are no mercury globules above the top level of the mercury column

10.2.4 If a measurement of temperature or density is suspected as being inaccurate, having previously established that the quality and condition of the fuel is not suspect in any way, the accuracy of the thermometer and hydrometer should be checked.

These checks may be carried out by means of one of the following options:

(a) send to a laboratory
(b) check against a reference thermometer/hydrometer on site
(c) check against a reference fluid provided by a laboratory
(d) check by comparison with other thermometers/hydrometers.

Accuracy requirements are +/-0.5degrees C and +/-0.001kg/litre.

10.4 Electrical equipment

All electrical equipment shall be checked and maintained by a trained and competent person(s). Hazardous area classified electrical equipment (e.g. ATEX marked and certified) shall only be maintained by trained personnel and training shall be recorded. Fixed facility earthing straps /rods, where fitted to storage tanks, pipework and filter vessels etc, shall be checked at least annually for resistance.

10.5 Other measurement equipment

Conductivity meters should be calibrated according to the manufacturer's recommended frequency, but at least 3 yearly, by an approved test facility or against a certified standard.

A "click type" torque wrench, where the clutch slips signalling that the correct torque is reached at the desired torque setting shall be used. The beam type torque wrench is not of an appropriate type for the required functions in aviation fuel operations.
The wrench should be calibrated in ft-lbs or Nm with a range of 0 – 50. Torque wrenches shall be calibrated according to the manufacturer's recommended frequency, but at least 5-yearly. Guidance can be found in BS EN 26789.
(Note that the torque wrench should be reset to zero when not in use to minimise calibration drift).

Dip tapes should be visually checked prior to use and shall be inspected annually for kinking/deformation that would impact measurement accuracy and
for security of the bottom weight.

Chapter 11

Health, Safety, Environment, Training And Emergency Procedures

11.1 Safety And Training

HEL.PE. and AAFPC must have a Health, Safety and Environment Policy, conforming to local and national Health, Safety and Environment legislation. Policy shall be available and enforced.

11.1.1 General

This section deals with those aspects of safety, which are the direct concern of operating personnel. It is the responsibility of the Manager to ensure that the personnel under his control are adequately trained.

The majority of accidents can be attributed to lack of attention to, or failure to carry out, or deviations from prescribed procedures. The training and indoctrination of all personnel at all levels in all of the operational tasks they are normally required to undertake, and the tasks they would be expected to perform in an emergency, is of prime importance in seeking to achieve "accident-free" operations.

11.1.2 Training

(a) New personnel must be thoroughly trained in all operations and procedures, which they will be called upon to perform in the course of their duties and in all actions to be taken in the event of an emergency. Existing personnel called upon to undertake new tasks must be similarly trained before undertaking the new task without supervision.

An employee training record must be maintained for every employee which indicates (i) for which tasks training has been given and the date of such training, (ii) the signature of the trainer, (iii) a "yes/no" assessment of whether the trainee demonstrated satisfactory understanding of the training, (iv)the signature of the trainee. Where necessary, training records for existing personnel must be established.

Follow-up job observation (with refresher training if it is found to be necessary) is to be undertaken by supervisory or training staff at a frequency determined by the depot Manager based on his assessment of on-going operator performance.

The dates and results of these follow-up observations are to be recorded on the operator's training record.

Training is to cover routine standard tasks such as sampling, tank and filter draining etc., and tasks which are specific to a location such as pipeline fuel

receipts and tank management. The latter tasks must be the subject of specific written procedures, which also form the basis of the training given. Where appropriate some of these written procedures should be displayed at the work location.

(b) Fire drills attended by all personnel shall take place approximately once every year on the type of fires, which may be encountered on the job, using fire extinguishers and equipment located at the facility. All personnel must be given the opportunity of operating and discharging fire extinguishers.

