澳門特別行政區
REGIÃO ADMINISTRATIVA ESPECIAL DE MACAU
民航局
AUTORIDADE DE AVIAÇÃO CIVIL
CIVIL AVIATION AUTHORITY

AC
No. : AC/AGA/003R01
Date : 11 March 2016

AERONAUTICAL CIRCULAR
CIVIL AVIATION AUTHORITY – MACAO, CHINA

SUBJECT:

Aviation Fuel at Aerodromes - Storage, Handling and Quality Control

EFFECTIVE DATE:

15 April 2016

CANCELLATION:

AC/AGA/003R00

GENERAL:

The President of Civil Aviation Authority – Macao, China, in exercise of his power under Paragraph 89 of the Air Navigation Regulation of Macao (ANRM) and Article 35 of the Statutes of Civil Aviation Authority, approved by the Decree-Law 10/91/M, establishes this Aeronautical Circular (AC) which contains information concerning aviation fuel installations at aerodromes, and fuel handling procedures, as detailed in Appendix 1 – Aviation Fuel at Aerodromes – Storage, Handling and Quality Control.

APPLICABILITY:

1. For safety reasons, the person(s) responsible for the management of an aviation fuel installation at an aerodrome shall ensure that on delivery fuel is of a grade appropriate to the installation to which it is supplied. Also they shall ensure that the installation is capable of storing and dispensing fuel in a state fit for use in aircraft and that the installation is properly marked to show the grade or grades of fuel it contains. The responsible person shall be satisfied by sampling and testing that the fuel is fit for use before it is delivered into an aircraft. Written records shall be kept, which show the dates, quantities and grades of all bulk deliveries with details of all samples taken and the results of tests. Details of maintenance and cleaning shall also be recorded. These records shall be preserved for twelve months or for a longer period as required by Civil

Aviation Authority (AACM). On request such records shall be produced to an authorized person within a reasonable time.

2. This publication provides guidance on measures that fuel installation managers should adopt in the discharge of the responsibilities placed upon them. It is aimed particularly at those installations managed directly by aerodrome owners or licensees, though the measures it contains are generally appropriate to all categories of installations.

3. Nothing referred to in this AC, including its Appendix, should be construed as overriding the requirements of Decree-Law n. 19/89/M, dated 20 March 1989, Decree-Law n. 5/92/M, dated 20 January 1992 and Decree-Law n. 18/99/M, dated 26 April 1999, which should be referred to for the precise legal responsibilities placed upon fuel installation managers.

4. For fuel and other specifications not mentioned in this publication advice should be sought from the AACM.

- END -

Aviation Fuel at Aerodromes

Storage, Handling and Quality Control

Introduction

1.1 This AC requires that any person having management of any fuel installation on an aerodrome in Macao shall not permit fuel to be delivered into the installation or into an aircraft unless he is satisfied that the fuel has been sampled before it is delivered into the installation and it has been found by tests to be fit for use in aircraft.

1.2 For each installation, which includes vehicles (bowsers/tankers), written records shall be made and preserved for a period of at least 12 months of particulars of all samples taken and the results of tests made on those samples.

1.3 ALL FUELS TO BE USED IN AIRCRAFT REQUIRE CAREFUL HANDLING. NEGLIGENCE IN THE RECEIPT, STORAGE AND HANDLING OF FUEL OR AN ERROR IN FUELLING CAN ENDANGER AN AIRCRAFT AND THE LIVES OF ALL ON BOARD. IT IS ESSENTIAL THAT THE CORRECT GRADE AND QUANTITY OF FUEL IS SUPPLIED AND THAT IT IS IN A CONDITION FIT FOR USE IN AIRCRAFT.

1.4 Certain requirements identified within this AC may involve the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. This AC refers only to the technical suitability of fuel intended for use in aircraft and in no way absolves individuals or corporations from statutory and all other legal obligations relating to general welfare, health and safety.

1.5 It is the responsibility of the fuel supplier to ensure that on delivery fuel is fit for purpose. The aerodrome fuel installation manager should therefore, on acceptance of bulk deliveries of fuel, insist that the supplier provides satisfactory evidence with supporting documentation to this effect. Such documentation may be in the form of a Certificate of Conformity and can be expected to give details of fuel quantity, fuel type with international standards and requirements acceptable by the AACM, fuel origin and batch references.

1.6 In the case of aerodromes licensed by the AACM, the person responsible for the management of an aerodrome fuel installation should be appointed by the licensee. When the fuel installation is under the management of a fuel company, or any other organization not managed by the owner or licensees, that company or organization should appoint the person responsible. Persons having the responsibility for the management of an aerodrome fuel installation must ensure that when fuel is delivered into the installation it is the grade appropriate to the tank designated for that product, and that it has been sampled and found fit for use in aircraft. After fuel has been delivered, the responsibility for its safekeeping, quality control, and proper delivery to aircraft similarly lies with this person.

1.7 Reference is made in this publication to the recording of receipts of fuels, their sampling and testing, and maintenance and cleaning of installations. When delivering into or dispensing fuel from an installation or when carrying out fuel

checks, maintenance and cleaning operations, records should be drawn up, signed and dated by the person responsible on completion of such work.

