



Maritime Helicopters

MARITIME HELICOPTERS

**3520 FAA Road
Homer, AK 99603**

Telephone: (907) 235-7771

**FUEL QUALITY
ASSURANCE MANUAL
CRS # ENRA619D**

Published by:

Maritime Helicopters, Inc.

3520 FAA Road

Homer, AK 99603

(907) 235-7771

Copyright © 2016 Maritime Helicopters, Inc.

All Rights Reserved. No part of the contents of this document may be reproduced or transmitted in any form by any means without the written permission of Maritime Helicopters, Inc.

Record of Revisions



MANUAL NO. _____ MANUAL HOLDER _____

Upon receipt of revisions, insert the revised page(s) in the manual and remove the replaced pages. Enter the insertion date and initials of the person incorporating the revision in the appropriate block on the Record of Revisions. . Return the Revision Notice/Acknowledgment Form to the Fairbanks Office Coordinator. This manual will be revised in accordance with Chapter 2 of this manual.

Rev No.	Rev Date	Change Summary	Received Via
Orig	12/01/11		
1	03/17/14	REWRITE	
2	04/30/16	REISSUE	
3	9/13/2021	Fuel reception and testing changes	DSB, Q&S Changes

List of Effective Pages

PAGE	STATUS	DATE	PAGE	STATUS	DATE	PAGE	STATUS	DATE
i	Revision 2	04/30/16	19	Revision 2	04/30/16	43	Revision 2	04/30/16
ii	Revision 2	04/30/16	20	Revision 3	9/13/21	44	Revision 2	04/30/16
iii	Revision 2	04/30/16	21	Revision 2	04/30/16	45	Revision 2	04/30/16
iv	Revision 2	04/30/16	22	Revision 2	04/30/16	46	Revision 2	04/30/16
v	Revision 2	04/30/16	23	Revision 2	04/30/16	47	Revision 2	04/30/16
vi	Revision 2	04/30/16	24	Revision 2	04/30/16	48	Revision 2	04/30/16
1	Revision 2	04/30/16	25	Revision 2	04/30/16	49	Revision 2	04/30/16
2	Revision 2	04/30/16	26	Revision 2	04/30/16	50	Revision 2	04/30/16
3	Revision 2	04/30/16	27	Revision 2	04/30/16	51	Revision 2	04/30/16
4	Revision 2	04/30/16	28	Revision 2	04/30/16	52	Revision 2	04/30/16
5	Revision 2	04/30/16	29	Revision 2	04/30/16	53	Revision 2	04/30/16
6	Revision 2	04/30/16	30	Revision 2	04/30/16	54	Revision 2	04/30/16
7	Revision 2	04/30/16	31	Revision 2	04/30/16	55	Revision 2	04/30/16
8	Revision 2	04/30/16	32	Revision 2	04/30/16	56	Revision 2	04/30/16
9	Revision 2	04/30/16	33	Revision 2	04/30/16	57	Revision 2	04/30/16
10	Revision 2	04/30/16	34	Revision 2	04/30/16			
11	Revision 2	04/30/16	35	Revision 2	04/30/16			
12	Revision 2	04/30/16	36	Revision 2	04/30/16			
13	Revision 2	04/30/16	37	Revision 2	04/30/16			
14	Revision 2	04/30/16	38	Revision 2	04/30/16			
15	Revision 2	04/30/16	39	Revision 2	04/30/16			
16	Revision 2	04/30/16	40	Revision 2	04/30/16			
17	Revision 2	04/30/16	41	Revision 2	04/30/16			
18	Revision 2	04/30/16	42	Revision 2	04/30/16			



FUEL QUALITY ASSURANCE MANUAL

Rev 3 : 9/13/21

1	GENERAL	1
1.1	PURPOSE AND SCOPE	1
1.2	MANUAL REVISIONS	1
1.3	MANUAL REVISIONS AND CONTROL	1
1.4	DISTRIBUTION AND AVAILABILITY	1
1.5	GUIDANCE	2
1.6	AUTHORITY AND RESPONSIBILITIES	2
1.6.1	DIRECTOR OF OPERATIONS	2
1.6.2	FUEL SPECIALIST	2
1.6.3	MECHANICS	3
2	FUEL QUALITY ASSURANCE	4
2.1	FUEL MONITORING, ORDERING, RECEIVING AND TESTING	4
2.2	REQUIRED INSPECTIONS	4
2.2.1	PURPOSE	4
2.2.2	FREQUENCY	4
2.2.3	DESCRIPTION OF INSPECTION	4
2.3	CLEAR AND BRIGHT TEST (API BULLETIN 1500: ATA SPECIFICATION 103 2-3)	4
2.3.1	APPEARANCE TEST	5
2.3.2	TEST RESULTS	5
2.3.3	WHO PERFORMS AND WHEN	5
2.4	FREE WATER TEST (ATA SPECIFICATION 103 2-5)	6
2.4.1	BACKGROUND	6
2.4.2	VISUAL DETECTION	6
2.4.3	WATER SENSITIVE PASTE OR PAPER	6
2.5	HYDRO KIT AND EQUIVALENTS	6
2.6	API GRAVITY TEST (ASTM D 1298)	7
2.6.1	PURPOSE	7
2.6.2	DESCRIPTION	7
2.6.3	EQUIPMENT NEEDED	7
2.6.4	6.4 PROCEDURE	8
2.7	WHITE BUCKET TEST (ATA SPECIFICATION 103 2-5)	11
2.7.1	7.1 PURPOSE	11
2.7.2	DESCRIPTION OF TEST	11
2.7.3	EQUIPMENT	12
2.7.4	PROCEDURE	12
2.8	RATING DEFINITIONS	13
2.8.1	SOLID CONTAMINANT INDICATORS	13
2.8.2	MOISTURE CONTENT INDICATORS	14
2.9	FILTER VESSEL DIFFERENTIAL PRESSURE (ATA SPECIFICATION 103 2-9)	16
2.9.1	PURPOSE	16
2.9.2	DESCRIPTION	16
2.9.3	PROCEDURES	16
2.10	FILTRATION TEST (MILLIPORE TEST) – ASTM D 3830; ATA SPECIFICATION 103 2-4)	17
2.10.1	PURPOSE	17
2.10.2	DESCRIPTION	17
2.10.3	PROCEDURES	18
2.11	FUEL STORAGE TANK RECEIVING AND INSPECTION	18
2.11.1	FUEL ORDERING AND DELIVERY MONITORING	18
2.11.2	RECEIVING OR TRANSFER OF AVIATION JET FUEL	18
2.11.3	FUEL RECEIVING PROCEDURES	18
2.12	REQUIRED INSPECTIONS	20
2.13	FUEL FILTER CHANGE	20
2.13.1	FILTER CHANGE CRITERIA	21
2.13.2	PROCEDURES	21

UNCONTROLLED COPY WHEN PRINTED

CHECK LOG OF EFFECTIVE PAGES TO VERIFY CURRENT VERSION BEFORE USING



FUEL QUALITY ASSURANCE MANUAL

Rev 3 : 9/13/21

2.14	SUMPING	21
2.14.1		
2.14.2	SUMPING AMOUNTS	22
2.14.3	12.1 SUMPING FUEL FILTERS	22
2.14.4	AIRCRAFT FUEL SAMPLES	23
2.15	FUEL ADDITIVES	23
2.15.1	ICING INHIBITOR FOR JET-B	23
2.16	MISCELLANEOUS INFORMATION	23
2.16.1	FUEL ODOR	23
2.16.2	VISUAL DETECTION OF MICROORGANISMS	24
2.16.3	TEST PROCEDURE	24
2.16.4	EVALUATION OF FUEL SAMPLE	25
2.17	FUEL VENDOR QUALITY ASSURANCE	25
2.17.1	PURPOSE	25
2.17.2	DESCRIPTION	25
2.17.3	APPROVAL OR DISCONTINUANCE OF A FUEL VENDOR	25
2.17.4	APPROVED FUEL VENDOR LIST	26
3	FUEL STORAGE TANKS.....	27
3.1	TYPE OF FUEL STORAGE TANKS	27
3.2	FUEL STORAGE TANK REQUIRED MARKINGS	27
3.2.1	PIPE MARKINGS	28
3.2.2	EMERGENCY SHUT-OFF	28
3.2.3	TANK GROUND	28
3.2.4	TANK LOW POINT SUMP	28
3.2.5	SECURITY	29
3.2.6	FUEL SKID/ AIRCRAFT REFUELING STATION	29
3.3	FUEL STORAGE TANK FILL RESTRICTIONS	29
3.3.1	RECEIVING FUEL FILTER	29
3.3.2	FILL CONNECTION POINT	29
3.4	AIRCRAFT REFUELING HOSE REQUIREMENTS	29
3.4.1	TYPE	29
3.4.2	SPECIFICATIONS	29
3.4.3	SERVICE LIFE	29
3.4.4	INSPECTIONS	30
3.5	REQUIRED INSPECTIONS	30
3.6	FUEL SYSTEM SECURITY	30
3.6.1	MARITIME HELICOPTERS INC. LOCATION	30
3.7	MARITIME HELICOPTERS CUSTOMER LOCATIONS	30
4	AIRCRAFT REFUELING PROCEDURES.....	31
4.1	HELICOPTER REFUELING POLICIES	31
4.2	REFUELING TRAINING	31
4.3	GROUNDING AND BONDING	31
4.3.1	GROUNDING	31
4.4	BONDING	31
4.4.1	ELECTROSTATIC BONDING	31
4.4.2	FIXED FUEL POINT BONDING	32
4.4.3	FUEL TRUCK OR TRAILER BONDING	32
4.4.4	DEFUELING UNITS	32
4.4.5	INSPECTIONS	32
5	AIRCRAFT DEFUELING.....	34
5.1	PURPOSE	34
5.2	EQUIPMENT	34



