GOVERNMENT OF INDIA **CIVIL AVIATION REQUIREMENTS**
CIVIL AVIATION DEPARTMENT **SECTION 2 -AIRWORTHINESS**
SERIES 'H ' PART III
ISSUE I, DATED 27TH AUGUST '1992 **EFFECTIVE: FORTHWITH**

Subject: Aviation Fuel at Airport: Storage, Handling and Quality Control.

1. APPLICABILITY:

Aircraft Rule 133(B) empowers Director General of Civil Aviation to approve organisations engaged in storage, compounding, blending of aviation fuels, aviation lubricants and products including fuelling/de-fuelling of aircraft. Further CAR Series E, Part-VI specifies the general requirements for approval of organisation engaged in any one or more of : storage, compounding, blending, testing, distribution, supply (including fuelling and defueling of aircraft) of Aviation fuels, Aviation Lubricants and Special products. All such Organisations must have their AVIATION FUEL STATION (AFS) approved by DGCA in terms of the above CAR.

This part of the CAR lays down the minimum requirements that Approved Organisation must comply and they may be summarised as ensuring that

i) Proper quality control and fuelling procedures are adhered to

ii) Sampling tests of fuel and inspections of installations are correctly completed and Records kept.

2. SCOPE:

Reference is made in this part of the CAR to the recording of deliveries of fuel, their sampling and testing and maintenance and cleaning of installations. The records should be drawn up, signed and dated by the person accepting deliveries into or dispensing fuel from the AVIATION FUEL STATION (AFS), carrying out the fuel checks, maintenance or cleaning operations immediately after completion of work.

It is for the AO to decide the form the records should take, but it is essential that they are kept in an orderly fashion and in such a way as to maintain their legibility. The records/forms the vendors adopt must be in line with the procedures reflected in their Quality Control Manual.

It is responsibility of AO who has the management of an AFS at an airport to satisfy himself on delivery of fuel into the installation that the fuel is of a grade appropriate to the installation to which it is being delivered, that the installation is capable of storing & dispensing the fuel in a state fit for use in aircraft, that the installation is correctly marked to show the grade, or grades of fuel it contains and that the fuel

being delivered has been sampled and tested to ensure that it is in a fit state for use in aircraft. He shall also satisfy himself by sampling & testing that the fuel is fit for use before it is delivered into an aircraft. He is required to keep written records of the dates, quantities and grade of all deliveries, details of sample taken and the results of test and details of maintenance and cleaning of the installation.
All procedure so adopted must be documented in the AO Quality Control Manual and got approved by DGCA.

When the operator of an aircraft requests, the manager of an installation should provide him with a written statement of the quantity and type of fuel supplied.

PART - I

RECEIVING BULK FUEL SUPPLIES

1 DOCUMENTATION:

1.1 When delivering aviation fuel the suppliers will normally present a Quality Control Release Certificate/Document which he will require to be endorsed by the person in charge of the AFS or his representative to the effect that the fuel is as ordered.

2. PRE-DELIVERY CHECK:

2.1 An aviation delivery vehicle shall be designed as per approved specifications and internally cleaned yearly.

2.2 Before the Quality Control Release Certificate/Document is completed and delivery accepted the person responsible for receiving the fuel should

2.2.1 Examine the seals/locks on the delivery vehicle and ensure that they are intact.

2.2.2 Check that the grade and quantity as shown on the certificate is as ordered, and corresponds with the grade of fuel already in the receiving tank.

2.2.3 Carry out a water check on the fuel already in the tanks(s) in accordance with the procedure in Part VIII and if necessary flush the water drains until a clear and water free sample is obtained.

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

2.2.5 If a filtration system of 180 mesh or finer is not fitted in the input to storage lines of the installation, check that cone filters are in a position on the delivery vehicle outlets.

2.2.6 Allow the delivery vehicle to stand on level ground for minimum ten minutes, draw a sample from the outlet tap of each vehicle compartment from which fuel is to be delivered and check in accordance with procedure in Part VIII.

2.2.7 If the sample is unsatisfactory, the procedure should be repeated if a third sample is necessary and also proves unsatisfactory, delivery of the fuel should be refused.

2.2.8 If the sample is satisfactory, complete the appropriate bonding procedure prior to delivery of the fuel into the selected and correctly grade plate receiving point.

2.3 RECORDS:
Record the results of the pre-delivery inspection and sample tests and details of the quantity and grade of fuel delivered (into each tank if more than one).

PART - II

STORAGE OF FUELS IN BULK

1. SETTLING TIMES:

1.1 On completion of delivery and before any aviation fuel is dispensed from the receiving tank, the fuel should be allowed to settle for a period depending upon the type of fuel and its depth in the tank, the type of tank and its input filter arrangement, and the method by which fuel is drawn from the tank.