Emergency situations which could occur during operations (e.g. fuel spillage, fire, injuries to personnel) should be simulated to provide practice in the most effective measures necessary to deal with them, and to ensure that all personnel clearly know their duties. Appropriate standing orders shall also be displayed.

Where possible, training should be carried out in co-operation with the airport or local fire service.

Fire drills and names of personnel taking part shall be recorded.

(c) All personnel must be familiar with the location of fire alarm systems and the procedure for calling the fire service and other emergency services. They must also be familiar with the location and operation of emergency stop switches and controls.

11.1.3 Medical Service - Washing Facilities

(a) Facilities for first aid treatment must be available and arrangements must be made to ensure that appropriate medical aid and ambulance service can be obtained at short notice.

(b) Adequate washing facilities are provided and instruction given on the care to be exercised when handling products to avoid contact with the skin. Clothing soaked with fuel must be removed without delay and a shower/bath taken.

11.1.4 Safety Precautions

(a) Entry into deep pits, tanks and other hazardous confined spaces should be avoided unless necessary for maintenance purposes and shall be controlled by an entry permit system. Warning notices shall be prominently and permanently posted inside pits forbidding entry unless safety precautions are strictly applied.

Where entry is necessary, it is important to ensure adequate ventilation to remove all toxic vapours and to ensure that adequate oxygen is present to maintain life. Continuous venting shall be maintained whilst operators are within the pit. Two men should always be involved in these operations, one on a life line with harness and one at readiness outside.

(b) Where required, adequate personal protection equipment must be provided.

11.2 Reporting Accidents/Incidents

11.2.1 Accidents

All Users and OFC shall be notified immediately of any accident involving personnel, facilities or equipment.

The Manager shall initiate whatever investigation is necessary.

11.2.2 Incidents Affecting Fuel Quality/Availability

All Users and OFC shall be notified immediately of any incident likely to affect fuel quality/fuel availability. The Manager shall consult the Users and OFC and carry out the agreed action. The Manager of the receiving depot must also be notified. Notification should include details of the time and date a problem was first identified, the investigations which have been initiated and the potential impact on delivery commitments.

11.3 Health Hazards

11.3.1 Drug and Alcohol Policy

HEL.PE. and AAFPC have a Drug and Alcohol Policy, available and enforced.

11.3.2 List of Precautions

To reduce health hazards in handling aviation products and other materials which may be held at the depot, a list of precautions are drawn up and posted prominently, and personnel instructed in elementary precautions.

11.4 Emergency Procedures

11.4.1 General

Personnel should be able to analyse emergency situations, act in a disciplined manner and apply the correct procedures with confidence.

This can only be achieved if procedures have been prepared to cover all possible emergencies and training carried out to ensure that all personnel are familiar with the procedures and proficient in their assigned duties.
Emergency Procedures should satisfy OFC expectations in case of any emergency occurs in OFC premises due to AAFPC facilities malfunction or failure by any cause, including acts of God.

11.4.2 Manager's Responsibility

It is the HEL.PE and AAFPC Manager's responsibility to identify all reasonably foreseeable emergencies, and to prepare written pre-planned procedures to meet such emergencies for approval by the AAFPC Shareholders. The procedures should include, but not be restricted to, the following:

- be specific to the type and location of the emergency;
- detail actions to be taken;
- state responsibilities of specific staff;
- list all essential contacts with routine and emergency telephone numbers;
- availability and source of emergency equipment;
- procedure for keeping up-to-date;
- be kept in locations where they will be clearly visible and where all staff will have immediate and direct access to them.

11.4.3 Training

All staff must be thoroughly familiar with these procedures and instructed in their use, particularly in the location and emergency usage of essential controls. Regular drills must be conducted so every employee can become proficient in his/her assigned duties. Wherever possible, relevant airport and local authorities should be involved in these drills.