1.8 It is for managers of installations to decide the form the records should take, but it is obviously important that they are kept in such a way as to maintain their legibility.

1.9 If it appears to the AACM that any aviation fuel is intended or likely to be delivered in contravention of any provision of this AC, the AACM may direct the person having the management of the installation not to permit aviation fuel to be dispensed from that installation until the direction has been revoked by the AACM.

1.10 For the purpose of this publication 'aviation fuel' means fuel intended for use in aircraft; 'aviation fuel installation' means any apparatus or container, including a vehicle, designed, manufactured or adapted for the storage of aviation fuel or for the delivery of such fuel to an aircraft.

1.11 When required by the commander of an aircraft receiving fuel, the manager of the fuel installation shall provide a written statement of the quantity and grade of fuel supplied.

Chapter 1 Receiving Bulk Fuel Supplies

1 Documentation

Aviation fuel should be delivered by a dedicated system. If this is not the case then special precautions not covered in this document are necessary and advice should be sought from the AACM before accepting deliveries of fuel.

1.1 Documentation should clearly state the type of fuel being supplied, and that it complies with the relevant specifications: Jet A-1 should comply with DEF STAN 91–91 or ASTM D 1655 and Avgas with DEF STAN 91–90 or ASTM D 910, together accomplishing IP Standard Methods for Analysis and Testing of Petroleum and Related Products. Jet A–1 containing Fuel System Icing Inhibitor (FSII) may also be dispensed, particularly at aerodromes used primarily by helicopters: this fuel should comply with DEF STAN 91–87.

1.2 On delivery of fuel, the person in charge of the installation will normally be required by the supplier to endorse the Certificate of Conformity/Release Note to confirm that the grade of fuel is as ordered, whereas listed certifications should be prepared to confirm the fuel quality before any fuelling proceeded:

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 JIG Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS) Check List, or other equivalent specification. It also provides information about 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 authorized signatory.

b) Certificate of Analysis

A Certificate of Analysis is issued by independent inspectors and/or laboratories and contains the results of measurements made of all the properties included in the latest issue of the JIG Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS) Check List or other equivalent specification. It cannot, however, include details of the additives added previously. It shall include details relating to the identity of the originating refinery and to the traceability of the product described. It shall be dated and signed by an authorised signatory.

Note 1: A Certificate of Analysis shall not be treated as a Refinery Certificate of Quality.

c) Recertification Test Certificate

This document contains the results of the Recertification Test (see Chapter 7) 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 Chapter 7) 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 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°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 Pre-Delivery Checks

2.1 Before the release documentation is accepted and delivery permitted, the person responsible for receiving the fuel should:

a) Check that the grade and quantity as shown on the certificate are as ordered, and corresponded with the grade of fuel in the receiving tank.

b) Examine the seals on the delivery vehicle or vessel and ensure they are intact. Also check the vehicle or vessel grade plate indicator.

c) Check there is sufficient available capacity in the receiving tank(s) for the quantity of fuel to be received.

d) Sample and test the fuel in the receiving tank(s) for the presence of water in accordance with the procedures detailed in Chapter 7. If necessary flush the water drains until a clear and water-free sample is obtained.

e) Allow the delivery vehicle to stand on level ground for ten minutes, then draw a sample from the outlet tap of each vehicle compartment from which fuel is to be delivered and check in accordance with the procedures detailed in Chapter 7.

f) Repeat the procedure in para. 2.1(e) if the sample is unsatisfactory. If a third sample is necessary and this also proves to be unsatisfactory, delivery of the fuel should be refused and the fuel supplier informed.

2.2 Once a satisfactory visual sample and density result (see note below) have been obtained, the vehicle should be bonded to an approved earthing point and discharge of fuel commenced into the selected and correctly grade-plated receiving point.

NOTE**:** If on delivery it is considered necessary to determine the density of the fuel then the density should not vary by more than 0.003 kg/litre (when measured at 15°C) from the value quoted on the delivery note.

2.3 On completion of the fuel delivery, record the results of the pre-delivery inspection and sample tests. Also record the quantity and grade of fuel delivered.

2.4 All samples of fuel taken should be retained for a minimum of seven days. See Chapter 7. In the case of aerodromes where there is a large turnover of fuel these reference samples may be held by the fuel company delivering the fuel.

3 Records

Records should be kept of all deliveries both to and from installations. These records should show the results of the actions listed in paragraph 2 above and include details of the checks and items listed below:

a) The results of sampling, water drain checks, differential pressure, filter and floating suction head checks.

b) Details of incoming consignments with cross reference to release notes/certificates of conformity.

c) Receiving tank contents and water check, settling times and release checks.

d) Filtration equipment – to include results of filter element, differential pressure and water checks.

e) Label and retain fuel samples. See Chapter 7.

f) Records shall include details of consequential action where an inspection, sampling or test has revealed a defect or deficiency.

Chapter 2 Storage of Fuels in Bulk

1 General

1.1 All facilities which are used for handling aviation fuel must be fully segregated from other products. Different grades of aviation fuels must also be segregated. Ideally installations should have separate delivery and suction lines and these should be provided on all new installations.

1.2 The use of protective treatments containing zinc is prohibited for the internal lining of pipelines, storage tanks and any other equipment. Zinc alloys, copper or copper alloys, cadmium plating, galvanised steel and plastic materials should not be used for main piping.