FUEL QUALITY ASSURANCE MANUAL

Rev 3 : 9/13/21

5.3	REQUIREMENTS.....	34
5.4	AIRCRAFT DEFUELING PROCEDURES.....	35
6	TRAINING REQUIREMENTS.....	36
6.1	PART 139 REQUIREMENTS (14 CFR 139.321).....	36
6.1.1	REQUIREMENTS.....	36
6.1.2	APPLICABILITY.....	36
6.1.3	TRAINING RECORDS.....	36
6.2	TRAINING SYLLABUS.....	37
6.2.1	PURPOSE.....	37
6.2.2	GENERAL RESPONSIBILITIES.....	37
6.2.3	HANGAR AND RAMP FAMILIARIZATION.....	37
6.2.4	FUEL SYSTEM FAMILIARIZATION.....	37
6.2.5	FUEL SYSTEM INSPECTIONS.....	38
6.2.6	FUEL QUALITY ASSURANCE CHECKS.....	38
6.2.7	SUMPING PROCEDURES.....	38
6.2.8	FUEL RECEIVING PROCEDURES.....	38
6.2.9	AIRCRAFT DEFUELING KIT.....	39
6.2.10	PERSONAL PROTECTIVE EQUIPMENT.....	39
6.2.11	RECORD KEEPING AND FORMS.....	39
6.2.12	WASTE DISPOSAL, LEAKS AND SPILLS.....	39
6.2.13	FOREIGN OBJECT DAMAGE (FOD).....	40
6.2.14	SECURITY OF FUEL SYSTEM.....	40
6.2.15	EMERGENCY PROCEDURES.....	40
6.2.16	STATIC ELECTRICITY, GROUNDING AND BONDING.....	40
6.2.17	LIGHTNING/ SEVERE WEATHER.....	41
6.2.18	NIGHT OPERATIONS.....	41
7	APPENDIX A - DEFINITIONS.....	42
8	APPENDIX B - FUEL QUALITY RECORDS FORM FQ-1.....	46
8.1	DAILY INSPECTION.....	46
8.1.1	D-001 GENERAL CONDITION OF TANK YARD.....	46
8.1.2	D-002 SECURITY.....	46
8.1.3	D-003 FUEL LEAKS.....	47
8.1.4	D-004 FIRE EXTINGUISHERS/ INSPECTION TAGS.....	47
8.1.5	D-005 GROUNDING REELS, CABLES AND CLAMPS.....	47
8.1.6	D-006 HOSES, SWIVELS & NOZZLE CONDITION.....	47
8.1.7	D-007 WARNING LIGHTS AND MODULE LIGHTS.....	47
8.1.8	D-008 MODULE VENTS.....	47
8.1.9	INITIALS OF PERSON PERFORMING CHECK.....	47
8.2	WEEKLY INSPECTION.....	48
8.2.1	W-001 FILTER SUMPS.....	48
8.2.2	W-002 WASTE FUEL TANKS.....	48
8.2.3	W-003 FLOATING SUCTION CABLE CONNECTION.....	48
8.2.4	W-004 TANK INVENTORY / WATER CHECK.....	48
8.2.5	W-005 NOZZLE SCREENS & FUEL LEAKS.....	48
8.3	MONTHLY INSPECTION.....	49
8.3.1	M-001 BONDING CABLE CLAMPS.....	49
8.3.2	M-002 FILTRATION TEST/ FILTER CHANGE.....	49
8.3.3	M-003 SIGNS & PLACARDS.....	49
8.3.4	M-004 FIRE EXTINGUISHERS.....	50
8.3.5	M-005 EMERGENCY SHUTDOWN SYSTEM.....	50
8.3.6	M-006 FILTER DIFFERENTIAL PRESSURE RATING.....	50
8.3.7	M-007 VALVE MOVEMENT.....	50
8.3.8	M-008 FUEL LEAKS INTERIOR/ EXTERIOR.....	50

UNCONTROLLED COPY WHEN PRINTED

CHECK LOG OF EFFECTIVE PAGES TO VERIFY CURRENT VERSION BEFORE USING



FUEL QUALITY ASSURANCE MANUAL		Rev 3 : 9/13/21
8.4	ANNUAL INSPECTION.....	50
8.5	FUEL DELIVERY	52
9	APPENDIX C - FUEL VENDOR AUDIT FORM.....	53
9.1	COVER SHEET.....	53
9.2	VENDOR CHECKLIST	55
9.2.1	GENERAL.....	55
9.2.2	STORAGE FACILITY	55
9.2.3	QUALITY CONTROLS	56
9.2.4	FUEL SERVICING EQUIPMENT	56
9.3	FINDING AND CORRECTIVE ACTIONS.....	57



1 GENERAL

1.1 Purpose and Scope

The Fuel Quality Assurance Program is based on the premise that Maritime Helicopters Inc. is responsible for ensuring that its operations are safe and in compliance with applicable regulations as well as its own policies and procedures

This manual is intended to provide guidance to the user covering the safe storage and distribution of quality jet fuel at Maritime Helicopters Inc. facilities as currently practiced in the commercial aviation industry. Best technical information, along with competent judgment, should be considered and followed at all times when overseeing aviation fueling operations.

Maritime Helicopters operates in and out of certificated and non-certificated airports. Safe fuel standards will be applicable to all locations where fuel is dispensed into a Maritime Helicopters aircraft. Compliance with 14 CFR 139, Certification of Airports, pertains to the safe storage, handling and dispensing of fuels used in aircraft on airports. Quality control procedures ensure that consistent fuel quality is provided at all times, no matter the location.

The purpose of this manual is to ensure that Maritime employees involved in the handling of aviation fuels is correct and clean dry fuel is provided for any aircraft in an approved, safe and environmentally responsible manner.

The program scope of responsibility encompasses all locations Maritime Helicopters obtains aircraft fuel. The program focus is to ensure that Maritime operates in accordance with all regulatory, Company and customer requirements and utilization of best safety practices. Ultimately, we strive to provide a safe efficient service to our customer.

1.2 Manual Revisions

The Director of Operations oversees the creation and revision of MHI controlled documents. Department Managers and Supervisors may submit suggestions and corrections for incorporation into this manual by contacting the Director of Maintenance. Changes made to this manual will be summarized in the change summary table and indicated throughout the manual by change bars. A vertical bar (change bar) in the right margin indicates a change, addition, or deletion in the adjacent text for the current revision of that page only. The change bar is dropped at the next revision of that page. The effected page will also be annotated by updating the revision level and date in the top right hand corner. The list of effected pages will also be updated.

1.3 Manual Revisions and Control

The Director of Operations enance is responsible for the content, currency, completeness, and revisions of this manual. Nothing in this manual shall be contrary to other Maritime Helicopters manuals, applicable Federal regulations, any applicable foreign regulation or the operations specifications and certificate of Maritime Helicopters Inc.

1.4 Distribution and Availability

The Director of Operations, or his/her designee, has the authority to determine when a copy of this manual shall be assigned. This may be delegated to the Maritime Helicopters Fuels



Specialist. The Maritime Helicopters Maintenance Records shall, upon request from the person with authority, distribute a current copy of this manual. The person to whom this manual is assigned shall assure that it is current and assessable when performing assigned duties

1.5 Guidance

Sources for development of this program are FAA AC 150/5230-4A "Aircraft Fuel Storage, Handling, and Dispensing on Airports", NFPA 407 "Standard for Aircraft Fuel Servicing, ATA 103 "Standard for Jet Fuel Quality Control at Airports", API 1500 "Storage and Handling of Aviation Fuels at Airports" and NATA "Refueling and Quality Control Procedures for Airport Service and Support Operations".

1.6 Authority and Responsibilities

1.6.1 Director of Operations

The Director of Operations is responsible for the overall operation of the fuel facilities at the locations where they are assigned, as well as any remotely based facility in their operating area. The manager may delegate these responsibilities to any qualified person (i.e., Maintenance Manager, Lead Pilot, or other qualified and designated Maritime employee assigned to the facility); but doing so does not relieve the Manager of the overall responsibility. These responsibilities include:

The selection and training of personnel assigned to the handling of aviation fuels.
Maintaining a list of all company personnel that have received Fuel Handlers Training.

Maintaining a record of all daily sumping of filters and tanks. These records shall be maintained at the controlling location using the appropriate Maritime Helicopters form.

Maintaining and distributing a list of approved fuel vendors.

1.6.2 Fuel Specialist

The Fuel Specialist is directly responsible to the Director of Operations. The Fuel Specialist's responsibilities include:

Coordinate all fuel activities with Maritime Helicopters mechanics at remote locations.
Establish fuel system and component criteria that will comply with industry standards.
Advise and coordinate fuel quality assurance efforts.

Maintaining a record system that will track fuel systems, components, and filter changes.

Establish and monitor audit procedures at fuel installation sites and ensure all required inspections are complete and up-to-date.

Coordinate the repairs, testing and installation of all fuel systems.

Establish an annual filter change procedures.

React to unscheduled problems when the attending mechanic cannot respond or at locations not covered by a nearby mechanic.

Perform required inspections and maintenance of facility fuel systems and other duties as assigned by the Director of Operations.



1.6.3 Mechanics

Mechanics will be trained and conduct fuel monitoring, ordering, receiving and testing of Jet Fuel as applicable to their assigned location.

Mechanics are responsible for performing the necessary inspections and light maintenance at their respective locations.



2 **FUEL QUALITY ASSURANCE**

2.1 Fuel Monitoring, Ordering, Receiving and Testing

Fuel services will be carried out by Maritime Helicopters mechanics and pilots with assistance and program oversight of the Fuels Specialist.

Mechanics are responsible for performing the necessary inspections and light maintenance at their respective locations.

Maritime Helicopters will have the responsibility to fulfill and accomplish the quality control tests.

2.2 Required Inspections

2.2.1 Purpose

All Maritime Helicopters owned refueling facilities shall be inspected by the trained personnel on site, generally the on-site mechanic on duty or the Maritime Helicopters Fuel Specialist. This shall include attended and unattended sites.

Additionally, Maritime Helicopters may take on the responsibility for accepting fuel deliveries and conducting required inspections at customer owned facilities. This shall only be on a case by case basis and must be approved by the Director of Operations.

2.2.2 Frequency

Inspections to be performed will be Daily, Weekly, Monthly and Annual inspections. A record of these inspections shall be recorded on Maritime Form FQ-1 and retained on site for a period of the current year + 1. Copies of inspections shall be forwarded to the Fuels Specialist at the end of each month.

2.2.3 Description of Inspection

The items to be covered for each inspection are described in Appendix A "Fuel Quality Record". Details of each inspection or filter change are provided in Section 2 and 3 of this manual as applicable.

2.3 Clear and Bright Test (API Bulletin 1500: ATA Specification 103 2-3)

The term "Clear and Bright" means that, when visually examined in a clear glass container, the fuel is visually free from undissolved water, sediment, and suspended matter. Fuel suitably free from these contaminants produces a bright sparkling appearance.

NOTE: "Jet B" fuel normally ranges in appearance from water white to a light straw or light amber color. ("Water White" means the fuel has no color and is as clear as water.)



2.3.1 Appearance Test

Performed by drawing a sample of fuel, ***under pressure***, into a clear glass cylindrical container. Make sure the container and the sampling tap are clean. The sample is then swirled to create a vortex. Visually detectable particulate matter will appear at the lower tip of the vortex.