11.4.4 Emergencies to be considered

The following are examples of emergencies, which should be considered:

(a) Equipment breakdown affecting ability to operate;
(b) Power failure;
(c) Product spillage;
(d) Serious injury to staff, contractors or third parties as a result of actions of joint operation;
(e) Terrorist actions, bomb warning, civil disturbances etc.;
(f) Fuel quality problems;
(g) Fire.

<u>Emergency Drawing</u>

A drawing of the installation identifying the location of fire fighting equipment emergency shut-down devices, alarm activation points, exits and assembly points should be prominently displayed. The location of first aid equipment should also be displayed.

11.4.5 Fuel Supply Contingency Plan

The Manager should ensure that a contingency plan for maintaining fuel supplies is available. The contingency plan should include procedures and responsibilities for the allocation of fuel in the event of disrupted supplies and should be agreed with the suppliers and the airport authority. A procedure for regular updating and informing all interested parties should be in place.

11.5 Management system review and improvement

The Joint Venture will need to periodically review its HSSE management system to ensure that it remains suitable, adequate and effective.

11.6 Security

It is the Manager's responsibility through the AAFPC Shareholders to ensure that the security arrangements are adequate to protect the personnel, assets and operation of the facility. Airport depots shall be secured to prevent the access of unauthorised people, to prevent theft of fuel and equipment, contamination of fuel and the use of equipment for illegal activities. Keys should be removed from unattended vehicles. Security measures to be considered include the use of contract guards, perimeter fencing, alarm systems and the locking of valves, etc.

11.7 Spillage of Fuel

Spillage and leakage shall be avoided at all times. Every spill is a fire hazard as well as an environmental pollutant and must be dealt with immediately. Each fuel spill presents a different situation involving many variables, such as size of spill, weather conditions and location of spill etc.

Action required will depend on particular situations, so no one set of instructions will apply in every case. Prompt action, good judgement and initiative by well-trained personnel are of major importance to prevent hazards arising from fuel spills.

An expanded text (if needed) referring to environmental damage from leaks and fuel handling activities as potential sources of spillage and also employee reporting of possible spills.

The Manager is responsible for ensuring that the local and national regulations relating to environmental pollution are fully met. This includes keeping the Spillage Emergency Plan up-to-date and ensuring that all staff is aware of the plan and what shall be done should a spill occur.

Appendix A1

Filtration Equipment - Routine Maintenance Checks

A1.1 General

All filter and strainer vessels have a drain connection at the lowest point of each chamber. The main sump drain line is fitted with a sample valve to facilitate regular checks.
All filters are equipped with direct reading differential pressure gauges to indicate the pressure loss across the unit.
All filters are fitted with air eliminators and pressure relief valves, with outlet pipework routed to suitable spill containment.
Filter vessel pressure relief valves should be maintained in accordance with the filter manufacturers recommendations.
All filters have the dates of inspection and element changes stencilled on the body and shall carry a plate showing the correct designation of the elements installed.
The maximum achievable flow rate through each filter vessel in service should be calculated and compared to the rated flow as shown on the manufacturer's plate. The maximum achievable flow rate should be marked on the vessel and noted in the filter records. If the rated flow is significantly greater than maximum achievable flow then the possibility of de-rating the vessel should be considered.
Stacked elements are no longer acceptable. Where stacked elements are being used, the stacked elements shall be replaced by full length single elements at the next internal inspection. This applies to all element types (monitors, coalescers, separators and micro filters).
New filter elements shall be stored in the manufacturer's original packaging in a cool dry place. Elements shall be used on a first-in-first-out basis and subject to the manufacturer's recommended maximum shelf life.

A1.2 Routine Checks On All Filters

A1.2.1 Daily, at the start of the morning shift, filter vessels shall be drained of any free water preferably whilst under pressure. Details of any free water or sediment found shall be recorded. A sample shall then be taken for a Visual Check.

A1.2.2 Periodically during each pumping operation, the differential pressure should be observed to ensure that the maximum limit is not exceeded. Unexpected variations should be reported and investigated.