2 Tanks

2.1 Tanks should be constructed and installed so as to prevent the ingress of water and dirt. They should have a well-defined low point. To achieve horizontal tanks should have a minimum slope of 1:30 with a sump at the lowest point. Vertical tanks should have a cone-down bottom with a minimum 1:30 slope to a centre sump.

2.2 When tanks are buried, the manhole chamber/cover should always be kept clean and clear of water.

2.3 Jet A-1 storage tanks should have free vent devices. Avgas tanks should have pressure/vacuum relief valves, unless the tank is underground.

2.4 All possible precautions should be taken to avoid the entry of water or dirt into storage tanks. Open ended pipes, hoses and sampling points should be fitted with dust caps, plugs or other suitable protection which should be replaced tightly after use.

2.5 Provision should be made for withdrawing water from the lowest points of tanks. Therefore above ground tanks should be fitted with a drain cock at the lowest tank point. Buried tanks should be provided with a thief pump drawing from the tank sump.

2.6 Samples which have been tested and indicated that the fuel may be contaminated, or not complied with the applicable specifications, are an indication that the integrity of the installation should be investigated immediately; while the product shall be quarantined and remain under quarantine until further testing has established that the quality is “Accepted for Aviation Use” by all participants. If frequent evidence of contamination is found the tank should be internally inspected and cleaned.

2.7 Tanks should be internally inspected at least once a year and internally manually cleaned every three years. A newly lined tank should be inspected one year after the lining is installed to check for soundness and adherence to the tank shell. Defects should be rectified before the tank is refilled.

2.8 It is recommended that all fuel tanks should be coated with a suitable lining. A specification for tank linings is available from the fuel suppliers.

2.9 The use of a floating suction fitted with a stainless steel check cable is recommended for the delivery of fuel from storage tanks. Check chains should not be used. Whether fixed or floating systems are used, the suction point should be positioned well clear of the tank sump, and in the case of a fixed suction at least 50 cm clear of the tank bottom.

3 Pipework

3.1 To ensure the integrity of fuels it is essential that each grade of fuel is handled in a completely segregated system with no interconnecting lines between pipelines which handle different grades of fuel. Separate input and outlet lines should be provided.

3.2 Drain points should be fitted at all pipeline low points.

4 Filters

4.1 Avgas Installations: Tank input and output lines should be fitted with filters of not less than 80 microns (180 meshes). Also a 5 micron filter should be fitted on the output line. 80-micron filters should be inspected weekly and cleaned if necessary. Damaged filters should be repaired or replaced.

4.2 Aviation turbine fuel installations: Tank input lines should be fitted with a 5-micron microfilter, or a filter separator. The output line should also be fitted with a filter separator. Filter separators should have a nominal rating of 5 microns for solid particles and a maximum of l5 parts per million for water.

4.3 Filter separators, filter monitors and microfilters should have the differential pressure (dp) checked weekly. The check should be completed at the maximum possible flow rate and the pressure readings recorded. Filter separator elements should be changed when the dp limit at the rated vessel flow as recommended by the manufacturer is reached (usually 1 bar or 15 psi), or after a maximum period of in-service use of three years.

4.4 Where a sudden or significant change of dp from the previously recorded trend is detected, the elements of microfilters or filter separators should be checked. They should also be inspected and replaced if necessary when a significant reduction in flow rate is observed or when a sequence of unsatisfactory drain samples is obtained.

4.5 It is recommended that monthly millipore colour and millipore gravimetric checks are taken to assess the performance of the filtration equipment. This check is particularly relevant where fuel flow rates exceed 1150 litres/min, with procedures detailed in Chapter 7, para 3(b) “Millipore Test (Membrane Filtration Test)”.

4.6 When initially filling a filter separator vessel the fuel flow should be regulated to prevent an excessive build-up of static electricity.

4.7 Jet A-1 is a very good insulator. Jet A-1 supplied within Macao may contain a static dissipator additive which reduces static electricity hazard. Fuel suppliers will advise whether fuel contains this additive. Suppliers may also provide advice on operating procedures and engineering safeguards which can be adopted to minimise static electricity hazards.

5 Settling Times

5.1 On completion of delivery, before aviation fuel is dispensed from the receiving tank, fuel should be allowed to settle for a period of time which depends on the grade and depth of fuel in the tank. The settling time is also dependent on the type of tank, filter arrangement and the method by which fuel is drawn from the tanks.

5.2 When discharge of fuel from the delivery vehicle or vessel has commenced, no fuel should be dispensed from the receiving tank until adequate settling time has elapsed and the satisfactory completion of the water and fuel cleanliness check carried out in accordance with the procedures details in Chapter 7.

5.3 Horizontal tanks fitted with floating suction devices require a minimum settling time of one hour per meter depth. Vertical tanks similarly equipped require a settling time of two hours per meter depth.

5.4 On tanks where floating suctions are not provided or where floating suction lines are used but not fitted with the filter arrangements mentioned in para 4.1 and 4.2 above, the following minimum settling times, dependent on fuel grade stored, should be required:

Jet A-1: 3 hours per meter depth or 24 hours, whichever is less;

Avgas: 90 minutes per meter depth.