1.2 For tanks fitted with floating suction devices for dispensing fuel, the minimum settling times are one hour for horizontal tanks and two hours for vertical tanks. The periods are appropriate only when, in the case of AVGAS a 1+ tank input filter of not less than 180 mesh gauze is fitted, or in the case of aviation turbine fuels an input microfilter, or a filter separator or filter monitor with a nominal 10 micron or finer rating for solid particles and 15 parts per million for water as per API/EI standards , is fitted.

1.3 For tanks with floating suction devices and which do not meet the filter criteria set out in paragraph 1.2, and for all tanks with other dispensing systems, the minimum settling times are half an hour per foot depth of fuel in the tank in the case of AVGAS, and one hour per foot depth for aviation turbine fuels.

1.4 No fuel should be dispensed from the receiving tank between the beginning of the discharge from the delivery vehicle, and the water and fuel cleanliness check made after the appropriate settling time, and carried out in accordance with the procedures in Part VIII.

2. TANKS:

2.1 Each airfield storage tank for JET A-1/JP-5/ATF K-60 shall be internally epicoated and equipment with a floating section.

2.2 All possible precautions should be taken to avoid the entry of water and 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. With buried tanks, the manhole chamber should always be kept clean and clear of water.

2.3 Provision should be made for withdrawing water from the lowest points of tanks. With above ground tanks this should be by means of a drain cock fitted at the lowest point, and with buried tanks from the tank sump by means of a thief pump.

2.4 The cause of any contaminated samples should be investigated immediately, and an internal inspection and cleaning of tanks carried out if frequent evidence of contamination is found.

2.5 As a routine measure, tanks should be internally cleaned and inspected at least every three years, if inlet to the tank are fitted with 5 micron filter elements and once in two years in case tank are fitted with 10 micron filter element. With a newly lined tank, inspection should be completed 1 year after the lining was installed to check for soundness and adherence to the tank shell. Any defects should be rectified before the tank is refilled.

2.6 Floating sections shall be inspected once in a week for satisfactory operation.

2.7 Tank bottom sample of ATF shall be tested for microbiological growth once in a year.

3. FILTERS:

3.1 AVGAS installations: Tank input and output filters of not less than 180 mesh gauze should be fitted. They should be inspected weekly, cleaned if necessary and repaired or replaced if damaged.

3.2 Aviation turbine fuel installations: Microfilters of 10 micron or finer rating or filter separators or filter monitor should be fitted on input lines. The filter separators should conform with the specifications in paragraph 1.2 above. On the output side of tanks, filter separator with a nominal 5 micron or finer rating as per API/EI standards shall be installed.

3.3 With filter separators, ~~and~~ micro filters and filter monitors, the pressure differential should be checked weekly at the maximum possible flow rate. The elements should be changed when the pressure differential limit specified by the manufacturer is reached.

3.4 Should any sudden and significant change from the previous trend of recorded differential pressures occur, the elements of micro filters and filter separators and filter monitors should be inspected to ensure that they are functioning correctly. They should also be inspected and if necessary replaced:

i) on significant reduction in rate of flow;

ii) on continuing unsatisfactory drain samples.

As a matter of routine, the elements of micro filters, filter separators and filter monitors should be inspected annually and should be replaced after three years use or the periodicity specified by the manufacturer whichever is earlier

4. LABELING AND COLOUR CODING:

4.1 All tanks should be labeled and colour coded to identify the grade of fuel they contain. Pipelines should also be similarly labeled and colour coded. The form and dimensions of labeling and colour coding are illustrated in Figure 1.

The overall dimensions of the grade labels should not be less than illustrated, but the dimensions of the coloured segments of both labels and pipelines may be varies provided that the primary indicator colours for the grades (Red for AVGAS, and Black for Jet A-1) predominate. The grade wording as illustrated should always be used.

4.2 As an additional measure to avoid refuelling errors it is recommended that the appropriate grade markings or a band of the appropriate primary grade indicator colour referred to in 4.1 should be painted on delivery hoses or pipes as close as practicable to the delivery nozzle, but not on the nozzle itself. Any colour coding on the delivery nozzle should be provided by a material which will not flake or separate from the nozzle in general use, for example a securely attached plastic sleeve or ring.

5. SAMPLING AND CHECKS:

5.1 Storage tanks should be constructed or modified so as to allow upper, middle and lower samples to be taken. These may be necessary from time to time for purposes of analysis.