A1.2.3 Once a week, when pumping at the highest flow rate normally used, the differential pressure shall be noted and recorded on a graph. This check shall always be carried out at approximately the same flow rate.

A1.2.4 Every twelve months all filters shall be opened and inspected internally for cleanliness of vessel, condition of the internal lining and cover seal, element appearance and proper fitting of elements and condition of internal lining and cover seal. The cover seal shall be replaced after a maximum of three

compressions. The tightness of elements shall be checked with a calibrated torque wrench that positively confirms torque setting (click stop type) and adjusted in accordance with the element manufacturer's recommendations. Elements found to be damaged or showing signs of microbiological growth (such as leopard spotting) or surfactant contamination shall be investigated and (if growth/contamination is confirmed) shall be replaced. Teflon coated and synthetic separator elements shall be inspected and tested in accordance with manufacturer's recommendations.

If blanking plates/elements have been fitted to reduce flow, these shall be checked in accordance with the manufacturer's recommendations at least annually for correct fit/torque and absence of leakage/bypass. The results of the inspection shall be recorded.

After opening for inspection or filter element change out, procedures should ensure that the vessel is refilled very slowly to allow entrapped air to vent and to ensure that no damage is caused to the installed elements.

A1.2.5 Additional filter inspections may be necessary, to check for element seal leakage, etc., if abnormal amounts of solids or water are found downstream of the filter.

A1.3 Element Change Criteria

A1.3.1 Micro-Filters (MF)

MF elements shall be replaced:

- if the differential pressure reaches the manufacturer's recommended maximum
- if flow rate falls to unacceptably low levels
- if filter membrane tests are carried out and abnormal results are obtained (see 2.3.4 (f))
- if unusual sediment is found downstream of the filter
- if there is a sudden drop in differential pressure without any obvious cause being found
- after three years.
- Differential pressure limit (for element replacement) applies at, or corrected to, the maximum operating flow rate through the filter vessel as currently installed. The maximum operating flow rate will usually be less than the design or rated flow of the vessel.

NOTE : Maximum operating flow rate of AAFPC's paper microfilters O-6203 A/S is 300 m^3/h.

A1.3.2 FS Coalescer Elements (First Stage)

Coalescer elements shall be changed:

- if the differential pressure reaches 1.0 bar (15 psi)
- if filter membrane tests are carried out and abnormal results are obtained (see 2.3.4 (f))
- if there is a sudden drop in differential pressure without any obvious cause being found

- if unusual sediment or traces of free water are found downstream of filter
- after a maximum of three years.
- it is not mandatory to perform routine single element tests. However, if a test is carried out and the element fails, all the coalescer elements in the vessel must be replaced.

NOTE : Maximum operating flow rate of AAFPC's Filter Water Separator O-6503 A is 300 m^3/h.

A1.3.3 FS Separator Elements (Second Stage)

Paper separator elements shall be changed:

- Whenever the coalescer elements on the same unit are changed.

Teflon-coated and Synthetic elements shall be:

- inspected and tested annually in accordance with the manufacturer's recommendations and/or when coalescer elements are changed.
- changed if washing in accordance with the manufacturer's instructions fails to restore them.

A1.4 Records

A1.4.1 Records shall be kept of:

- All daily drainings
- Weekly differential pressure readings.

A1.4.2 Records shall be kept of all filter maintenance showing at least the following:

- Number and type of new elements installed
- Differential pressure before and after change
- Throughput since previous change
- Reason for change and any relevant details.

An example of a suitable form is included as Appendix A1.7

A1.5 Gauze Strainers and designated low points

Where gauge strainers are required for fuel quality reasons they shall be fitted with a sample point and drained weekly.
Other strainers such as pump protection strainers shall be opened and cleaned at least once per year unless they are installed such that they form a pipework low point.
All designated low points shall be drained at least monthly. A designated low point in a pipework system is defined as a drain point in a pipeline where significant quantities of particulate /water would accumulate if the position was not flushed on a regular basis. Where Pipelines are in turbulent flow conditions, it is unlikely that significant quantities of particulate/water will accumulate.