6 Labelling and Colour Coding

6.1 Marking of airport equipment for fuel identification

All airport equipment should be marked to identify the type and grade of aviation fuel being issued and dispensed in order to preclude intermixing or contaminating the fuels.

1. Fuelling system

   Airport fuelling systems should be marked utilizing the marking code described in paragraph 6.2.

   a. Fuel tanks should be marked with letters at least 3 inches high to identify type and grade of fuel.

   b. Piping should be marked with letters at least 3 inches high and colour coded as required.

2. Fuelling vehicles

   To prevent error in identification of fuels in fuelling vehicles, marking as described in paragraph 6.2, with white letters at least 3 inches high, should

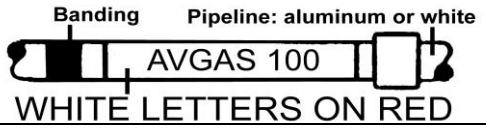
be painted at the hose outlet and the grade label of fuel should be painted on vehicles at location for easy identification.

6.2 Labelling and Colour Coding

A labelling and colour coding should be used to permit rapid identification under varying visibility conditions. All tanks should be labelled and colour coded to identify the grade of fuel they contain. Pipelines should also be similarly labelled and colour coded. The form and requirements of labelling and colour coding are illustrated in Table 1.

1. Aviation Gasoline:
   a. The grade label for aviation gasoline is printed in white letters and numbers on a red background.
   b. The colour of the single band around the piping or hose is the same colour as the dye in the grade of Avgas flowing through the line. They are red for Avgas 80, blue for Avgas 100LL and green for Avgas 100. A minimum 4-inch wide band is recommended. If the pipeline is painted the colour of the Avgas, then no banding is needed.
2. Jet Fuel:
   a. The grade label for jet fuel is painted in white letters on a black background.
   b. Two 4-inch wide (minimum) black bands around the piping or hose are used to identify Jet A-1.

Table 1: Labelling and Colour Coding - Aviation Gasoline and Jet Fuel

PRODUCT	BANDING	MARKING
Avgas 100	1 Green	
Avgas 100 LL	1 Blue	
Avgas 80	1 Red	
Jet A-1	2 Black	

7 Sampling and Checks

7.1 Storage tanks should be constructed or adapted so as to allow upper, middle and lower samples to be taken. These samples, taken through the depth of the tank, may be required from time to time for analysis.

7.2 Sampling, in accordance with the procedures detailed in Chapter 7 should be carried out at the following times:

a) Each day before the first delivery from the tanks;

b) Immediately before receipt of fuel into tanks;

c) After receipt when the fuel has been allowed to settle for the recommended period;

d) After prolonged heavy rain or snow.

NOTE: Line flushing should always be sufficient to ensure that a proper tank sample is obtained

7.3 If a sample identifies the presence of water or sediment, a further sample should be taken. No fuel should be dispensed from a tank until a clear and bright sample has been obtained.

7.4 Should a fuel sample reveal large quantities of water, dirt or slime, or should the fuel be discoloured the tank should be quarantined until the source of contamination is identified and remedial action completed.

7.5 Satisfactory samples may be returned to storage to avoid waste of fuel. If contaminated, samples should not be returned to any part of the aviation fuelling system unless the contamination has completely settled out and been removed. It is good practice for installations to have a product recovery (slops) tank for each grade of fuel. Product recovery tanks should be treated in the same way, in terms of water draining, as the main storage tanks.

7.6 Buoyancy of floating suctions should be checked at least weekly by the operation of the check wire. Check wires should be secured and bonded to the tank shell.

8 Change of Grade Procedures

Change of fuel grade in storage tanks can pose a risk of contamination of the new grade by residues of the previous fuel stored and therefore, where possible, such changes should be avoided. If this is not practicable, it is recommended that guidance on the proper procedures should be obtained from the fuel supplier concerned.

Additional information on this operation can be found in DEF STAN 91-66.

9 Hoses

9.1 Hoses shall comply with the requirements of the latest issue of BS EN1529 or EN1361/ ISO1825. New hoses, and hoses previously used in aviation fuel

systems, should be carefully checked and left to soak with fuel appropriate to the installation for a minimum of 8 hours at a temperature of 15°C or higher before flushing with at least 2,000 litres. Longer soak times are required where product temperatures are lower. Flushed product shall be visually inspected until no evidence of manufacturing residue is detected and shall be returned to a storage tank that is not in service. Hoses which have been used previously for non-aviation fuels should not be used on aviation fuel installations.

9.2 The maximum service life for fueller loading hoses and hydrant flushing hoses is limited to 10 years from the date of manufacture.

9.3 Fuel in delivery hoses should be recirculated if the delivery system has been unused for a period of two days. If a delivery system has been unused for longer than this period, then fuel lying in a hose should not be recirculated or dispensed to aircraft unless a satisfactory sampling check in accordance with the procedures in Chapter 7 is obtained.

9.4 All hoses shall be given a permanent identification, and a record maintained of the date of manufacture, the date put into service and details of all testing.

10 Periodic Testing of Fuel Stocks

10.1 Fuel deteriorates with time and prolonged storage may render it unfit for use in aircraft. Therefore the quality of static bulk stocks of aviation fuels should be verified by periodic test when:

a) Jet A-1 has been stored and not added to for a period of six months;

b) Avgas has been stored and not added to for a period of three months.