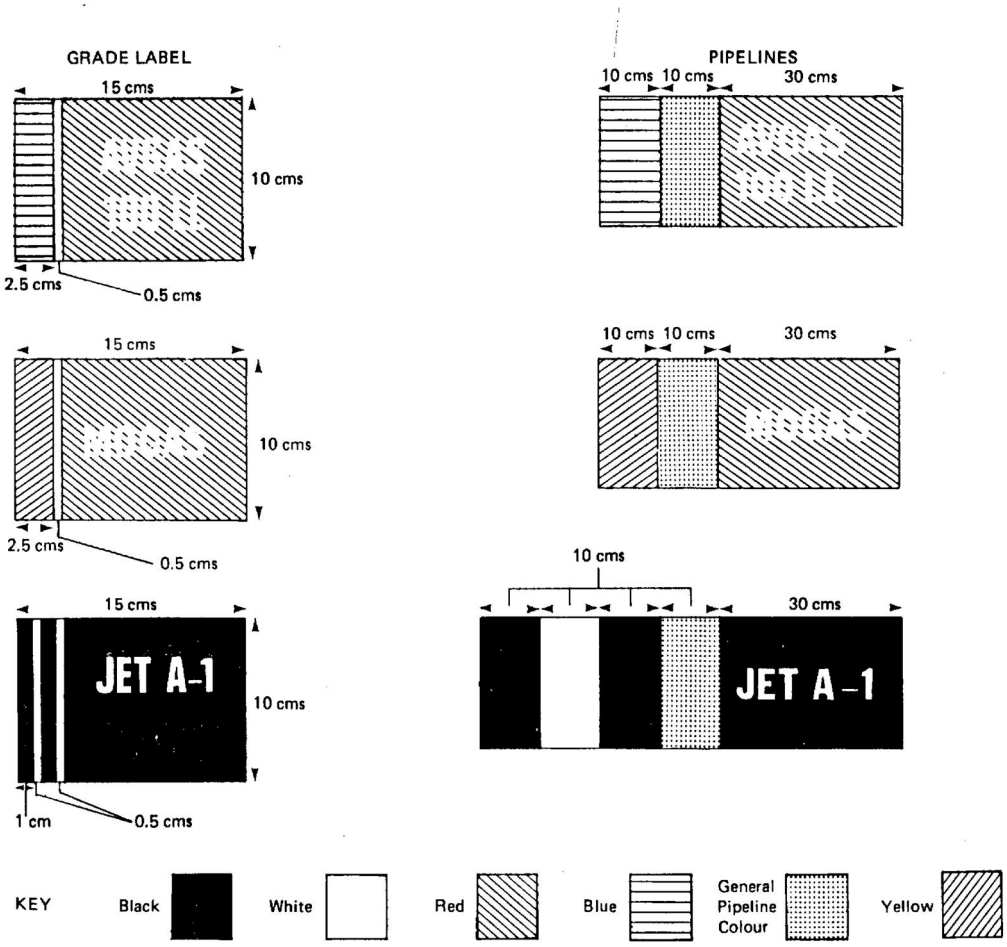

Fig 1 Labelling and Colour Codes

5.2 Sampling in accordance with the procedures in part VIII should be carried out after sample line flushing sufficient to ensure that a tank bottom or sump sample is obtained:

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

ii) Immediately before receipt of fuel into the tanks;

iii) After receipt when the fuel has been allowed to settle for the recommended period.

5.3 If a sample is unsatisfactory further samples should be taken. Fuel should not be dispensed from the tank until a satisfactory sample has been obtained.

6. PURGING:

6.1 Water should not be allowed to remain in aviation fuel storage tanks. Any water found should be removed immediately, and in the case of excessive water or sediment steps should be taken to find and eliminate the source. In addition, all filter separators,filter monitors, microfilters, gauze filters and other drain points on static equipment or pipelines should be purged once daily, and the drawn fuel checked in accordance with the procedures in Part VIII. If contamination is found, further samples should be drawn until a clean sample is obtained.

6.2 When samples are found to be in good condition they can be returned to storage to avoid waste of fuel. If contaminated, they should not be returned to any part of the aviation fuelling system unless contaminant(s) are completely settled out and removed.

7. HOSE CLEANLINESS:

Fuel in delivery hoses should be recirculated if no fuel has been dispensed from an installation for a period of two days. If any fuel is left in hoses for a longer period than this, it should not be recirculated or dispensed to aircraft unless a sampling check in accordance with the procedures in Part VIII shows it to be uncontaminated.