A1.6 Differential Pressure Gauges

All differential pressure gauges shall be tested every six months. For piston type gauges, a check for correct zero reading and for free movement throughout the full piston travel is adequate. A record of all checks shall be maintained and all inaccurate or defective gauges shall be replaced.

A1.7 Filtration Details

The following details should be recorded and kept up to date.

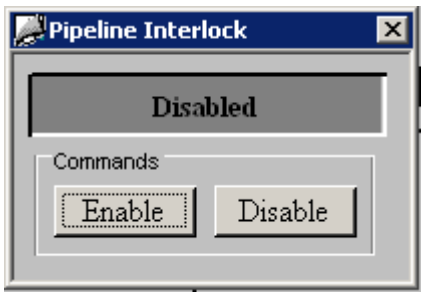
Type (MF / FWS / Monitor)

Location	
Filter No.	
Vessel -make -model -rated flow	
Coalescer/monitor elements -make -model -quantity	
Separator elements -make -model -quantity	
Last change of elements -date -throughput -differential pressure	
Previous change of elements -date	
Previous change of cover seal (to be changed after three compressions) -date	
The following details were updated On……..(date)	
Current throughput (since last change)	
Current differential pressure	
Latest filter membrane tests - Colorimetric (wet and dry) - Gravimetric (mg/litre, into-plane)	
Other data / comments	

Appendix A2
Functionality of Automation Interconnection (OFC – AAFPC)

A2.1 Start condition

Similar requirements with existing OFC truck off-loading system, which provides a "green light" to OFC operator to start the pump for truck off-loading is provided by OFC PLC in order to open through OFC Scada the MOV62002.
Truck offloading is automatically disabled before OFC operator starts the pipeline receipt. An extra interlock (If pipeline receiving is active) will be put on all offloading pumps. If pumps are interlocked FCV's are interlocked as well. For operational reasons, product shall be received by both systems after a manager level order. A button is added in the offloading picture. After a manager level the following pop-up window appears:



Clicking the enable button the interlock (pipeline receiving) will be bypassed for all pumps.

It is possible to open MOV62002 manually if following requirements are in place:

- If receiving tank is in filling mode and its inlet valve is open. This means also no HH, HHH and leak alarm is active.
- ESD is not active
- EFSO is not active
- Inlet Filter Water Separator (FWS) Differential pressure reading does not have a HH-alarm.
- High Alarm (PAH62004) by PI-62004 shall not be active.
- PRV is not activated (Even for only one time and then is off, the MOV must not be able to be opened, but it requires operators acknowledgment.)
- Offloading system not active

All these requirements will be put as interlocks on the valve. MOV62002 shall open and close manually through Wincc by the OFC operator.

For opening: After successful change of tank mode to "filling mode" and all interlocks are in place, PLC gives a "flushing green light" ("Safe to receive") on pipeline system (located next to MOV62002), which shall be the signal to OFC operator, he can open the valve if he wishes to do so.

For closing: the OFC operator is allowed to close it through Wincc at any time (e.g. end of receipt). MOV AUTOMATICALLY closes in case one interlock is not in

place. At the same time, an automatic alarm and the existing horn and flushing light in the OFC control room will be activated.

If the respective MOV is successfully fully opened, then the OFC operator shall only be allowed to transmit the 'OFC ready to receive product' digital signal to the Pipeline Automation System.
On Pipeline system picture is a button 'Ready To Receive Product'. This button is enabled after fully open of MOV62002. By clicking on this button following pop-up window appears:

Clicking on Start the text will change to 'Ready To Receive Product' and it will be sent to the pipeline company. This shall be considered as the OFC confirmation that facilities are ready to receive product by pipeline.
This text will be displayed also on pipeline picture to inform the operator about the status without opening the window.