10.2 The quality of aviation fuel stored in either a tank commissioned for use from new, or stored in a tank which has been reintroduced to service after cleaning requires verification by periodic test.

10.3 The companies supplying fuel can provide information on recognised laboratories that can undertake these tests.

10.4 In any event, where the suitability of aviation fuel is in doubt, a full specification test to the relevant standards may be conducted in accordance with "Recertification Test" detailed in Chapter 7.

11 Records

Records should be kept of all deliveries into and from an installation. The results of sampling, filter differential pressure readings, purging and floating suction checks should be recorded. A record of tank inspections tank cleaning and maintenance work should also be kept.

Chapter 3 Aircraft Fuelling Vehicles

1 General

1.1 All fuelling vehicle equipment should be constructed of either aluminium alloy, stainless steel or mild steel protected internally with an epoxy lining. Zinc and copper alloys, cadmium plating, galvanised steel or plastic materials are not permitted.

1.2 Grade identification labels of the type illustrated in Chapter 2, para 6 should be carried in prominent positions on fuelling vehicles. Fuel inlets and outlets including hoses and nozzles should be marked accordingly.

1.3 Tank compartments, whether lined or unlined, should be kept clean and precautions taken to prevent the entry of contaminants. All open-ended hoses, pipes and sampling points should be fitted with dust caps, plugs or other suitable protection which should be properly replaced after use.

1.4 Tank compartments should be designed so as to drain to a low point sump fitted with a drain line valve. Drain lines should have a constant downward slope with a drain plug fitted at the lowest point overall which will permit complete draining of the tank installation.

1.5 Tank compartments should be drained and inspected internally within a twelve monthly inspection cycle. Cleaning and repair work, when necessary, should be completed during these periodic inspections.

1.6 Where fuelling vehicles draw fuel from aerodrome installations which handle both Jet A-l and Avgas, all line couplings should be grade selective. A fuelling vehicle should carry only one grade of fuel.

1.7 Change of fuel grade in vehicle tanks can pose a risk of contamination of the new grade by residues of the previous fuel carried, therefore, where possible, such changes should be avoided. If this is not practicable, it is recommended that guidance on the proper procedures should be obtained from the fuel supplier concerned.

Additional information on this procedure can be found in DEF STAN 91-66.

2 Sampling and Purging

2.1 All fuelling equipment (drain cocks, tank compartments, filter separators, filter monitors, microfilters, gauze filters and air separators) should be purged of water and sediment

a) Before the first aircraft refuelling each day;

b) After each filling of the vehicle and after defuelling;

c) After vehicle washing, prolonged heavy rainfall or snow.

2.2 After a refueller has been filled, samples should not be taken until l0 minutes settling time has been allowed. No deliveries either from or into the vehicle

should be made until satisfactory samples are obtained. If unsatisfactory samples continue to be obtained, action must be taken to identify and eliminate the cause. Satisfactory samples may be returned to storage.

(Recommended sampling and checking procedures are explained in detail in Chapter 7)

3 Hoses

3.1 Hoses shall comply with the requirements of the latest issue of BS EN1529 or EN1361/ ISO1825. New hoses, and hoses previously used in aviation fuel systems, should be carefully checked and left to soak with fuel appropriate to the installation for a minimum of 8 hours at a temperature of 15°C or higher before flushing with at least 2,000 litres. Longer soak times are required where product temperatures are lower. Flushed product shall be visually inspected until no evidence of manufacturing residue is detected and shall be returned to a storage tank that is not in service. Hoses which have been used previously for non-aviation fuels should not be used on aviation fuel installations.

3.2 The maximum service life for fueller loading hoses and hydrant flushing hoses is limited to 10 years from the date of manufacture.

3.3 Fuel in delivery hoses should be recirculated if the delivery system has been unused for a period of two days. If a delivery system has been unused for longer than this period, then fuel lying in a hose should not be recirculated or dispensed to aircraft unless a satisfactory sampling check in accordance with the procedures in Chapter 7 is obtained.

3.4 All hoses shall be given a permanent identification, and a record maintained of the date of manufacture, the date put into service and details of all testing.

4 Filters

4.1 All fuelling vehicles containing Avgas should be fitted with a 5 micron filter. Vehicles containing Jet A-1 should be fitted with a filter separator or monitor with a 5 micron rating.

4.2 150 micron (100 meshes) rating hose end filters should be fitted which should be inspected at least once monthly and if necessary, cleaned, repaired or replaced. Excessive contamination of a hose and filter may indicate deterioration of the hose in which case the hose should be replaced.

4.3 Differential pressure checks taken at the maximum flow rate should be made on microfilters, filter separators and filter monitors at weekly intervals.

4.4 Micro filters and filter separator elements should be changed when the dp reaches the limit recommended by the manufacturer (normally 1 bar or 15 psi).

4.5 Filter monitor type elements should be replaced after a maximum of three years use or when the dp reaches 1.5 bar or 22 psi.

4.6 Should a sudden or significant change from the previous trend of differential pressures occur, the elements should also be inspected to ensure they are functioning correctly. Filter elements should also be inspected and changed if necessary if a significant reduction in flow is detected or continuing unsatisfactory drain samples are obtained.