2.3.2 Test Results

Undissolved (i.e. free) water will appear as a separate layer below the product when the swirling action stops. A hazed sample usually indicates either suspended free water or very fine particulate matter. Jet fuel must be "Clear and Bright" in all phases of handling.

2.3.3 Who Performs and When

This test is performed by the individual receiving fuel and is obtained from the fueling source.



2.4 Free Water Test (ATA Specification 103 2-5)

2.4.1 Background

Dry fuel is a prime contributor to flight safety. There are numerous ways that water enters fuel systems. The most common are leakage at manholes and tank plumbing, water-laden transport deliveries, and condensation of atmospheric moisture in partially filled storage tanks. Water in fuel is exhibited in one of two forms: Dissolved water ("water in solution") or free water. Dissolved water is best described as a condition similar to humidity in the air.

The amount of dissolved water in fuel varies with the fuel temperature. The higher the fuel temperature, the higher the potential concentration of dissolved water. When the temperature of the fuel is reduced due to change in ambient temperature or during flight, especially at high altitudes, dissolved water will condense from the fuel and become free water. Free water is heavier than fuel and will settle to the bottom of tanks and accumulate in low points in the fuel system. Free water in fuel causes various problems.

The most serious problem is engine flameout, caused by a slug of water reaching the engine, or the formation of ice crystals that may block fuel filters and fuel control units. Therefore, free water is not permitted to accumulate or remain in fuel systems; and free water testing must be performed as scheduled. Over the years, various tests have been developed. However, experience has shown that the human senses cannot be substituted.

2.4.2 Visual Detection

Large quantities of water in the fuel can be seen. The water quickly separates from the fuel and settles on the bottom of the sample container. Jet fuel varies in color from dark straw to water white, thus it is possible to mistake an all water sample as fuel. Adding a known quantity of water to the sample will determine if it is all water or all fuel. If the sample is all fuel, the water will quickly separate and settle to the bottom. If the sample is all water, the added water will not separate.

2.4.3 Water Sensitive Paste or Paper

Chemically treated paste or paper may be used to indicate the presence of free water. These materials change color when they contact water. They do not readily react to low concentrations of water, such as a hazy fuel sample. These pastes and papers are normally applied to gauging sticks and tapes when checking storage tank bottoms for bulk water.

2.5 Hydro Kit and Equivalents

This is one way of checking for dissolved water in fuel. The test consists of adding a pre-measured amount of water-sensitive powder to a sample of fuel. If water is present, the powder turns pink. The chemical powder is sensitive to water concentrations in excess of 15 ppm. Follow the instructions that come with the Hydro Kit. Check the expiration date of the kit before using it. The fuel being sampled will



come from the final fuel nozzle, unless off-loading from the fuel trailer. In this case the fuel is taken from the trailer manifold.

NOTE: The SHELL Water Detection Kit® may be substituted for the Hydro Kit.

A Hydro Kit test will be conducted on every refueling point at each approved refueling location at least once a week.

If a refueling point fails this test, recheck that the fuel nozzle is clean and free of moisture and resample the refueling point. If the refueling point sample fails again, or has not been tested within the previous seven days, close the refueling point by securing the shut-off valve using standard "Lockout-Tagout" procedures and notify the Director of Operations.

A refueling point that has been "Locked Out" and closed will not be reopened until it has passed a valid "Clear & Bright" and "Hydro Kit" test.

Tracking the refueling points that have been tested during a seven day period may be assured using computer generated spread sheets, white boards, simple checklists and/or any other tracking method as deemed appropriate and effective by management.

After a refueling point has been tested with the Hydro Kit, log this on the Fuel Quality Record, Maritime Form FQ-1 (ref W-004).

Any time a positive reading of more than 15 ppm is found, the fuel filter must be changed. Refer to Paragraph 11 in this Section (FQAM 2 ¶11) of the manual.

2.6 API Gravity Test (ASTM D 1298)

2.6.1 Purpose

This procedure describes the means for measuring the gravity of fuel with a hydrometer. A significant change in gravity may indicate contamination by another product. The hydrometer is calibrated in units of **API Gravity**. The term "Gravity" will be used throughout this procedure as a general term to avoid repeating these measurement terms

2.6.2 Description

The scale reading at the intersection of the fuel surface on a freely floating hydrometer and the temperature of the fuel at the time of the test are observed and recorded. The observed readings are then used to correct the gravity to the standard temperature for the test.

2.6.3 Equipment Needed

An ASTM approved thermo hydrometer (graduated in degrees API Gravity and degrees F), a hydrometer cylinder, and a wheel chart.



2.6.4 6.4 Procedure

Check the Bill of Lading from the truck paperwork and record the API Gravity from this form on Maritime Form FQ-1, under "Fuel Delivery".

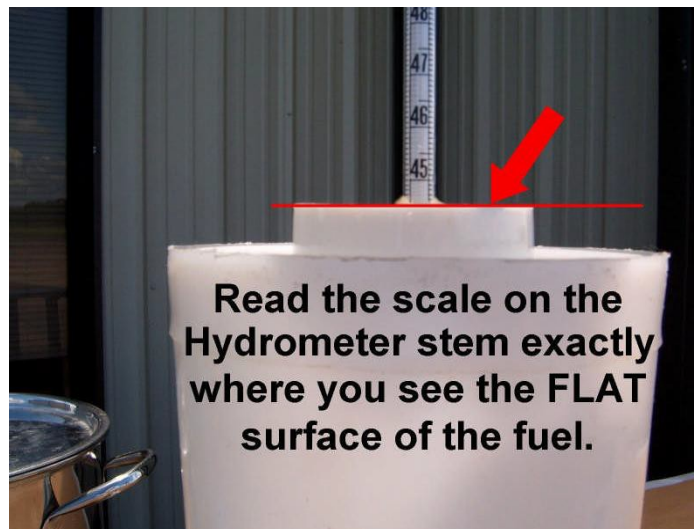
After the tank trailer has been idle for 10 minutes, with the lower tank valves open, perform the "Clear and Bright" test. If this test is acceptable, then take approximately one (1) quart of jet fuel and fill the center of the hydrometer cylinder. The cylinder should be placed on a level surface in a location free from air currents.



Carefully wipe off the hydrometer and slowly lower it into the fuel. DO NOT drop the hydrometer into the fuel. When it has settled, depress it about two scale divisions into the liquid and then release it. Gently spin the hydrometer when releasing it. This will assist in bringing it to rest, floating freely away from the cylinder walls.



When the hydrometer has come to rest, read the scale on the hydrometer stem exactly where you see the flat surface of the fluid. **DO NOT** read the scale at the point the fuel is riding up on the glass stem. Record this reading. To do this with the greatest accuracy, it is recommended to set your eye slightly below the level of the liquid and then raise it to the exact level in the cylinder before taking the reading. It is extremely important that the hydrometer not be read if it is touching the wall of the cylinder.

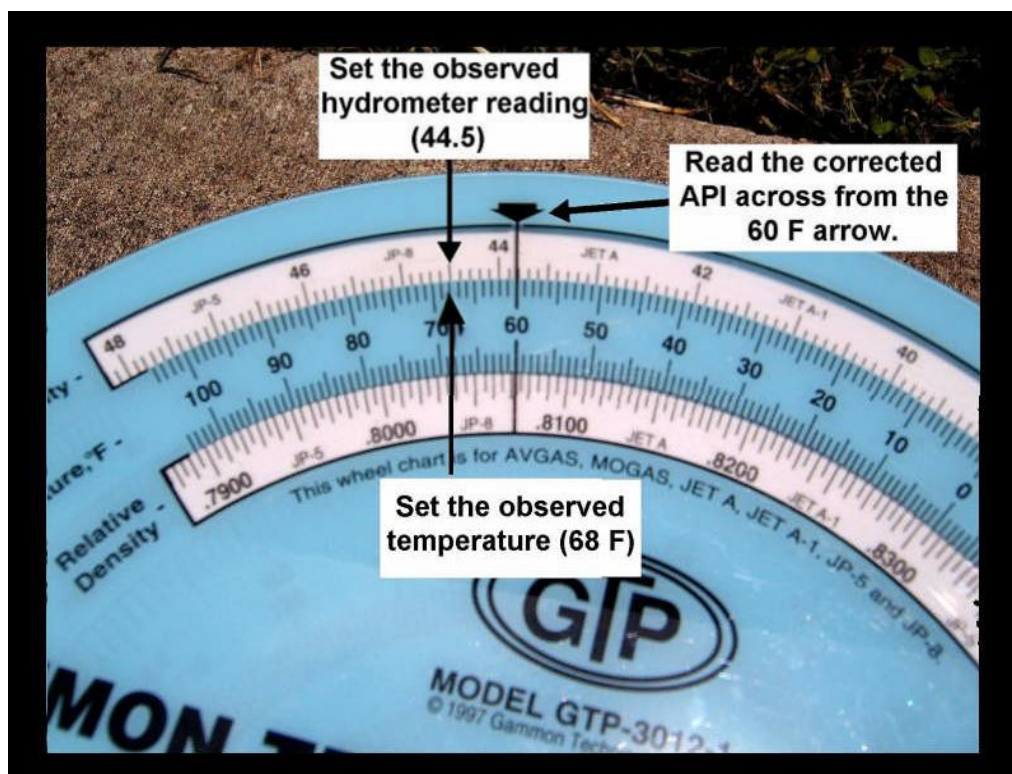




Grasp the stem of the hydrometer and slowly raise it until you can read the thermometer. Read the temperature to the nearest degree and record the temperature.



NOTE: The numbers on the wheel chart scale read from right to left. To use the wheel chart scale, align the fuel temperature reading (on the blue ring) and the gravity reading from the hydrometer (on the white ring). Read the corrected API Gravity at the black arrow. Record this reading.



If you find that your corrected API Gravity measurement was more than plus or minus 1.0 from the Bill of Lading, you should check it again to make sure. If the test is still greater than plus or minus 1.0, contamination is suspected and the fuel load will be rejected

EXAMPLE: Bill of Lading = 46.4 API Gravity

Hydrometer reading = 47.1 and Temperature reading = 73 degrees F. The corrected measurement is 45.9 API Gravity.

The corrected API gravity in this example must be between 45.4 and 47.4 to be acceptable. In this example, the API gravity is within the acceptable range.

2.7 White Bucket Test (ATA Specification 103 2-5)

2.7.1 7.1 Purpose

The purpose of this test is to visually determine the possible presence of surfactants, water, and/ or solids in turbine fuel.

2.7.2 Description of Test

A fuel sample is obtained in a white bucket from sump drains of filter vessels and tanks, and observed for indications of surfactants, or presence of water and/ or solids.