8. HOSE REQUIREMENTS:

8.1 Aviation delivery hoses shall conform to IS/BS/API specifications.

8.2 Before commissioning a new hose, aviation product on which it is going to be commissioned shall be stored in the hose for a period of 24 hours with both ends blanked. Subsequently a sample shall be taken of the product stored in the hose and checked for discolouration. If the product is found to be discoloured, the hose shall be emptied and fresh product stored in it for a further period of 24 hours and observation as observed made. This procedure shall be repeated till the product from the new hose shows no discolouration.

8.3 Alternately, 10,000 litres of the product shall be circulated through a new hose and a sample taken at the end of circulation shall show no discolouration.

8.4 If the fuelling equipment has not been used for 48 hours, the hose shall be pressurized to the normal working pressure and tested. Every morning the hoses shall be checked for abrasion, soft spot, bulgings or any other damage.

9. FLOATING SUCTION CHECKS:

9.1 Float buoyancy should be checked atleast weekly.
9.2 At monthly intervals a test should be made of the effectiveness of devices such as check wires fitted to the system to prevent the suction head drawing fuel from the tank bottom if the float should be punctured. Due to the possibility of wearing of the links, the use of a chain to restrain the suction head is not recommended.

10. LABORATORY TESTS OF FUEL STOCKS:

The quality of static bulk stocks of aviation fuels, that is those which are older than six months from the last date of certification for Jet A-1, AVGAS should be verified through a recertification test and re-tested every 3 months at an approved laboratory before further issues are made. The fuel supplying companies can provide information on DGCA approved laboratories that can undertake these tests.If the product is dormant for 1 year or more it shall be tested for full specification before further issues are made.

11. RECORDS:

Records should be kept of all deliveries into and from the installation; the results of sampling, pressure differential, filter and floating suction head checks; purging of the system; tank inspection; and any rectification of maintenance work carried out.

PART III

AIRCRAFT FUELLING VEHICLES

1. GENERAL:

1.1 Grade identification labels of the types illustrated in Part II paragraph 4.1 should be carried in prominent positions on fuelling vehicles, including at fuel inlets and outlets. Delivery hoses/nozzles should also be colour coded in accordance with Part II, paragraph 4.2.

1.2 Tanks, lined or unlined, should be kept clean and precautions taken to prevent the entry of contaminants. 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.

1.3 Each refueller tank shall be cleaned and inspected once in a year. Its Lined tanks should be inspected for lining defects. Any defects found should be repaired, or if the defects are extensive, the lining replaced..

2. SAMPLING AND PURGING:

2.1 As a routine measure, fuelling vehicles should be purged of water and sediment once a day before use. This purging should encompass all drain cocks, tank compartments, filter separators, fuel monitors, microfilters, gauze filters and air separators.

2.2 Samples of fuel should be taken after providing a settling time of minimum 10 minute and checked in accordance with the procedures in Part VIII:

i) following each reload or top up of a fuelling vehicle;

ii) after the vehicle has been exposed to heavy rainfall, sleet, thawing snow, or vehicle washing.

2.3 If the first sample is found to be contaminated, further samples should be taken. If unsatisfactory samples continue to be obtained, action should be taken to identify and remove the cause. Until satisfactory samples are obtained no deliveries from or into the vehicle should be made.

2.4 When samples are found to be in good condition they can be returned to storage to avoid waste of fuel. If in unsatisfactory condition, samples should be disposed of and not returned to any part of the fuelling vehicle or aviation fuelling system unless contaminant(s) have been completely settled out and removed.

3. FILTERS:

3.1 Hose end protection filters of 100 mesh gauze should be fitted. They should be inspected at least monthly, and if necessary cleaned, repaired or replaced. Excessive contamination of a hose end filter may indicate deterioration of the hose lining. The hose should be replaced if this is confirmed.

3.2 Deliveries of AVGAS from the vehicle should be made through a microfilter with a nominal rating of 5 microns.

3.3 Vehicles delivering aviation turbine fuels should be fitted with a filter water separator or filter monitor with a nominal 5 micron or finer rating as per API/EI standards..

3.4 Checks should be made at weekly intervals on the pressure differentials at the maximum possible flow rate on microfilters, filter separators or filter monitors (whichever are applicable). Elements should be changed when the differential reaches the limit recommended by the manufacturer. Should any sudden and significant change from the previous trend of recorded differential pressures occur, the elements should also be inspected to ensure that they are functioning correctly. They should also be inspected and if necessary changed:

i) on significant reduction in flow rate;

ii) on continuing unsatisfactory drain samples.

As a matter of routine, the elements of filter separators should be replaced after three years use, and the elements of monitors after two years use.

3.5 The filtration system in refueller/dispenser shall be subjected to milipore test by gravimetric method once in 3 months at all airfields.