5 Records

Records should be kept of all fuel deliveries both into and from vehicles together with the results of sampling differential pressure, purging and filter checks. Results of tank inspections should also be recorded along with a record of all rectification and maintenance work. Details of hose inspections should also be kept.

Chapter 4 Hydrant Systems

1 Hydrant Pits

1.1 Hydrant pits should be kept clean and dry at all times. Inspections should be made at regular intervals.

1.2 Hydrant pit covers should be secured to pits by a suitable means.

1.3 If a pit is not used for a period of three months or more, the contents of the spur line should be flushed.

1.4 Hydrant pits should be marked with identification and should also show the appropriate fuel grade labelling and colour coding referred to in Chapter 2 para 6.

2 Low Point Drains

2.1 All low points on a hydrant system should be fitted with a low point drain.

2.2 All low point drains should be flushed thoroughly with the line under pressure at least once a week, to ensure the removal of any water or sediment, until a clear and bright sample is obtained.

2.3 If excessive water or dirt is found the reason must be identified and eliminated before further supplies of fuel are dispensed to aircraft.

Chapter 5 Defuelling Procedures

1 Defuelling

1.1 When an aircraft is to be defuelled, whether in total or in part, instructions on the disposal of the fuel should be obtained from the aircraft operator. Fuel must not be returned to aircraft tanks unless satisfactory quality checks are obtained.

1.2 The acceptance of fuel from aircraft into fuelling vehicles or aerodrome storage tanks can introduce the following two hazards to quality:

a) Water, other liquid or sediment from the aircraft tanks may be introduced into vehicle or storage tanks;

b) Fuel taken from aircraft tanks, and any resultant blend with existing contents of the vehicle or storage tanks, may not meet the appropriate product specification.

1.3 The above mentioned hazards will be avoided by defuelling into an empty fuelling vehicle or an empty storage tank segregated from other parts of the installation. Before defuelling is commenced, samples should be taken from the drain cocks of each aircraft tank involved in the defuelling operation. Unsatisfactory samples do not preclude defuelling but will call for particular attention and thoroughness in the cleaning of vehicles and tank installation after disposal of the fuel.

2 Records

Records of all defuelling operations are required. They should include the registration of the aircraft involved, the results of sampling checks and the quantity and grade of fuel drawn. Record should also be made of the fuel disposal.

Chapter 6 Barrelled Supplies

1 Delivery, Handling and Storage

1.1 A barrel is generally considered to be a container having a capacity less than 210 litres. Barrels storing aviation fuel should be distinctly coloured according to grade.

1.2 Before acceptance, barrels should be examined for damage and seal integrity. Grade marking and inspector's identification should cross check with details on the delivery note and release certificate.

1.3 Barrels should be stored under cover, clear of the ground and on their sides with both bungs below the liquid level.

1.4 A storage system should be adopted that will use the oldest fuel first, according to batch number and filling date.

1.5 Different grades of fuel should be separated from each other to minimise the risk of fuelling error.

1.6 Batches of Avgas require periodic testing three months after the filling date with periodic three monthly checks thereafter. For Jet A-1 the testing period is every six months. After sampling the barrels must be resealed.

2 Sampling

2.1 Before sampling, check that the seals are intact then stand the barrel on end and wipe clean the area adjacent to the bung. Allow the contents to settle before drawing off the required quantity of fuel. Sampling procedures should be in accordance with Chapter 7.

2.2 Discolouration of the fuel, or the presence of water or dirt in the sample indicates that the fuel is unfit for aviation use and therefore the barrel must be rejected.

3 Decanting and Dispensing

3.1 Fuel should preferably be decanted from barrels into fuelling vehicles or storage by means of a suitable pump and lines fitted with a microfilter or filter separator. Avgas may alternatively be decanted through a funnel fitted with an 80 micron filter.

3.2 When it is necessary to dispense fuel direct from barrel to aircraft, the barrels should be stood on end and the contents allowed to settle for ten minutes before taking samples. Once a satisfactory sample has been obtained fuel may then be dispensed to the aircraft tanks through a suction standpipe designed so that fuel cannot be drawn from below a depth of 75mm from the barrel bottom.

3.3 Delivery of Avgas or Jet A-1 to an aircraft should be via a filter monitor type element or equivalent filter. Additionally, Jet A-1 delivery should be through a

microfilter or filter separator. Specifications are given in Chapter 2 para 4, and the test "Millipore Test (Membrane Filtration Test)" is detailed in Chapter 7, para 3(b). Fuelling hoses should comply with the latest issue of BS EN1529 or BS EN 1361/ ISO1825.

3.4 After decanting or dispensing fuel, replace barrel caps tightly and reseal.

3.5 After use, drums should not be re-filled with fuel intended for aviation purposes. It is recommended that when emptied barrels should be returned to the fuel supplier.

4 Records

Records should be kept of all barrel deliveries, decanting and dispensing of fuel, and sampling checks.

Chapter 7 Sampling and Testing

1 General

1.1. During the handling and storage of aviation fuels sampling checks will be required to ensure that fuel intended for use is in a fit state for that purpose.