2.7.3 Equipment

The preferred equipment consists of a clean nine-quart white porcelain bucket. No plastic buckets are permitted.

2.7.4 Procedure

Clean the sump drain with a rag. Make sure that any exterior dirt is not part of the sample reading.

Fill the white bucket to an approximate depth of eight inches (1 to 1.5 gallons of fuel). Swirl the contents. Particulates will accumulate in the center of the bucket bottom. Let the sample settle for one minute to remove air bubbles

Place the white bucket on a level surface and inspect the bottom for water, contaminants, hazy/cloudy condition, and/ or slime.

2.7.5 Interpretation of Test Results

You may use the following system to rate a white bucket fuel sample. Example: "2C" means there is slight particulate matter with a cloudy condition in the sample.

DO NOT ACCEPT FUEL IF RATING IS ANYTHING OTHER THAN "1A".
--

Rating of White Bucket Sample

Solid Contaminant Indicators

1. Clean
2. Slight Particulate Matter
3. Particulate Matter
4. Dirty

Moisture Content Indicators

- A. Bright
- B. Hazy
- C. Cloudy
- D. Wet (Free Water)
- E. Surfactants



2.8 Rating Definitions

2.8.1 Solid Contaminant Indicators

- a. Clean (1) – Refers to lack of particles, silt or sediment, flakes or dye, rust or solids.



- b. Slight Particulate Matter (2) – Contains several fine or moderate sized particles.



- c. Particulate Matter (3) – A sample in which many small particles may be seen floating or settled on the bottom.





- d. Dirty (4) – Discoloration or many particles dispersed in the fuel or settled in the bottom.



2.8.2 Moisture Content Indicators

- a. Bright (A) – A quality independent of the color of the sample and sparkle.





b. Hazy (B) – A condition resulting from fine droplets of moisture dispersed throughout the sample producing a dull hazy appearance. This can be a temporary condition brought about by a drop in temperature. During the first minute, the fuel can appear hazy due to air bubbles.



c. Cloudy (C) – The result of extremely fine droplets of water dispersed throughout the sample giving it a milky appearance.



d. Wet (D) – Any form of free water such as droplets, bulk water on the bottom of the bucket, or clinging to the sides.



e. Surfactants (E) – Slime in the bottom of the bucket or at the fuel/water interface, appearing as a dark brown/ black layer, scum, or lacy material floating in or on the sample.

2.9 Filter Vessel Differential Pressure (ATA Specification 103 2-9)

2.9.1 Purpose

The purpose of observing differential pressure across a filter vessel is to monitor the changing condition of the elements.

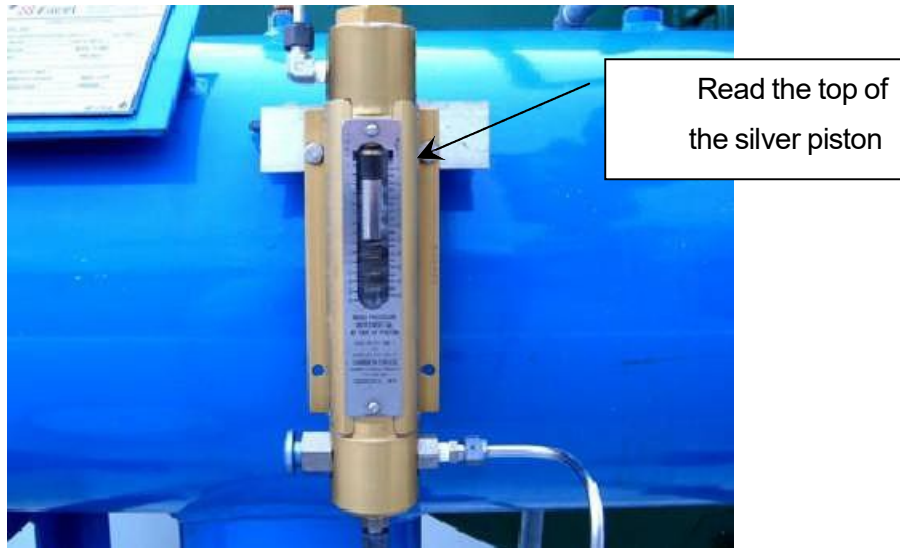
2.9.2 Description

Whenever fuel passes through a filter, a drop in pressure should occur. The difference in pressure between the inlet and outlet of the filter is known as *differential pressure*, and is one of the more apparent indications of filter element conditions.

2.9.3 Procedures

The differential pressure reading are taken and recorded monthly on Form FQ-1 (M-006). For accuracy, these checks should be undertaken when the flow rate is steady and as close as possible to maximum operating flow rate.

NOTE: In Delta Junction, or PS-2, PS-4, PS-5, and PS-6 the by-pass valve is teed from Filter #2. It must be in the CLOSED position to get a proper reading.



The filter vessel elements should be replaced when any of the following changes in differential pressure occur:

The differential pressure of a filter/ separator is 15 psi or more. b. There is a sudden drop in differential pressure under identical operating condition.

The differential pressure gauge lines and valves should be checked periodically to ensure they are not plugged or restricted.

Some direct reading gauges have small filters in their inlets. They must be cleaned or replaced periodically to assure proper operation.

2.10 Filtration Test (Millipore Test) – ASTM D 3830; ATA Specification 103 2-4)

2.10.1 Purpose

The filtration test (Millipore Test) is used to test aviation fuel for particulate contamination.

2.10.2 Description

A measured volume of fuel is passed from a flowing pipe directly through a 0.8 micrometer membrane. Dirt particles are caught on the membrane, which can be visually color rated or weighted for gravimetric rating. The darker the membrane, the dirtier the fuel.



2.10.3 Procedures

Follow the instructions included in the testing kit. Record the test rating on the fuel quality record Maritime Form FQ-1 (M-002). File the test membranes in a protective cover for reference during the next test. Retain the sampling for one year.

2.11 Fuel Storage Tank Receiving and Inspection

2.11.1 Fuel Ordering and Delivery Monitoring

Fuel will be ordered through Maritime Helicopters when inventories reach a predetermined level in individual storage tanks. Every effort will be made to consolidate deliveries between nearby locations in order to hold down delivery costs.

Every delivery accepted by a Maritime Helicopters representative will be subject to a pre-acceptance test conducted to satisfactory results PRIOR TO off-loading fuel.

Documentation from the fuel loading point-of-origin will be scrutinized to ensure compatibility with the proposed use. Copies of the appropriate documents and completed tests will be

collected and forwarded to the Maritime Helicopters Fuel Specialist. Records will be retained for one year.

Acceptance of fuel will depend on the following tests and documentation:

Appropriate documentation from the fuel source indicating the type of fuel loaded into the delivery vessel and the specific gravity (SG) of the fuel.

Specific gravity measurement / test.

Other tests as necessary or applicable.

2.11.2 Receiving or Transfer of Aviation Jet Fuel

This procedure must be followed when receiving fuel into storage tanks, or when transferring fuel from tank to tank or a tank to truck.

2.11.3 Fuel Receiving Procedures

The purpose of following these quality check procedures is to ensure that the truck delivering the fuel is delivering the correct fuel and that the fuel is clean and uncontaminated. Of particular concern in Alaska, is the use of a single transport truck to deliver a variety of fluids over a period of time, including water.

Procedures;

Before receiving fuel into the fuel storage tank, the tank sump must be drained of all water. This will help ensure water and debris in the tank is not mixed with the fuel during



the receiving process. Removing the water from the tank on a routine basis will reduce fungus growth in the tank.

If the location has no receiving filter-separator in use, the system must be placed "Out of Service" until time is allowed for the water and debris to settle out and sumping of the fuel storage tank is completed.

NOTE: Water settles out of turbine fuel at the rate of one (1) foot per hour. This means if you have 96 inches of fuel in the storage tank after receiving a new fuel load, and you do not have a receiving filter-separator, then you must wait for eight (8) hours before sumping the storage tank and refueling aircraft at this location.

No tank is to be filled completely. Fill tanks to a maximum of 90% full. The following guidance is to be followed for Maritime Helicopters fuel storage tanks:

Tank	Maximum Fill Amount
10,000 gallon	9000 gallons
8000 gallon	7200 gallons
6000 gallon	5400 gallons

Before testing or unload the transport truck, allow the truck to stand idle for 10 minutes, with the internal tank valves open.

Verify the amount in the storage tank prior to filling by either a dipstick or gauge reading.

Use the Fuel Quality Record Maritime Form FQ-1, Fuel Deliver Block, when for documentation of receiving the fuel.

FUEL DELIVERY	1st Shipment of Month	2nd Shipment of Month	CORRECTIVE ACTIONS
Date:			
Product:			
Shipper:			
Quantity:			
Sample Condition:			
API Gravity:			

1. Record the date of the delivery, the product name and the shipper name.



2. Perform the "White Bucket Test". Record the results of the test under "Sample Condition".
3. Perform the "API Gravity Test". Record the results of the test under "API Gravity".
4. Enter the fuel received under "Quantity". Verify the amount on the delivery ticket and the dipstick or gauge reading.
5. Any deficiencies or discrepancies must be entered on the form. Annotate what the corrective action is for the deficiency.
6. If a fuel load is rejected, notify the Fueling Specialist immediately.
7. Per the ATA 103, it is desirable to have one hour settling, per vertical foot of product depth after refueling, or adding fuel from a defueling aircraft. Maritime fuel facilities will have placards, to record fuel date/time to monitor settling times. Fuel for some contracts, **must** follow these settling times per contract instruction or customer manuals.

2.12 Required Inspections

A visual inspection of the interior of all bulk fuel storage tanks shall be completed at least every 12 months.

Check for build-up of sediment or evidence of microbial growth. If the inspection reveals microbial growth or buildup of sediment exceeding 1/10 of the area of the tank bottom surface, cleaning should be accomplished. Jet fuel storage tanks should be cleaned with high-pressure water only.

After cleaning with water, use squeegees and lint free mops to dry the tank surfaces. Assure removal of all free water, and allow the tank to dry through natural ventilation as long as practical. If the tank has an internal epoxy coating, inspect the coating for evidence of chipping, flaking, or other deterioration.

Maintain a record of the tank inspection on a Maritime Form FQ-1 (A-002).

WARNING

Entry of a fuel storage tank requires specialized equipment and training and must be accomplished IAW local, state and federal occupational safety regulations. Maritime Helicopters Inc. personnel will NOT enter a bulk fuel storage tank or transport tank for any reason.



2.13 Fuel Filter Change

2.13.1 Filter Change Criteria

Replace the fuel filter after the one (1) year service life has expired. This is good until the end of the month one year from the date it was installed. Inspection tags will be affixed to the filter. These may be obtained from the Fuel Specialist.