A2.2 During receipt

- All involved interlocks shall be active and shall shutdown the MOV62002 at pipeline receiving station in OFC in case of any problem. Should MOV is closed by any interlock, an audiovisual statement shall be provided by OFC Scada. Ready to receive signal will stop.

A2.3 At the end of the receipt

- If refinery pump stops, then MOV must close and an audiovisual alarm "Refinery pumps stopped or valves closed" is generated in OFC Wincc. This will not happen if MOV is already closed and refinery pump stops.
- OFC operator is able to print out a pipeline receipt report at any time during the receipt with all actual receiving data. A button is added in the pop-up window printing reports. At the end of the receipt and after MOV62002 fully closed, a message informs OFC operator that pipeline receipt is completed and a delivery receipt will be printed out by OFC printer.

Appendix A3

An Example of a Form for JET A-1 Recertification

Date: **Quantity In Tank Before**
Tank No: **Quality Received**
Batch No: **Quantity In Tank After**

Property	Test Method*	"Checklist" Limits**	Present Recertif.	Refinery Cert. Qual.	Previous Recertif.	Accept. Diff.
Visual Appearance		C&B				
Saybolt Colour	D156	Report				
Particulate Contamination, mg/l	D5452	1.0 max				
Cumulate channel particle counts/ml (≥4μm, ≥6μm, ≥14μm, ≥21μm, ≥25μm, ≥30μm)	IP565	Report				
Total Acidity, mg KOH/g	D3242	0.015max				
Total Aromatics, % v/v	D6379	26.5max				
Sulfur, Total, % m/m	D4294	0.30max				
Sulfur, Mercaptan, % m/m	D3227	0.003max				
or Doctor test	D4952	Negative				
Refinery components at point of manufacture: Non/ Mildly/Severely Hydroprocessed components % v/v Synthetic components %wt		Report				
Net Heat of Combustion, MJ/Kg	D3338	42.8min 25min				
Smoke point, mm	D1322	19min				
or Smoke point, mm	D1322	3max				
and Naphthalenes, % v/v	D1840					
Distillation	D86					8
Initial boiling point, ºC		Report				
10% Recovered, ºC		205 max				"
50% Recovered, ºC		Report				"
90% Recovered, ºC		„				"
End Point ºC		300max				
Residue, % vol		1.5				
Loss, % Vol		1.5				-
Flash Point ºC	D56	40 min				-
						3
Density at 15ºC, kg/l	D4052	0.775-0.840				
Upper						3
Middle						3
Lower						3
						3
Freezing Point, ºC	D5972	-47 max				
Viscosity at -20ºC, cst	D445	8 max				
Cu Strip (2h,100ºC), Class.	D130	1 max				Spec
JFTOT	D3241					
Control Temperature,ºC		Min 260				
Filter Pressure Dif, mm Hg		25max				
Tube Deposit RatingVisual		<3max				
«P» or «A» deposits		NO				
		7.0 max				
Existent Gum (Steam jet)	D381					Spec
Microseparometer (MSEP) rating	D3948					
Fuel with SDA		70 min				
Fuel without SDA		85 min				

Elec. Conductivity, pS/m at 25ºC (Fuel with SDA)	D2624	50 min 600 max				Spec
Static Dissipator (Statis 450), mg/l		3 max				
FAME Content, ppm	IP583	50 max				

Batch Recertification Approved by ……. Date ……

Tank Checked & Released for Service …… Date ……

Where minimum/maximum limits are given, the Acceptable Difference values do not apply to results below minimum or above maximum.