1.2. The aerodrome licensee shall arrange for adequate sampling of a sufficient portion of any fuel intended to be stored in the installation to ensure that the fuel is of a grade appropriate to that part of the installation for which it is intended. The results of tests following sampling shall be assessed to ensure that the aviation fuel will be fit for use in aircraft. Before any fuel is dispensed from the installation into aircraft, the licensee shall arrange for adequate sampling of a sufficient portion of the fuel in order that the quality of the aviation fuel may be assured, relative to its design specification.

1.3. Written records confirming that the fuel installation is being kept in a fit state for the storage and dispensing of aviation fuel shall be made after each assessment of the installation or the fuel's suitability. These records shall be preserved by the management of the fuel installation for at least 12 months from the date of assessment. The records shall include details of consequential action where an inspection has revealed a defect or deficiency.

1.4. The documentary evidence relating to the qualifications and competence of personnel employed in the management and operation of the fuel installation and the fuelling of aircraft shall be well maintained.

1.5. Records of inspections, sampling, test, maintenance, servicing and cleaning of the fuel installation and the aviation fuel held at the aerodrome, shall be produced at the request of any person authorised by the AACM.

1.6. A sufficient number of representative samples of aviation fuel shall be taken and retained as evidence that the fuel installation is being kept in a state fit for the storage and quality control of aviation fuel so that it will be fit for use in aircraft.

1.7. Certificate examinations:

a) Certification of Analysis Testing

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.

Sample quantity required:

Jet A-1: 2 litres minimum

Avgas: 25 litres

An approved sample container as in sub-section 4 shall be used.

b) Recertification Testing

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 shall be checked to confirm that:

- The specification limits are met;
- No significant changes have occurred in any of the properties.

This check should 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). It is important to check that the determined properties have not changed. It is the only way to be reasonably sure that the remaining unchecked specification properties have also not changed significantly and remain satisfactory.

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 before sampling;
- Additional columns shall be introduced on the forms so that a separate column is used for each batch and for any stock that 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 set out in the table below:

	Jet A-1	**Avgas**
Appearance/Colour	X	X
Saybolt Colour	X	-
Distillation	X	X
Flashpoint	X	-
Density @ 15°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 (IP323 / D3241)	(3)	-
FAME	(4)	-

Sample quantity required:

Jet A-1: 2 litres minimum

Avgas: 4 litres

An approved sample container as in sub-section 4 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 transported systems that also carry gas oil/ diesel fuel or non-dedicated storage that may have contained gas oil/ diesel fuel.

c) 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. Periodic Test:

This test is carried out to certify that product which has been static in storage for more than three months for Avgas and six months for Jet A-1, conforms to the relevant specifications 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 the maximum storage period. Samples should also be taken from each tank in which less than half of the product has been replaced during the three-month period for Avgas and six-month period for Jet A-1.

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 in respect of recertification tests.

Test requirements are shown in the table below:

	Jet A-1	**Avgas**
Appearance/Colour	X	X
Saybolt Colour	X	-
Distillation	X	X
Flashpoint	X	-
Density @ 15°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 sample container as in sub-section 4 shall be used.

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

2 Visual Examinations

2.1 Appearance Check (Clear and Bright)

Fuel should be considered unfit for use in aircraft if visual examination shows:

a) More than a trace of sediment;

b) Globules of water;

c) Cloudiness; or

d) A positive reaction to water finding paste, paper or a chemical detector.

The following should serve as a guide to the visual assessment of fuels:

a) Colour: It is red for Avgas 80, blue for Avgas 100LL and green for Avgas 100. Aviation turbine Jet A-1 is undyed and can vary in appearance from water white to straw yellow.

b) Undissolved water (free water) will appear as droplets on the sides or as bulk water on the bottom of the sample vessel. When suspended water is present the fuel will appear hazed or cloudy.

c) Solid matter (particulate matter) generally consists of small amounts of rust, sand, dust, scale etc. suspended in the fuel or settled out on the bottom of the sample vessel.

d) The terms 'clear' and 'bright' are independent of the natural colour of the fuel. 'Clear' refers to the absence of sediment or emulsion. 'Bright' refers to the sparkling appearance of fuel free from cloud or haze.

2.2 Visual Check

A Visual Check is an Appearance Check for Jet fuel with the addition of a chemical water check. 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".

3 Technical Description

The following check/tests have been previously mentioned in this publication and for reference are described below:

a) Density Check (Control Check):

This check is frequently made to confirm the correct grade and unchanged quality of fuel stocks by comparison of test results with the value recorded on delivery documentation. Should this comparison, after correction to standard temperature (15°C), differ by more than 0.003 kg/litre, fuel contamination should be suspected and therefore further investigation should be made before the product is accepted for aviation use.

b) Millipore Test (Membrane Filtration Test):

For this test five litres of fuel should be passed through double 0.8 micron membranes in order to determine colorimetric or gravimetric levels of particulate contaminant. This test is carried out in accordance with the joint ASTM D2276/IP 216 Standard.

c) 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.

d) Test for Micro-biological Growth:

The fundamental method for accessing the presence of microbiological growth in storage tanks and filters is the daily appearance check 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.

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.

e) 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.

The following table summarizes the minimum use of the CWD as required in the Visual Check and Density Check (Control Check) for all airport operations.