Replace the fuel filter when the filter sump samples continuously indicate surfactants, microbial, or solid contaminants.

Replace the fuel filter when the chemical water detection test (Hydro Kit or equivalent) indicates a positive reading of more than 15 ppm.

2.13.2 Procedures

Use appropriate PPE throughout this procedure.

Stop pumping fuel to the filter vessel, close the shut-off valves in the inlet and outlet lines, and open the vent.

Open the drain valves and allow sufficient time for the unit to vent.

Drain the filter housing completely before opening the cover or removing the clamp.

Open the cover or remove the clamp/ housing assembly and remove old elements.

Wash the interior of the filter vessel with clean jet fuel.

Inspect epoxy coating for deterioration. Repair or replace as necessary.

Install a new filter vessel element in accordance with the manufacturer's recommendations. Use throwaway polyethylene or cotton gloves when handling the elements. With gloves on, the elements may be handled without harming them. **DO NOT TOUCH WITH BARE HANDS.**

Install new seal, close the cover or install the clamp and tighten all bolts.

Open the inlet valve and allow the filter vessel to fill slowly. Allow all entrapped air to escape. On vessels equipped with a manual air bleed valve, allow the vessel to fill slowly until fluid begins to flow through the bleed valve. Then close the bleed valve.

Inspect for leaks. Repair as necessary.

Open inlet and outlet valves to full open position.

Record the filter change date on inspection tag and attach it to the filter housing.

Record the filter change on the Maritime Form FQ-1 under M-002 or in "Notes".

Circulate the fuel at normal rate.

2.14 Sumping

2.14.1 Purpose

Fuel tanks and filters are sumped to remove water and debris that have settled-out of the fuel. If contamination is found, continue sumping until the fuel is "Clear and Bright." You may need to drain several gallons of fuel to remove all the water and debris. If the fuel sample continues to look contaminated after **5 gallons** of fuel has been removed from the sump outlet, **DO NOT USE** the fuel from this source. Notify the Director of Operations or Fuel Specialist so the problem may be corrected.



NOTE: All fuel drained from the sump outlet of any filter, tank, or aircraft drain will be considered contaminated and properly disposed of. At most locations, this fuel will be placed in the “Used Oil Tank” or Contaminated Fuel Tank” for disposal. **At no time will this sumped or drained fuel be returned to the aircraft or fuel storage tank.**

2.14.2 Sumping Amounts

Normal amounts of fuel removed when sumping will vary with the type of system being sampled. Listed here are some recommended amounts:

“Fire Guard” double-wall fuel storage tanks 3 – 4 gallons
Standard steel fuel storage tanks 1 – 1 ½ gallons
Aircraft fuel sumps and filters ¾ - 1 quart
Fuel system filters ¾ - 1 quart

NOTE: If contamination is found in an aircraft, **notify maintenance immediately.** If contamination is found in other locations, continue to sump until the fuel is “Clear and Bright.” If the fuel sample continues to look contaminated after a total of 5 gallons has been removed from the tank, DO NOT USE this fuel. Notify the Director of Operations and/or the Fuel Specialist for further instructions.

2.14.3 12.1 Sumping Fuel Filters

All filter assemblies will be sumped with pressure applied to the system. The HCS filter/coalescer assembly, normally located at the fuel receiving point, may require the transporter truck to be transferring fuel before the filter is considered to be under pressure



2.14.4 Aircraft Fuel Samples

The Pilot-in-Command will ensure the daily fuel system sumping procedure as outlined by the Aircraft/ Rotorcraft Flight Manual has been performed. A “Clear & Bright” fuel sample taken from the main fuel tank sump will be placed in a sample jar, marked with the aircraft tail number, and be retained until the aircraft has completed all daily flights. At the end of the flight day, these fuel samples will be properly disposed of and the jar is cleaned.

2.15 Fuel Additives

2.15.1 Icing Inhibitor for Jet-B

Generally, anti-icing additives (FSII) are included in the composition of the product during manufacture.

2.16 Miscellaneous Information

2.16.1 Fuel Odor

Acceptable jet fuel produces a distinctive odor, which can range from relatively mild or sweet, to moderately objectionable. Specification ASTM D1655 states that fuel shall not produce an odor, which is nauseating or irritating”. If fuel produces an unfamiliar, nauseating or irritating odor, further investigation is required.



2.16.2 Visual Detection of Microorganisms

Purpose

This is a method to visually detect symptoms which indicate the presence of microorganisms in a turbine fuel handling system. For microorganisms to grow in turbine fuel, two things must exist – water and oxygen. Oxygen is available through the necessary tank vent. Proper sumping of the fuel tank removes the settled out water.

Description

This test is performed concurrently with routine draining of storage tanks and filter sumps. A sample from these locations is drawn into a white bucket and examined visually. Microorganisms produce visual evidence, which can be identified by the operator.

Equipment

The equipment consists of a plain white bucket, clear glass petroleum product sample bottles, a small magnet and a permanent marker.

Preparation

Thoroughly rinse the white bucket and sample bottles in the system fuel. Wipe the inside of the white bucket until it is dry and free of contaminants with a clean rag or paper towel.

CAUTION: Some contaminants commonly found in turbine fuel handling systems produce visual evidence, which may be erroneously interpreted as microorganisms. For this reason, it is essential that the operator does not draw immediate conclusions. Because visual evaluation is used, the elements of human perception and judgment are involved. The determinations made using this test indicate only the probability that microbial contamination exists. Confirmation must be made by laboratory analysis.

2.16.3 Test Procedure

Collect a sample in the white bucket from the fuel storage tank sump, filtration equipment sump, or a low point drain in system piping.

Allow the bucket sample to settle for at least one minute.

Tip the bucket from side to side while visually observing for any evidence of dark-colored solids, dark-colored water, substances which cling to the side of the bucket, or scummy mucus-like material.

If suspect materials are found, collect a sample of the material in a clear glass sample bottle.

Cap the sample bottle tightly and identify as to the date, location, and sampling point.



2.16.4 Evaluation of Fuel Sample

Visually examine the contents of the sample bottle in an area providing strong background lighting.

If the sample is chiefly solids, check for the possibility of the material being rust. This can be done by holding a small magnet against the side of the sample bottle and moving it around. Rust particles will collect and follow the magnet.

If the sample is dark-colored sludge-like substance, but does not respond to a magnet, fungi are a possibility. Further indicators are matty, lumpy or stringy consistency, and a rank moldy odor.

If the sample is chiefly discolored water, check for the possibility of fine suspended rust. This can be done by filtering some of the fluid through a clean white paper towel and allowing it to dry. After drying, visual and magnet inspection can usually detect the rust.

If the sample is chiefly water, especially dark brown or black in color, and has a scummy mucus-like interface or topping, viable microorganisms may be present. A further indicator is a noticeably foul odor.

If a visual examination as described above indicates the possibility of fungi or microorganisms, forward the sample to a qualified laboratory for analysis. The operator should make no positive statement concerning microbial contamination unless confirmed by laboratory analysis.

2.17 Fuel Vendor Quality Assurance

2.17.1 Purpose

The purpose of the program is to evaluate and approve regular fueling locations and distributors that are outside of Maritime Helicopters control. This is to ensure clean dry fuel is regularly available. Typical places that will be evaluated would be an FBO where fuel is obtained during work on a long term contract (1 year or longer) or from a regular distributor that provides fuel to Maritime Helicopters fueling tanks.

2.17.2 Description

Fuel Vendor Quality Assurance should be evaluated annually by using the Fuel Vendor Audit Checklist found in Appendix C.

The audit may be accomplished by an on-site visit by the Fuel Specialist. A self-audit conducted by the FBO or distributor may be conducted every other year.

2.17.3 Approval or Discontinuance of a Fuel Vendor

A fuel vendor may be approved provided no significant findings have been discovered. A fuel vendor may be conditionally approved provided any findings are resolved in 30 days. A vendor may be discontinued or not approved when significant findings are identified. Concurrence with the Director of Operations must occur for approvals, conditional approvals or discontinuances.



2.17.4 Approved Fuel Vendor List

The Approved Fuel Vendor list shall be prepared annually, or more frequently, if required by the Fuels Specialist. This shall be presented to the Director of Operations and Chief Pilot. The Approved Fuel Vendor list shall be distributed to all pilots and used in accordance with the instructions provided in the Maritime Helicopters General Operations Manual.



3 FUEL STORAGE TANKS

3.1 Type of Fuel Storage Tanks

Maritime Helicopters Inc. uses a double-wall above ground “Fire-Guard” type tanks for bulk fuel storage. This tank provides integral secondary containment for a minimum of 110% of the stored product and does not require a fuel containment wall.

3.2 Fuel Storage Tank Required Markings

Decals Installed - Storage tanks are to be marked as follows:

- a. Maritime Helicopters Logo” (Both sides of each tank)
- b. FUEL, AVIATION, TURBINE ENGINE (Both sides and ends of each tank)
- c. NO SMOKING WITHIN 50 FEET (Both sides and ends of each tank)
- d. JET B (Both sides and ends of each tank)
- e. NFPA Label (Both sides of tank)
- f. Flammable Placard – 1863 (Both sides and ends of each tank)
- g. Sump Daily (Next to the sump drain or pump)



3.2.1 Pipe Markings

Fuel piping at each refueling point, berm/ tank output line, and receiving point will be marked with a 4-inch black and the words "JET A", as shown below.



3.2.2 Emergency Shut-Off

Each fuel system will have at least one mechanical or electrical emergency fuel shut-off. This shut-off will be marked with letters that are at least two (2) inches tall and contrasting sharply with the sign background.



3.2.3 Tank Ground

The tank skid is grounded with brass clamps and copper wire to a copper or brass rod in the ground.

3.2.4 Tank Low Point Sump

"Fire-Guard" type tanks are equipped with a sump pump to remove any water and debris from the low-point sump inside the tank. Because the fuel must be pumped from the bottom of the tank, a minimum of 3 or 4 gallons of fuel must be sumped out to ensure the water and debris have been removed.



3.2.5 Security

The fuel farm (tank and fuel skid) should not be accessible to the general public and a means of locking-out the fuel system to other than authorized users must be used when the location is left unattended.

3.2.6 Fuel Skid/ Aircraft Refueling Station

The fuel skid/ refueling station consists of the final fuel filter, hose, refueling nozzle, bonding wire or bonding reel, fuel shut-off valve, fire extinguisher, and fuel pump. Additionally, associated records and manuals should be stored in the skid.

NOTE: Lock-open type fuel nozzles are not authorized.