4. HOSE CLEANLINESS:

4.1 Fuel in delivery hoses should be recirculated if no fuel has been dispensed from a fuelling vehicle for a period of two days. If any fuel is left in hoses for a longer period than this it should not be recirculated or dispensed to aircraft unless a sampling check in accordance with the procedures in Part VIII shows it to be uncontaminated.

5. FUELLING VEHICLES USED FOR STORAGE:

The guidance given in this part in relation to fuelling vehicles in equally applicable to vehicles or trailers used for fuel storage, except that after delivery of fuel and prior to the sampling that is referred to in paragraph 2.2 (i) a settling time of 90 minutes per metre depth of fuel should be allowed in the case of AVGAS, and three hour per metre depth for aviation turbine fuel.

6. RECORDS:

Records should be kept of all deliveries into and from vehicles; the results of sampling, pressure differential and filter checks; purging and tank inspections; and any rectification or maintenance work carried out.

PART IV

HYDRANT SYSTEMS

1. HYDRANT PITS:

1.1 All pits should be grade marked and kept clean and free of water. They should be checked atleast weekly and after heavy rain or snow, and any contaminants removed. Monthly checks should also be carried out to verify the correct operation of shut-off valves and grade selection devices.

1.2 All valves and fittings should be checked weekly for leaks, and rectification action taken as necessary.

2. WATER SAMPLING EXTRACTION PITS:

2.1 These should be checked for water at least weekly. If water is found it should be removed and the fuel sampled, following the procedures set out in part VIII. No fuel should be dispensed until an uncontaminated sample is obtained.

2.2 The drain point should be checked weekly for leaks, rectification action taken as necessary, and any waste fuel in the pit removed.

3. SHOCK ALLEVIATORS:

Their condition should be checked at monthly intervals, and the air pressure adjusted as necessary to conform with the designed operating level. The gland of the isolating valve should at the same time be checked for leaks and repaired or replaced if defective.

4. DISPENSERS-SAMPLING,PURGING AND PRESSURE DIFFERENTIAL CHECKS:

4.1 Hydrant dispensers, although not classed as bulk fuel carriers, may nevertheless have dispensing systems which fall into the same category as those on fuelling vehicles. These systems should conform with the specifications and be Checked in accordance with the procedures set out in Part III - AIRCRAFT FUELLING VEHICLES.

4.2 Checks should be made at weekly intervals on the pressure differentials on microfilters, filter separators or filter monitors (whichever are applicable), the elements of which should be changed when the differential reaches the limit recommended by the manufacturer. Should any sudden and significant change from the previous trend of recorded differential pressures occur, the elements should also be inspected to ensure that they are functioning correctly. They should also be inspected and if necessary changed:

i) on significant reduction in flow rate;

ii) on continuing unsatisfactory drain samples.

As a matter of routine, the elements of filter separators should be replaced after three years use, and filter monitors after two years use.

4.3 Immediately after fuelling is completed, a sample should be drawn from the dispenser and checked in accordance with the procedures set out in Part VIII. Ideally this sampling check should be carried out before the aircraft leaves the refuelling point, or if this is impracticable and radio communication with the aircraft can be established quickly, it should be completed and assessed before the aircraft is positioned ready for take off.

4.4 If the sample is unsatisfactory a further sample should be tested. If this is also unsatisfactory, the aircraft pilot or operator's representative should be informed immediately so that arrangements can be made to check the state of the fuel in the aircraft tanks. Take off should not be attempted until this has been done and the fuel found to be free of contamination. No further fuellings should be made from the system until the reason for the presence of contaminant(s) has been established, and they have been removed.

5. RECORDS:

A record should be kept of quantities of fuel dispensed, the results of all checks and sampling, and any maintenance and rectification action carried out.

PART V

BARRELED SUPPLIES

1. DELIVERY, HANDLING AND STORAGE:

1.1 Before accepting delivery from the fuel supplier, a check should be made of the state of barrels and their seals. Delivery should be refused of any leaking barrels or if their seals are broken.

1.2 The number of barrels, grade markings, and fuel company inspector's marks should be checked against the details in the suppliers' release and consignment notes.

1.3 The barrels should be stored under cover, clear of the ground and on their sides with the bungs in the 3 o'clock or 9 o'clock position.

1.4 A system of storage or a procedure should be followed which will ensure that the oldest fuel in store is used first, according to batch numbers and date of filling of the barrels

1.5 To minimize the risk of fuelling errors, different grades of fuel should be stored separately from each other.

2. SAMPLING:

Before fuel is decanted, or dispensed from barrels into aircraft, it should be checked for contamination in accordance with the procedures set out in Part VIII.