Operation	Density Check[1]	Visual Check (CWD Required)	Appearance Check[1]
Receipts by pipelines, (dedicated or multi-product) barge/coastal vessels before and during discharge	X		
Receipts by rail or road tank car	X		
Receipt tank sample for recertification			X
Airport storage tank sump drain before release for service	X	X	
In service airport storage tanks sump drain – daily		X	
Airport storage tanks sump drain not in service (settling or awaiting release)			X
Airport fixed filter vessel sumps (receipt) and strainers			X

Airport hydrant filter, loading filter and vehicle filter sumps – daily		X	
Fueller drain points – routine off-ramp (fuller tank draining after filling)		X	
Sampling during fuelling and defuelling		X[2]	
Hydrant low point servicing vehicle tank sump flushing before use and after use – daily		X	
Hydrant low point flushing – each low point running sample		X	

[1] A Chemical Water Detector Test (CWD) may also be performed to provide verification of free water status.

[2] A CWD shall be performed on at least one of the samples taken during fuelling.

4 Sample Containers

Clean, clear glass jars with necks and screw caps should be used for sample examination. Where, in addition, buckets are utilised they should be manufactured from stainless steel. When fuel is drawn into buckets they should be bonded to the fuel line by cable and clip. All sampling equipment should be kept in a scrupulously clean condition.

5 Sampling Procedures

5.1 Water finding paste applied to the end of a dipstick or dip tape should be used for direct checking of fuel in bulk storage, barrels or fuelling vehicles. Fresh paste must be used for each check and the dipstick allowed to rest on the bottom of the container for a short period of time but not for longer than 10 seconds.

5.2 Fuel samples from above ground storage tanks and aircraft fuelling vehicles should be drawn from sampling or drain cocks. From buried tanks and barrelled supplies fuel samples should be obtained by using a thief pump.

5.3 Samples should then be proceeded the appearance check, visual check, as well as application of CWDs.

5.4 If a fuel sample proves to be unsatisfactory then the sampling procedure should be repeated. If a third sample is necessary and proves to be unsatisfactory then action should be taken to identify the cause of contamination and no fuel

dispensed to aircraft from the installation concerned. It would, in this case, be advisable to inform and seek advice from the fuel supplier concerned.

6 Retained Samples

6.1 Samples, with minimum 2 litres for Jet A-1 and 4 litres for Avgas, should be taken and retained for the following activities.

a) For all deliveries, whether by road tanker, pipeline, or in packages;

b) From the bulk tank, hydrant system, vehicle or packed stock, each day aircraft refuelling is made.

c) Whenever samples are taken for periodic testing.

6.2 Samples should be retained for a minimum of seven days, or longer if required by the AACM.

6.3 All samples should be kept cool and stored in suitable containers (e.g. meeting the specification ASTM A4306), out of daylight and be labelled with the following information:

a) Grade of fuel;

b) Reason for sample;

c) Date and time of sample;

d) Place taken;

e) Name of sampling person.

6.4 These samples are the means whereby the installation manager may demonstrate satisfactory quality of the fuel used for refuelling the aircraft.

Chapter 8 Health, Safety, Environment, Training and Emergency Procedures

1 Safety and Training

Supply and Distribution depots must have a Health, Safety and Environment Policy. It is the responsibility of the participants of each joint operating facility to ensure that a suitable policy, conforming to local and mandatory Health, Safety and Environment legislation, is available and is enforced.

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.

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.

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 must be 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.

1.4 Safety Precautions

a) Entry into deep pits 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.

2 Reporting Accidents/Incidents

2.1 Accidents

All participants shall be notified immediately of any accident involving personnel, facilities or equipment.

The Manager shall initiate whatever investigation is necessary.

2.2 Incidents Affecting Fuel Quality/Availability

All participants/users shall be notified immediately of any incident likely to affect fuel quality/fuel availability. The Manager shall consult the participants/users and carry out the agreed action.

3 Health Hazards

3.1 Drug and Alcohol Policy

Supply and Distribution depots must have a Drug and Alcohol Policy. It is the responsibility of the participants of each joint operating facility to ensure that a suitable policy is available and is enforced.

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 shall be drawn up and posted prominently, and personnel instructed in elementary precautions.

4 Emergency Procedures

4.1 General

Personnel must 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.

4.2 Manager's Responsibility

It is the Manager's responsibility to identify all possible emergencies, and to prepare written pre-planned procedures to meet such emergencies for approval by the Management Committee. The procedures should include, but not be restricted to, the following:

a) Be specific to the type and location of the emergency;

b) Detail actions to be taken;

c) Mandatory responsibilities of specific staff;

d) List all essential contacts with routine and emergency telephone numbers

e) Availability and source of emergency equipment;

f) Procedure for keeping up-to-date;

g) Be kept in locations where they will be clearly visible and where all staff will have immediate and direct access to them.

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.

4.4 Emergency 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.

5 Security

It is the Manager's responsibility through the Management Committee to ensure that the security arrangements are adequate to protect the personnel, assets and operation of the facility.

6 Spillage of Fuel

Spillage and leakage must 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 judgment and initiative by well trained personnel is of major importance to prevent hazards arising from fuel spills.

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