3.3 Fuel Storage Tank Fill Restrictions

3.3.1 Receiving Fuel Filter

A receiving fuel filter should be installed between the fill connection point and the fuel storage tank. This filter may also serve as the outlet filter on some systems. Ensure that all ball-valves are in the proper position before transferring fuel from the tanker truck to the fuel storage tanks.

3.3.2 Fill Connection Point

The fill connection point is to have a one-way check valve, a ball valve, and a Cam-lock connection fitting with a dust cap or plug. These fittings are installed as close together as possible to minimize fuel dripping when the tanker hose is disconnected.

3.4 Aircraft Refueling Hose Requirements

3.4.1 Type

New hoses and hoses previously used in aviation fuel systems should be checked for serviceability and thoroughly flushed with fuel appropriate to the installation.

3.4.2 Specifications

Aircraft refueling hoses shall be given a permanent identification number, such as the hose serial number, and the Fuel Specialist will maintain a record of the date of manufacture and the date the hose was put into service. These records may be maintained in a tracking spreadsheet electronically.

3.4.3 Service Life

Aircraft refueling hoses shall be installed within 2 years of the date of manufacture and have a maximum service life of 10 years from the date of manufacture.



3.4.4 Inspections

Aircraft refueling hoses will be inspected daily for external damage, irregularities, and leaking. This inspection shall be logged on the Fuel Quality Record, Maritime Form FQ-1 (D-006).

3.5 Required Inspections

An annual inspection will be performed on Maritime Helicopters fuel storage tanks in accordance with Section 3 ¶10.4 of this manual.

3.6 Fuel System Security

3.6.1 Maritime Helicopters Inc. Location

Fuel systems will be locked at any time the location is left unattended.

3.7 Maritime Helicopters Customer Locations

Fuel systems will be locked at all times when refueling is not in progress.



4 AIRCRAFT REFUELING PROCEDURES

4.1 Helicopter Refueling Policies

Helicopter refueling will only be conducted by competent and trained personnel, utilizing recommended safe practices.

Each Pilot-in-Command is responsible for ensuring the proper type of fuel and fuel additives as outlined in the Aircraft Flight Manual are used in the aircraft.

It is Maritime Helicopters Inc. policy that refueling the helicopter with engines running will not be accomplished unless certain extraordinary circumstances exist. Refer to the Maritime Helicopters General Operations Manual for more information on this topic.

4.2 Refueling Training

Any Maritime Helicopters employee or customer, other than qualified pilots and A&P mechanics, must be given instructions and training on aircraft refueling procedures as listed in this the aircraft Maintenance Manual or the Aircraft Flight Manual before they will be allowed to refuel aircraft.

A qualified Maritime Helicopters pilot or A&P mechanic may give this instruction and training. A record of this training will be logged and kept on file with the Maritime Helicopters Fuels Specialist.

4.3 Grounding and Bonding

4.3.1 Grounding

4.4 Bonding

Bonding is the practice of taking a metal cable connecting the fuel dispenser and the vessel receiving the fuel for the purpose of providing a conductive path to equalize potential between the two.

4.4.1 Electrostatic Bonding

A provision for bonding shall be incorporated in the design of fuel servicing vehicles and systems to prevent differences in electrostatic potential.

Bonding cables shall be constructed of conductive, durable and flexible material.

Bonding connections shall be electrically and mechanically firm.

Jacks, plugs, clamps and connecting points shall be clean, unpainted metal to provide a positive electrical connection.



4.4.2 Fixed Fuel Point Bonding

On-shore fixed refueling points shall be equipped with a bonding reel attached to the fuel system. The cable will be of sufficient length to reach the aircraft bonding (grounding) point, with a plug and clip attached to the cable.

When refueling aircraft, the fuel nozzle will be bonded to the aircraft before the aircraft fuel cap is open or removed.

After refueling, the fuel cap is to be closed and locked in place before removing the bonding plug from the aircraft.

4.4.3 Fuel Truck or Trailer Bonding

Fuel points that may fill a fuel truck or trailer shall have a bonding cable connected to the fuel nozzle of sufficient length to reach a clean unpainted metal part of the truck, and a large alligator type clamp to attach to the truck.

Before opening the truck tank fill cover, a bonding cable shall be attached by a clamp from the fuel system to the truck.

After filling, close the tank fill cover before the bonding clamp is removed.

When using the fuel truck or trailer to fill transporter tanks, the fuel nozzle and truck/trailer must be bonded to the transporter tank by means of an alligator clamp to a clean, unpainted metal part of the tank before removing the fill plug.

After filling the transporter tank, install the fill plug before removing the bonding clamp.

4.4.4 Defueling Units

Defueling units will be bonded to the aircraft during defueling procedures.

Defueling units will be bonded to the fuel storage tank/ system when fuel is being transferred from the defueling unit to the main fuel supply tank.

4.4.5 Inspections

All bonding cables and wires will be check monthly for continuity. This check will be recorded on the Fuel Quality Record Form FQ-1 (M-001).

Anytime a bonding or ground wire is replaced or repaired, it will be checked for continuity.

A continuity check is done by using a multi-meter set on the 10,000 ohm scale range. Place a test lead on the metal aircraft plug or clip and the other test lead on the nozzle or piping. The meter should read at or near zero. The maximum resistance between the bonding cable clip and the fueling system framework shall not exceed 25 ohms.



A continuity test light may also be used to verify continuity of a bonding or grounding wire/ cable.



5 AIRCRAFT DEFUELING

5.1 Purpose

The purpose of this section is to provide a safe environment in which to perform aircraft defueling. This section addresses a detailed list of equipment requirements and the procedures to follow when defueling an aircraft, as well as how to dispose of fuel.

5.2 Equipment

Maritime Helicopters uses a defueling kit that consists of hoses and fuel filters. This kit is available at the following locations:

Metro Field Hangar PS 4 (Galbraith Lake)

The defueling kit is under the direct control of the Maintenance Department. All items in Section 2 of this manual pertinent to Filter change criteria and procedures apply to the defueling kit.

5.3 Requirements

All locations which have aircraft defueling kits must comply with the following requirements and procedures.

The defueling kit is designed to be used as a means of defueling aircraft and transferring serviceable fuel through a fuel filter back into a main fuel storage tank.

Inspections of the defueling kit will be completed by maintenance personnel prior to use.

An annual inspection of the defueling kit will be completed. Use of the Fuel Quality Record "Annual Checklist" section will be sufficient to document inspection of the kit. Mark a line through those items that do not apply. The original record of this inspection record shall be retained with the defueling kit and a copy of it shall be forwarded to the Fuel Specialist. The Fuel Specialist is responsible for tracking these inspections. Each station may also track this inspection on their local tracking board.

The fuel filter will be replaced every 12 months.

The defueling kit will only be used for aviation "Jet-A or B" fuel and have the following decals affixed to the kit:

Jet A and Jet-B Decals
Fuel Filter Inspection Tag or Marking

When the defueling kit is in use, inspect for leaks and condition. Immediately correct any discrepancies found.



5.4 Aircraft Defueling Procedures

WARNING: “Jet A and B” fuel is extremely flammable. The fuel fumes and gases can be ignited by static electricity, friction sparks, electrical devices, cigarettes or similar ignition sources.

Defueling aircraft will be accomplished in accordance with the aircraft Maintenance Manual. The Maintenance Manual is very clear on the proper procedures to be followed when defueling an aircraft.

Qualified maintenance personnel will perform defueling operations. Appropriate PPE shall be worn during all aircraft defueling processes. Prior to using the defueling kit, the kit will be inspected and one gallon of fuel will be flushed from the fuel hose into a bucket. The fuel will be disposed of in the proper location.

The bucket used during defueling shall be bonded to the aircraft at all times. Aircraft defueling operations will not be performed with the aircraft engine(s) running.

NOTE: All fuel drained from the sump outlet of any filter, tank or aircraft drain will be considered contaminated fuel and must be properly disposed of. **At no time will this sumped or drained fuel be returned to the aircraft or fuel storage tank.** This includes any fuel drained into a “catch pan”, no matter how clean the pan may be.

If the fuel being transferred is contaminated, the defueling kit must be tagged “Out of Service” until the contaminated fuel has been properly disposed of and the kit and filters cleaned.

If the fuel being transferred is clean and serviceable; the fuel may be transferred into the main fuel storage tank. At no time will this fuel be transferred directly back into the aircraft.

Defueling aircraft is prohibited during thunderstorms, in heavy rain, or when lightning is within five (5) miles of the defueling point



6 TRAINING REQUIREMENTS

6.1 Part 139 Requirements (14 CFR 139.321)

6.1.1 Requirements

As the supervisor for the Maritime Helicopters Fuel Program, an aviation fuel training course in fire safety that is authorized by the FAA must be completed every 24 consecutive calendar months (14 CFR 139.321(e)(1)).

All Maritime Helicopters employees who fuel aircraft, accept fuel shipments, or otherwise handle fuel will receive at least initial on-the-job training and recurrent instruction every 24 months. This training will include the handling of aviation fuels, fire safety, and emergency procedures associated with those fuels. To ensure prompt action in the event of a spill, fire, or other hazardous condition developing during fueling operations, fuel handling personnel shall be trained in the operation of emergency fuel shut-off controls and fire extinguishers. A record of the training shall be maintained in the employees' personal training record. (14 CFR 139.321(e)(2)) This training may be received from the supervisor trained under Sec 6 ¶1.1.1 above.

6.1.2 Applicability

All Maritime Helicopters employees involved in the handling of aviation fuels shall receive classroom and on-the-job training related to their specific fueling handling responsibilities.

The Fuel Specialist shall receive training in the more technical aspects of fuel handling and emergency procedures. This information will be required when conducting on-the-job training.

Pilots who have completed initial and recurrent training IAW the Maritime Helicopters Flight Operations Training Program shall be considered as having completed fuel handling training. A record of the training shall be retained in the individuals' training file IAW established record keeping requirements for initial and recurrent training.

A&P Mechanics/ Engineers shall receive Initial and Recurrent training.

Customer training is required for all personnel that are not Maritime Helicopters employees who refuel aircraft or sump refueling tanks. If needed, they shall be given instruction on the proper procedures for refueling aircraft and maintaining refueling systems.

6.1.3 Training Records

Training records shall be retained in the individuals training record file.

If no form is available to document an individual's training, then record of training may be documented on Maritime Form FQ-2, located in Appendix_.



Use of the electronic training matrix may be used to track when recurrent training is due. It is the responsibility of the applicable manager to ensure their personnel's training records are up to date.