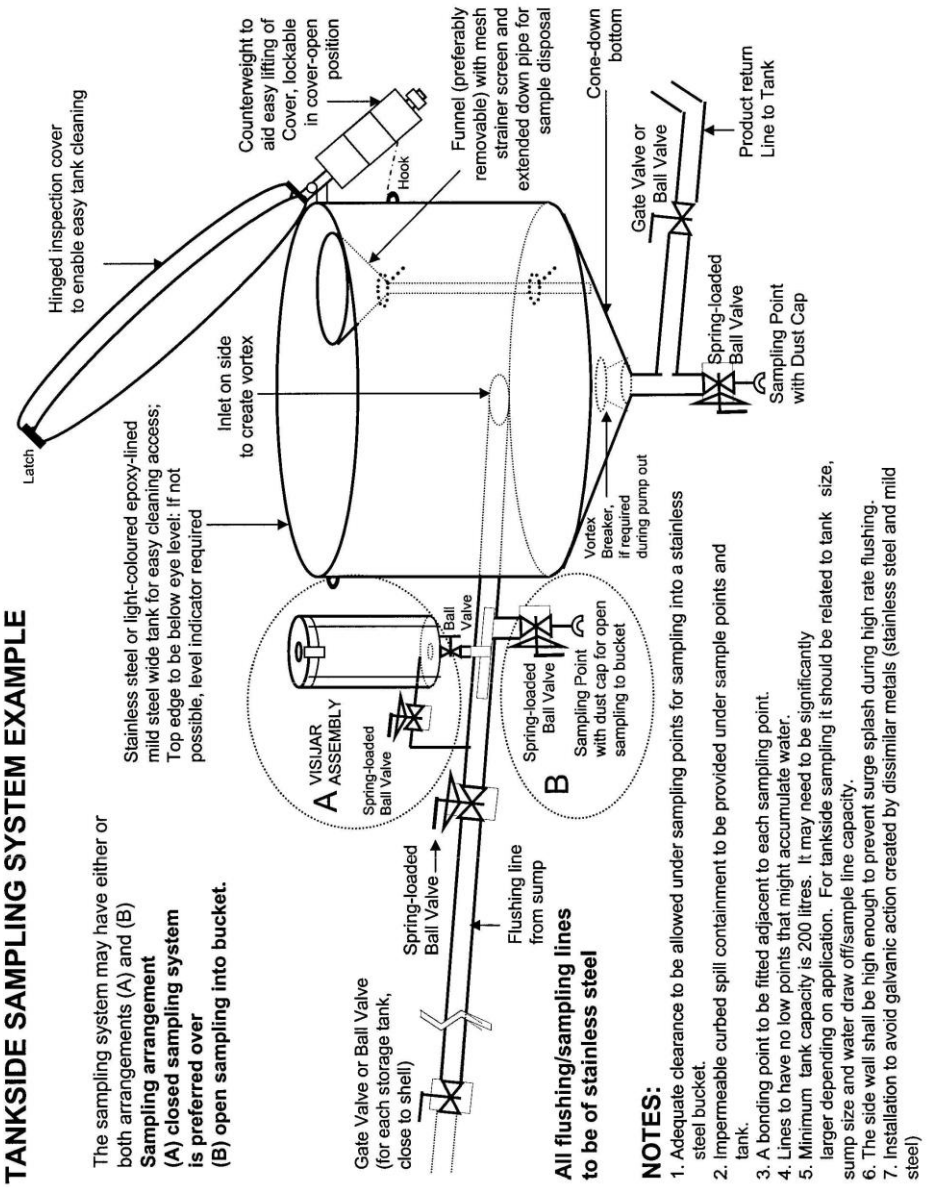
* Test methods as per relevant specification

** See JIG Bulletin for latest issue of AFQRJOS

Guidelines for Aviation Fuel Quality Control and Operating Procedures for Jointly Operated Supply & Distribution Facilities

Appendix A4

Sampling System Diagram



Appendix A5

Lost time incident report

A lost time incident (LTI) is defined as an incident resulting in personnel not being available for duty on their next scheduled shift. Details of injuries to personnel to personnel while on duty shall be recorded and investigated. This form may be used for that purpose.