3. DECANTING AND DISPENSING:

3.1 Fuel should be decanted from barrels into fuelling vehicles or storage preferably by means of a suitable pump and through a microfilter or filter separator, though AVGAS may alternatively be decanted through a funnel fitted with a 180 mesh (or 20 x 250 Hollander weave) gauze filter or a good clean chamois leather. It is important to ensure that all chalk deposits are removed from a new chamois leather before use.

3.2 If fuel is to be dispensed from barrels into aircraft, the barrels should be stood on end and the contents allowed to settle for 10 minutes before the sampling check referred to in paragraph 2 is completed. If satisfactory samples are obtained the fuel should be dispensed through a suction standpipe designed so that fuel cannot be drawn from a depth lower than 3 inches from the barrel bottom. The bottom 3 inches of fuel should not be used in aircraft.

3.3 AVGAS should be dispensed direct into aircraft only through a 180 mesh gauze or equivalent filter.

3.4 Delivery of aviation turbine fuel direct into aircraft tanks should be made through a microfilter, or filter separator with a nominal 5 micron rating for solid particles and 15 parts per million for water.

3.5 All equipment used in decanting or dispensing barrelled fuel should be kept in a scrupulously clean condition.

3.6 After decanting or dispensing fuel, replace bungs tightly. Any barrels still containing fuel that is to be used in aircraft should be resealed.

3.7 Barrelled fuel - If, after the barrels have been filled by the supplying company, the periods stated in the Table below have been exceeded, barrelled fuel should not be used unless it has been assessed as fit for use in aircraft by laboratory tests.

AVGAS	Six months
Aviation turbine fuels	Six months

4. RECORDS:

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

PART VI

DEFUELLING

1. GENERAL:

1.1 When an aircraft is to be defuelled instructions on the disposal of the fuel should be obtained from the aircraft operator. The manager of the aerodrome fuel installation into which the fuel is drawn should not return it to aircraft tanks if he has reason to believe that the fuel is not fit for use in aircraft.

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

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

ii) 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.

2. PROCEDURES:

2.1 To minimize the hazards referred to above, it is recommended that aircraft should be defuelled into an empty fuelling vehicle, or an empty storage tank segregated from other parts of the installation, which has previously held the grade to be defuelled. As an additional precaution, before defuelling commences, samples should also be taken from the drain cocks of each aircraft tank to be involved in the operation, and checked in accordance with the procedures in Part VIII.

2.2 The obtaining of unsatisfactory samples need not preclude defuelling but will call for particular attention to be paid to the thoroughness of the cleaning of the

installation after disposal of the defuelled product. It follows also from paragraph 1.1 above that if unsatisfactory samples are obtained the withdrawn fuel should not be returned to aircraft tanks.

2.3 Irrespective of the results of this sampling, after disposal of the fuel the defuelling vehicle or storage tanks and systems used should be flushed to remove all traces of the defuelled product before further use. Flushings should not be returned to the aerodrome fuel installation or used in aircraft.

3. RECORDS:

Records should be kept of all defuelling operations including the registration of the aircraft involved, the results of sampling checks, the quantity and grade of fuel drawn off and its disposal, and the disposal of flushings.

PART VII

FUEL GRADE CHANGES

1. Changes of grades of Aviation fuels in storage tanks, fuelling vehicles and hydrant dispensers can pose a risk of contamination of the new grade by residues of the previous grade stored. This risk is of most significance when changing from a 'leaded' fuel such as AVGAS 100LL to Aviation Turbine Fuels, due to the absorption of lead into the system, particularly tank linings.

2. Changes should be avoided if possible, but where they are unavoidable the whole of the system should be thoroughly purged and cleaned before the new grade is introduced. When changing from AVGAS to aviation turbine fuel the installation filter systems should be modified as necessary to conform with the more demanding filtration specifications for aviation turbine fuel set out in the preceding Parts of this CAR.

PART VIII

SAMPLING PROCEDURES

1. GENERAL:

1.1 The purpose of sampling checks is to ensure that fuel intended for use in aircraft is in a fit state for that use.

1.2 Fuel should be assessed as unsatisfactory for use in aircraft if a sample shows:

i) more than a trace of sediment;

ii) globules of water;

iii) cloudiness;

1.3 A sample can be checked by visual inspection to ensure that it does not contain excessive sediment, is generally clean, and is of the colour appropriate to its grade. AVGAS is blue; aviation turbine fuels are undyed and clear; but fuel from different sources of production may vary in colour. However, apart from cases where it is present in globules and thus readily evident, a conclusive check on the presence of water in fuels can only be made using the aids mentioned in 1. 4 below.