6.2 Training Syllabus

6.2.1 Purpose

All Maritime Helicopters employees involved in handling fuel will be provided instruction on inspection requirements and refueling procedures before they will be allowed to perform these duties. The Director of Operations will designate the person who will conduct this training. This individual must be in compliance with the initial and recurrent training requirements of 14 CFR 139.321 and as stated above in Sec. 6 ¶1.1.1.

6.2.2 General Responsibilities

Maritime Helicopters employees involved in the handling of aviation fuels are responsible for ensuring that correct and clean dry fuel is provided for any aircraft in an approved, safe and environmentally responsible manner. Refer to Sec. 1 for more details.

6.2.3 Hangar and Ramp Familiarization

Location Familiarization

Location specific

Access routes to the ramp area

Aircraft parking and tie down locations

Fuel, water, electrical and air points

Location of light switches and emergency equipment

Customer Facilities – Should cover each customer facility where fuel handling is required. If applicable, this tour should be given with the approval of the person in charge of the facility, and if possible, with a customer representative present.

- a. Approved customer safety briefing
- b. Description of fuel system components
- c. Approved fuel handling areas

Airport facilities – Should cover access routes, buildings and location of emergency equipment and/ or services.

6.2.4 Fuel System Familiarization

Ensures the location, maintenance and operation of the fuel system components are understood.

- a. Storage tanks
- b. Markings
- c. Floating suction



- d. Drains/ Sumps
- e. Vents
- f. Pumps
- g. Differential pressure gauges
- h. Relief valves
- i. Filtration equipment
- j. Separator types, if installed
- k. Meters, if installed
- l. Emergency shut-off
- m. Grounding/ Bonding reels and wires
- n. Valve operation
- o. Hoses
- p. Fire extinguishers
- q. Piping
- r. Maintenance

6.2.5 Fuel System Inspections

Every precaution must be taken to maintain quality assurance for our fuel systems. The checklist contains the major items of an operation nature that should be checked and maintained regularly. Which checks to perform and how to conduct them is explained in Appendix A and Sections 2 and 3 of this manual.

6.2.6 Fuel Quality Assurance Checks

Follow the guidance in Section 2 to ensure that only clean and correct fuel is introduced into an aircraft.

6.2.7 Sumping Procedures

Training should ensure a thorough understanding of sumping procedures. Refer to Sec 2.

Purpose of Sumping

Aircraft Sumping

Tank and filter sumping

6.2.8 Fuel Receiving Procedures

Training should ensure a thorough understanding of fuel receiving procedures. Refer to Sec. 3.

Fuel receiving checklist

Paperwork verification

Product quality assurance

Fuel additives

Paperwork disposition

Fuel transfer procedures



6.2.9 Aircraft Defueling Kit

Training should ensure a thorough understanding of the aircraft defueling kit and associated maintenance manual instructions.

- h. Reasons for defueling
- i. Duties during defueling operations
- j. Defueling procedures
- k. Disposing of fuel

6.2.10 Personal Protective Equipment

Ensure a thorough understanding of PPE and when it must be used.

Hearing / Eye Protection

- a. Dangers from rotor wash
- b. Use of hearing protectors and earplugs
- c. Proper type and use of eye protection
- d. Eye wash locations

Clothing

- a. Static generation by clothing
- b. Danger of metal on shoe soles
- c. Contents of pockets as FOD
- d. Loose clothing and rags
- e. Gloves

6.2.11 Record Keeping and Forms

Training should ensure a thorough understanding of record keeping and the forms required.

- a. Location of fuel records and forms
- b. Filling out the proper forms and documenting inspections

6.2.12 Waste Disposal, Leaks and Spills

Training should ensure a thorough understanding of waste disposal, leak detection and spill prevention.

Waste Disposal

- a. Waste fuel disposal procedures
- b. Disposal of different products



Spill Prevention and Response

- a. Cleanup procedures
- b. Reporting procedures

6.2.13 Foreign Object Damage (FOD)

Ensure a thorough understanding of the company FOD program.

Sources of FOD

- a. Damage and cost
- b. Use of tool control practices

6.2.14 Security of Fuel System

Training should ensure a thorough understanding of the security requirements for all Maritime Helicopters fuel locations

6.2.15 Emergency Procedures

Provide familiarization with emergency procedures particular to handling fuel. Training is expected to ensure the response to an emergency is prompt and correct.

First Aid

- a. Cover MSDS for aviation fuels. Include skin exposure, eye exposure, inhalation and ingestion.
- b. First aid kit location and use
- c. Emergency telephone numbers
- d. Hospital/ clinic locations
- e. Reporting procedures, including those associated with customers
- f. Identification of employee First Responders
- g. Eye wash stations and their use
- h. Emergency shower locations and their use

Fires

- a. Emergency shut-off location and use
- b. Reporting procedures
- c. Fire extinguisher location and use
- d. Fire triangle
- e. Sources of ignition
- f. Smoking policy

6.2.16 Static Electricity, Grounding and Bonding

To ensure a thorough understanding of static electricity, grounding and bonding requirements

Static electricity

Generation of static electricity



Methods to reduce a static electric charge

Grounding and bonding procedures

Bonding refueling equipment and system to aircraft

Aircraft to ground

Reasons for bonding

6.2.17 Lightning/ Severe Weather

Training should ensure an understanding of operations during severe weather.

- a. Refueling and defueling during electrical storms or heavy rain
- b. Personal safety
- c. Safety equipment
- d. Appropriate clothing

6.2.18 Night Operations

Training should ensure an understanding of night operations at location

- a. Equipment such as flashlights and wands
- b. Clothing
- c. Driving precautions
- d. Reduced visibility



7 APPENDIX A - DEFINITIONS

Adsorption - A separation method where one component is concentrated on the surface of a porous solid. Surfactants (surface-active-agents) are separated from jet fuel by adsorption on clay.

API - American Petroleum Institute

API Degrees - Units for fuel density measurement

API Gravity - The petroleum industry's scale and method of measuring density of liquid petroleum products.

Ambient Temperature - The air temperature surrounding a specific area.

BRS-AK - Bristow Alaska, Inc.

Clay Treatment Vessel - A filtration vessel equipped with bulk clay, clay bags, or clay canisters used for removing surfactants (surface-active-agents) from jet fuel.

Coalescence - The property of a coalescer element to bring together very fine droplets of free and entrained water to form large droplets, which are heavy enough to fall to the bottom (sump) of a filter/separator vessel.

Coalescer Element - The first stage cartridge in a filter/separator vessel that removes solid particles and coalesces free water from jet fuel. It is upstream of the separator cartridge.

Contaminants - Substances either foreign or native, which may be present in jet fuel that detracts from its performance.

Cyclone Separator - A device that uses the principal of centrifugal force to cause the contaminate in jet fuel to settle to the bottom of a vessel without the use of filtration media.

Deadman Control - A control device, which must be physically held open by the system operator to allow fuel to flow. When released, fuel flow stops automatically.

Density - The amount of mass (weight) in a unit volume of material.

Differential Pressure - The measured difference in pressure between any two points, generally between inlet and outlet connections on filtration vessels.

Direct Reading Differential Pressure Gauge - A pressure gauge, which automatically displays the differential pressure between the inlet and outlet connections of filtration vessels.

Disarming Action - The rendering of elements in filtration systems incapable of performing their designed functions; e.g., coalescers incapable of coalescing water and separator elements incapable of separating water from fuel.

Dissolved Water - Water which is in solution in jet fuel. This water is not free water and cannot be removed by conventional means.

Effluent - Stream of fluid at the outlet of filtration vessels.



Elements - A generic term given to different types of decontamination media installed in various types of filtration vessels.

Emulsion - A dispersion of two dissimilar immiscible droplets in a continuous liquid phase.

Entrained Water - Small droplets of free water in suspension, which may make jet fuel appear hazy or cloudy.

Filter - A decontamination device to remove solid particles from fuel.

Filter Membrane (Millipore) Test - A standard test in which jet fuel is passed through a small filter membrane housed in a plastic holder. The cleanliness of the fuel can be determined by measuring the residue or amount of solid contaminants left on the membrane.

Filter/Separator - A filtration vessel which removes solids and coalesces free water from jet fuel. All filter/separators are equipped with two types of cartridges; coalescer elements (first stage) and separator elements (second stage).

Fixed Base Operator (FBO) - Common title for aircraft fueling agents or vendors at airports.

Flash Point - The lowest fuel temperature at which the vapor above the fuel will ignite.

Floating Suction - Pump suction piping with floatation capability used to draw the cleanest product from the upper level of the fuel in a jet fuel storage tank.

F.O.D. – Foreign Object Damage

FQAM – Fuel Quality Assurance Manual

Free Water - Water in fuel other than dissolved water. Free water may be in the form of droplets or haze suspended in fuel (entrained water or an emulsion) and/or water layered at the bottom of the container holding the fuel.

Freeze Point - The coldest fuel temperature at which the last fuel wax crystals disappear when fuel physically changes from a solid back to a liquid when warmed.

Hydrophilic - Attracts water or is water wetting. Has an affinity for water. Opposite of hydrophobic.

Hydrophobic - Repels water or is non-water wetting. Resists attracting water. Opposite of hydrophilic.

Immiscible - Liquids that are mutually insoluble. Opposite of miscible.

Influent - Stream of fluid at the inlet of filtration vessels.

Joint Use Fueling Systems - Where two or more users share and receive fuel from a common pipeline system.

Micronic Filter - A filtration vessel equipped with pleated paper cartridges designed to remove solid particles from aviation fuels.

Micron (Micrometer) - A unit of linear measurement. One micron is equal to 0.000039 inches and approximately 25,400 microns equals one inch.

Miscible - Liquids that are mutually soluble. Opposite of immiscible.



MSDS - Material Safety Data Sheet

NIST - National Institute of Standards and Technology

NFPA - National Fire Protection Association

OJT - On the Job Training

Particulates - Solid contaminants found in jet fuel, i.e., dirt, rust, sand, or fibers.

PEI - Petroleum Equipment Institute

Pre-Check Valve - A device used to check the operation of the automatic high-level shut-off equipment on tank trucks for preventing fuel spills.

Prefilter - A high dirt holding capacity Micronic Filter with pleated paper cartridges installed upstream of other filtration units. Prefilters are designed to extend the useful life of other more expensive filtration media in a fuel distribution system exposed to high solid levels.

Pressure Drop - See Differential Pressure

Product - Unless indicated otherwise, it will mean jet fuel.

PSI - Pounds per Square Inch

Random - Proceeding, made, or occurring without a definite aim or method.

Relative Density - The ratio of weight of any volume of fuel to the weight of an equal volume of water. Sometimes referred as Specific Gravity.