Location	
Date and time of incident Include timings and details of people involved.	
Investigation Analysis of incident	
Cause of incident	
Potential consequences Future/long-term effect of injury	
Corrective action taken	
Recommendations To reduce the risk of future similar incidents.	
Report prepared by	**Date**
Report reviewed by	**Date**
Incident closed out Recommendations implemented	**Date**
Total LTI days lost	

APPENDIX A6

Tank Inspection Report

_____ **Terminal/Airport** **Number** _____

1. **TANK DATA**

Tank Number _____ **Capacity** _____ **m3/USG**

Vertical ☐ **Horizontal** ☐ **Other** _____

Above Ground ☐ **Semi-Buried** ☐ **Buried** ☐

Date Constructed _____ **Leaded/Unleaded** _____

Extent of Lining _____ **Date of Lining** _____

Grade Before Cleaning _____ **Grade After Cleaning** _____

Date of Last Repair _____ **Type of Repair** _____

_____

Date of Last Inspection _____ **Date of This Inspection** _____

2. **TYPE OF INSPECTION** **By Entry** ☐ **Without Entry** ☐

Entry Permit Number _____ **Dated** _____

3. **CLEANING METHOD** _____

4. **INSPECTION OF FITTINGS** **CONDITION**

Contents Gauge _____

Temperature Gauge _____

Level Alarms _____

Floating Suction/Swing Arm/Cables _____

Water Drain Facilities _____

Valves: Inlet _____

Outlet _____

P & V _____

Leak Detection System _____

Under-floor Valves _____

Other Fittings (Specify) _____

_____

5. **DETAILS OF CONTAMINATION REMOVED**

Quantity of Sludge _____ **Quantity of Water** _____

Comments _____

DETAILS OF EXTERNAL EXAMINATION

6. _____

DETAILS OF INTERNAL EXAMINATION

7. _____

(a) Floor

_____

_____

(b) Walls _____

_____

_____

(c) Columns And Beams _____

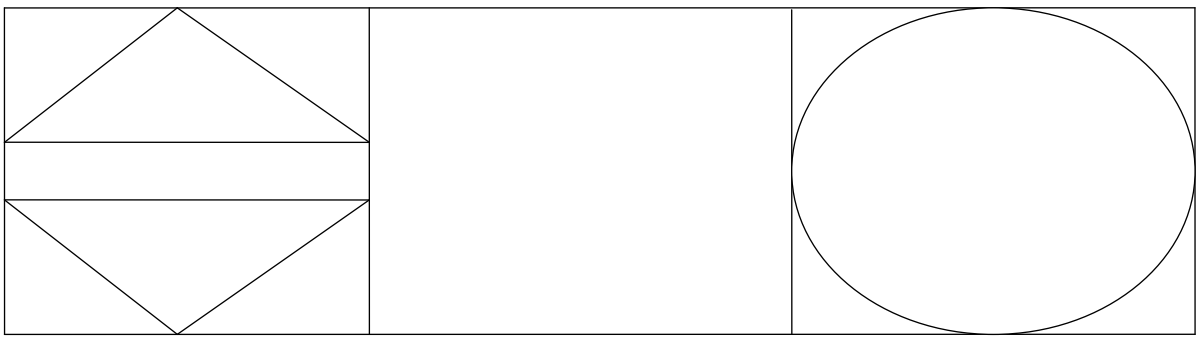
_____

(d) Roof _____

_____

_____

8. DIAGRAM



9. REMARKS (reason for inspection, quality control test results etc.) **Horizontal Section**

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10. RECOMMENDATIONS

- The Tank is considered to be clean and satisfactory for the storage of Aviation product

- The following actions are recommended before the Tank can be considered suitable for the storage of Aviation products:

_____

_____

Signed _____ **Inspector** _____