1.4 Free water may be present in AVGAS and both free and suspended water in aviation turbine fuels should not exceed 30 ppm. Suitable water detecting device shall be used to show the presence of free/suspended water..

2. PROCEDURES:

2.1 Water finding paste applied to the end of a dipstick should be used for direct checking of fuel in bulk storage, fuelling vehicles or barrels. Fresh paste should be used for each check and the dipstick allowed to rest on the tank or barrel bottom for no longer than ten seconds.

2.2 In the case of above ground storage tanks and aircraft fuelling vehicles, samples should be drawn from sampling of drain cocks, or with buried tanks by means of a thief pump. Samples from barrelled supplies should be drawn with a glass or plastic pipette.

2.3 Sufficient fuel should be drawn to enable a full and conclusive check of the state of the fuel to be completed. As a general guide when sampling from fuel company delivery vehicles, bulk storage and aircraft fuelling vehicles it is recommended that 3/4-1 gallon (31/2-41/2 litres) is drawn from each compartment or sample drain. With barrelled supplies or for the after fuelling check on hydrant dispensers, a sample of about one pint will generally be sufficient.

2.4 Ideally the sample should be drawn into a clear glass bottle or jar, though if this is not available a stainless steel or aluminium bucket should be used, which should be bonded to the installation. Containers made of any other material should not be used.

2.5 Check that the sample is the correct colour for its grade, for sediment, water globules, cloudiness and general cleanliness. Check for free and suspended water using water finding paste or paper, and the chemical water detector in the case of aviation turbine fuels. The presence of free or suspended water is indicated by a distinct change in the colour of the paste, paper or detector element.

2.6 All sampling equipment should be maintained in a scrupulously clean condition.

2.7 If a series of samples taken from an installation are unsatisfactory, immediate action should be taken to identify the cause. No fuel should be dispensed from the installation until this has been done, the appropriate measures to prevent a recurrence of the contamination have been completed, and further sampling checks shows that the fuel in the installation is fit for use in aircraft.

PART IX

TESTING OF AVIATION PRODUCTS

1. Aviation products must be delivered in the same `on specification' condition in which they were procured from the producing refineries. From the refineries, aviation products are transported by various methods such as Ocean Tankers, Tank wagons, Tank Trucks, Refuellers, Dispensers and packed containers to the final consuming points i.e. aircraft. During this transportation, the aviation products are also stored for certain periods at various intermediate stages such as Terminals, Depots and Aviation Storage Points before the final delivery to the aircraft.

1.1 To ensure that the aviation products received from refinery are "on specification" and to maintain the same level of quality throughout the transport and storage till delivered to the aircraft, various types of laboratory as well as field testings at different stages are essential.

1.2 The type of tests with characteristics for which the tests to be conducted are furnished in the following pages. Frequency of such tests should be covered in Quality Control Manual.

1.3 Strict following of the procedures laid down shall ensure the quality of the products transported, handled, stored and delivered are maintained till the end and also whether or not the "existing controls" are adequate and effective. As such, the testings at laboratory and field levels are most important.

2. Sampling Procedure:

2.1 Introduction:

1. Visual examination
2. Short test
3. Monitoring test
4. Laboratory inspections or full tests
5. Preservation of records.

2.2 Proper sampling is important, as improper sampling shall lead to unfavourable test results even though the product may be on specification. Procedures enumerated below must be implicitly followed whenever samples are drawn.

2.3 Types of samples.

Different types of samples are drawn depending on type of tests to be conducted. Reference of depth of sampling is always taken from the top surface of the product.

1. Upper sample:- One taken at a level of 1/6th of the depth of the product below the top surface.

2. Middle sample:- One taken at a level of one-half of the product below the top surface.

3. Lower sample:- One taken at a level of 5/6th of the depth of the product below the top surface.

4. Single tank composite sample:- For a tank of uniform cross-section, a composite sample consists of a blend of equal parts of upper, middle and lower samples.

5 Bottom sam ple:- One taken from within about 12mm of the bottom surface of the tank or from the lowest point of a pipeline.

6. All level sample:- One which is collected by submerging a closed sample bottle to the bottom of the tank, then opening the sample bottle and raising it at a uniform rate so that it will not be completely filled as it emerges out from the product ensuring the entry of the product into the bottle at all levels.

2.4 General precautions to be observed while drawing samples.

1. Sampling shall be carried out during the coolest part of the day preferably before 8 a.m. to reduce evaporation loss.

2. Sampling shall be carried out in an area which is shaded from the sun and protected from wind and dust.

3. Sampling shall be done by a responsible person fully aware of the sampling procedures.

4. It shall be ensured that all necessary sampling equipment is at hand and ready for use. The equipment shall be absolutely clean, dry and in good condition.

5. Separate sampling equipment shall be used for each product.

6. Sampling equipment and sample containers shall be rinsed out several times with the product to be sampled and allowed to drain before finally drawing the sample.

7. Sample containers shall be protected from the weather and shall be closed immediately after the samples are collected.

8. Sufficient space shall be left in container to take care of product expansion.

2.5 Sampling Equipment:

1. A weighted can or bottle with stopper.

2. A tube or sampling thief of glass or metal suitable for sampling 200 liter barrel.

3. Bottom sampling thief.

4. Decanting funnel.

5. Sample containers - One liter colored bottles or 2 liters aluminium containers suitably encased in felt wooden boxes.

2.6 Procedures:

Bottom sample: Lower the sample thief to the bottom of the tank. On touching the bottom the extended lever will rise opening the bottom valve. Hold the thief for 2/3 minutes in this position to allow the product to enter from bottom and fill up the thief. Slowly raise the thief for the lever to come down and close the opening at the bottom of thief. Pull the thief out of the tank and transfer the product into a bottle or sampling can.

All level sample - Lower the stoppered bottle to the bottom of the tank, pull out the stopper with a sharp jerk of the chain (non-sparking) and raise the bottle/can at such a uniform rate that it is nearly but not quite full as it emerges from the product level.

Upper, Middle and Lower samples:- Lower the sampling quipment to the selected level, pull out the stopper with a sharp jerk of the chain and allow the bottle/can to fill completely by keeping it at the selected level. After complete filling draw out the equipment and replace stopper immediately.

2.7 Barrels:

Barrels should be kept upright, tilted and sampled from the top. Remove the bung, close the upper end of the clean dry sampling tube with the thumb and lower the tube into the product a depth of about 30 cms. Remove the thumb allowing the product to flow into the tube. Again close the upper end with the thumb and withdraw the tube. Allow the product to rise in the tube by turning the tube horizontally and discard this product. Again lower the tube into the drum holding the thumb against the upper end. When the tube reaches the bottom remove the thumb and allow the tube to fill. Replace the thumb, withdraw the tube quickly and transfer the contents into sample container.

2.8 Sample containers shall be labeled immediately after the sample is collected and despatched to the laboratory. The label shall contain the following information:

1. Grade of product

2. Serial No. of the sample

3. Location

4. Sampled by

5. Date and time of sampling

6. Source of sample (Tank No.)

7. Type of sample (Bottom/All level)

8. Quantity of product represented

9. Reason for sampling

10. Batch Number

11. Testing laboratory

12. Test required

2.9 Samples for testing shall be despatched as per requirement.

2.10 Containers shall be ensured to be leak-proof.

2.11 Material used as washer for tight closing shall be resistant to the product.

3. Laboratories:

3.1 Aviation products shall be subjected for various tests in a Refinery Laboratory or Marketing laboratory approved by DGCA under CAR Section 2 Series 'E' Part VI.

3.2 Frequency of tests for aviation products and other fluids shall be as detailed in Quality Control Manual and as per requirements.

3.3 Laboratories shall have necessary standard testing equipments to conduct the concerned tests.

3.4 In case of non-availability of a particular testing equipment in an approved laboratory, such tests shall be conducted in another approved laboratory where such equipment is available and the test result indicated in test reports accordingly with a notation.

3.5 Calibrated testing accessories such as thermometers, Hydrometers and Pressure Gauges, etc. shall be checked for accuracy once a year with a Master item of the respective accessory.

3.6 Master items shall be calibrated once in 5 years.

3.7 Chief Chemists, Senior Chemists, Chemists and Junior Chemists of approved marketing laboratories who meet the requirements for Test Reports signatories under CAR Series E, shall be considered for approval by DGCA as Test Report Signatories.

3.8 Chief Chemists, Dy. Chief Chemists, Chemists, Quality Control Managers, Dy. Quality Control Managers, Sr. Quality Control Officers and Quality Control Officers of approved Refinery laboratories meeting the requirements of Test

Report Signatories under CAR Series `E' shall be considered or approval by DGCA as Test Report Signatories.

3.9 Aviation product test report issued by a DGCA approved laboratory shall be signed (manually or electronically) and released by such an approved Test Report Signatory only.

3.10 Any additions or changes in the personnel set-up at an approved laboratory with regard to approved test report signatories, shall be intimated to Quality Control Manager, Head Office immediately for advising the DGCA to update their records.

(M Sathiyavathy)
Director General of Civil Aviation