Separator Element - The second stage cartridge or shroud in a filter/separator vessel that allows passage of jet fuel but repels free water. It is located downstream of the coalescer cartridge.

Settling Time - The time allowed for water or dirt entrained in jet fuel to drop to the bottom (sump) of the fuel storage tank.

Shall - Indicates a mandatory requirement.

Should - Indicates a recommendation or that which is advised but not required.

Specific Gravity - See Relative Density

Sump - A chamber or depression installed at the bottom of a fuel storage tank or filtration vessel to facilitate the collection and removal of contaminants.

Sump Fuel - Fuel removed from storage tanks, filtration vessels, and aircraft refuelers while performing routine quality control tests and equipment maintenance.

Surfactants - An acronym for surface-active-agents that are chemical substances or detergent like compounds frequently found in jet fuels. These chemicals disarm the water removing capability of coalescer cartridges in filter/separators. Clay treatment is the primary means in removing surfactants from jet fuel.

Surge Tanks - Small tanks that collect fuel from high-pressure relief valves on hydrant trucks.



Thermo hydrometer - A hydrometer with a built-in thermometer used in determining fuel density and measuring fuel temperature simultaneously.

Thief (Sump) Pump - A small pump having a suction line, which extends to the low point of a fuel storage tank for the purpose of drawing off water which may have accumulated.

Turbine Fuel - Various kerosene and naphtha based fuels manufactured to be used in jet engines

Vendor - See Fixed Base Operator (FBO)

Waste Fuel - Fuel that is contaminated resulting from exposure to biological activity, surfactants, oil/water separators, chemicals, petroleum product mixes, surface drains, and from other various water/solid combinations.

Water Defense System - A device which senses the predetermined level of free water in filter/separator sumps and automatically stops the flow of fuel to prevent downstream contamination.

Water Slug - A large amount of free water

Working Tank - The fuel storage tank being used to supply fuel to aircraft refueler tanker trucks or to hydrant systems.



8 APPENDIX B - FUEL QUALITY RECORDS FORM FQ-1

It is the intent that each of the steps in the daily inspection is to be completed each time the weekly inspection is performed. Each time the monthly is performed it will include the daily and weekly steps. Each time an annual is performed it will include the daily, weekly and monthly steps.

These instructions are broken out by a complete overview of the form and when inspections are performed.

After quality checks are performed, post Fuel Quality Record in fuel skid. Copies shall be made and forwarded to the Fuels Specialist monthly

8.1 Daily Inspection

DAILY CHECKLIST

Items below to be checked daily	DATE:	1	2	3	4	5	6	7
D-001 General Condition of Tank Yard	Carry-over	S	S	S	S	S	S	S
D-002 Security (Snow around skid)		S	S	S	S	I	S	S
D-003 Fuel Leaks		S	S	S	S	S	S	S
D-004 Fire Extinguishers/Inspection Tags		S	S	S	S	S	S	S
D-005 Grounding reels, cables and clamps		S	S	S	S	S	S	S
D-006 Hoses, swivels & nozzles condition		S	S	S	S	S	S	S
D-007 Warning lights & module lights		S	S	S	S	S	S	S
D-008 Module Vents		S	S	S	S	S	S	S
Initials of Person performing check		JM	JP	JP	JP	JM	JM	JM

8.1.1 D-001 General Condition of Tank Yard

Check the general condition of the yard area for appearance and cleanliness. Report and correct any condition that needs immediate attention, such as plugged drainage, weeds, poor housekeeping, etc. Evidence of any recent fuel spill must be investigated immediately.

8.1.2 D-002 Security

Check the tank yard and fuel handling facility for any security, fire or safety deficiencies or unusual conditions requiring immediate corrective actions. Ensure that all gates and access doors are kept locked when area is unattended. All broken fences and gates are to be repaired or replaced immediately. In unsecured areas, all tank openings, valves, sump drains, fill caps, loading/ unloading hoses, master electrical switches and other accessible fittings must be kept locked at all items when not in use.



8.1.3 D-003 Fuel Leaks

Start system and check for leaks. Check tanks, piping, valves, hoses, meters, filters, and other fuel handling equipment for leaks. Any visible leaks must be immediately reported and repaired.

8.1.4 D-004 Fire Extinguishers/ Inspection Tags

Verify that fire extinguishers are in proper place with unobstructed access for immediate use. If seal is broken or inspection tag is missing, extinguisher must be taken out of service until recharged and tagged for acceptance.

8.1.5 D-005 Grounding Reels, Cables and Clamps

Check condition of static grounding reels, cables and clamps. Defective equipment is to be replaced or repaired immediately.

8.1.6 D-006 Hoses, Swivels & Nozzle Condition

Check condition of the fuel hose, swivel and nozzle for wear, damage and leakage. Check nozzle screen for tightness. Check that the nozzle dust cover is in place and bonding wire on nozzle is not frayed or missing bonding plug. Any item that is defective or is leaking must be reported immediately.

8.1.7 D-007 Warning Lights and Module Lights

Observe and correct for any warning light status. Ensure operation of module lights. Correct any deficiencies.

8.1.8 D-008 Module Vents

Check that the vents in the module are open and clear of blockage, such as snow, ice or bird nests. This helps prevent an undesirable accumulation of explosive vapors inside the module.

8.1.9 Initials of Person Performing Check

After completion of the daily checks, affix your initials in the date column.



8.2 Weekly Inspection

WEEKLY CHECKLIST

Items below to be checked Weekly		
	Week 1	Week 2
W-001 Filter Sumps	S	
W-002 Waste Fuel Tanks (Fluid level)	S-1/2	
W-003 Floating Suction Cable Connection	S	
W-004 Tank Inventory/Water Check	S	
W-005 Nozzle Screens, Fuel Leaks	S	
W-006 Snow Removed On & Around Tank	S	
Initials of Technician Performing Check	JM	

8.2.1 W-001 Filter Sumps

Perform the "White Bucket Test" (ref. FQAM 2 ¶7) on all working filter sump drains. Drain minimum of one gallon of fuel under pressure into white porcelain bucket. Rate the sample in accordance with the solid contaminant and moisture content indicators. A rating other than 1A is NOT acceptable. Occasionally fuel will appear hazy when first drawn. Let sample settle for 10 minutes before rating.

8.2.2 W-002 Waste Fuel Tanks

Gauge liquid level of waste fuel containers. Containers are to be checked or drained as required to prevent overflow and spillage. Notify local waste disposal company when waste fuel barrel is full.

8.2.3 W-003 Floating Suction Cable Connection

Verify satisfactory operation of tank floating suction by visually inspecting the device. All tanks have an inspection port to visually check the floating suction. A stainless steel line is attached to the float to ease this inspection.

8.2.4 W-004 Tank Inventory / Water Check

Check and record the quantity of fuel in the tank using a dipstick, coated at the bottom with water finding paste. Record fuel level on inspection form. Reading of the stick gauge in inches should be converted to gallons using strapping chart for the fuel tank. Velcon kit?

8.2.5 W-005 Nozzle Screens & Fuel Leaks

Remove nozzle and examine screens for particles. If particles are found, investigate sources of contamination, which could be from the inner hose lining, equipment failure, seals, gaskets, etc. Screens are to be cleaned or replaced if damaged. Source of the



contamination is to be cleared. Filter elements may need to be replaced if contamination is found. Use of “visual Detection of Microorganisms” (FQAM 2 ¶14.2) might provide helpful information in determining the source of contamination.

8.3 Monthly Inspection

MONTHLY CHECKLIST			
Items below to be checked Monthly			
M-001 Bonding Cable Clamps			S
M-002 Filtration Test/Filter Change			S
M-003 Signs & Placards			S
M-004 Fire Extinguishers			S
M-005 Emergency shutdown system			S
M-006 Filter differential pressure rating			S
Filter #1	Filter #2	Filter #3	
10	10	10	
M-007 Valve Movement			S
M-008 Fuel leaks interior/exterior of system			S
Initials of Technician performing check			JM
SUPERVISOR FILING INSTRUCTIONS			
This form is to be posted monthly in the fuel shed. When complete, it shall be sent to Fairbanks, Fuel Specialist for filing.			

8.3.1 M-001 Bonding Cable Clamps

Ensure that grounding/ bonding cables, clips, straps and adapter plugs are in good condition. Check for frayed wires, broken or damaged clips and worn or damaged adapter plugs. Conduct electrical continuity check on ground/ bonding cables and clamps.

8.3.2 M-002 Filtration Test/ Filter Change

Perform a color membrane test downstream of the filter/ separator vessels per the Gammon Mini Monitor (Millipore) tester operating instructions. Record the test rating. Compare the membranes to the last test. Report any increased rating to the Fuel Specialist. File test membranes in protective covers and place in fuel book. Return the book to the fuel skid or other storage location as applicable.

8.3.3 M-003 Signs & Placards

Verify that fueling equipment is clearly marked with the proper type of fuel being dispensed, flammable/ no smoking signage, emergency shutoff and other appropriate information and instructions, signs or decals as required. Notate any signage deterioration so replacement signage can be ordered.



8.3.4 M-004 Fire Extinguishers

Check fire extinguisher inspection tag dates, seals and verify that the extinguishers are properly charged. Update the tags for the monthly inspection.

8.3.5 M-005 Emergency Shutdown System

Check the emergency shutdown system. Immediately report any operational discrepancies. Manually check for freedom of movement of the fire valve operator to ensure it will close upon melting of the fuse link.

8.3.6 M-006 Filter Differential Pressure Rating

Check and record filter differential pressure on filter vessels while system is running.

8.3.7 M-007 Valve Movement

Cycle all valves through full range of movement. Repair and report any restrictions or binding.

8.3.8 M-008 Fuel Leaks Interior/ Exterior -

8.4 Annual Inspection

ANNUAL CHECKLIST

A-001 Storage tank interstacial	S
A-002 Storage tank interiors	S
A-003 Change & date filter elements (1 year maximum)	S
A-004 Tank Vents	S
A-005 Valve movement	S
A-006 Facility condition	S
A-007 Hose and nozzle	S
A-008 Flow rates	S
A-009 Fuel leaks entire system	S
A-010 Skid level	S
Initials of Technician performing check	JM



A-01 Storage Tank Interspatial

Check to make sure no fuel is in the space between the two tanks.

A-02 Storage Tank Interiors

Open fuel storage tanks and check interiors for cleanliness and condition of coating. Clean as required. Ensure at this time all contaminants and water are removed.

A-03 Filter Elements

Replace filter elements in accordance with manufacturer's instructions. **Mark filter replacement date (date due?) on exterior of filter canister with permanent marker.**

A-04 Tank Vents

Check cleanliness of tank vent screen. Tanks that have pressure/ vacuum vents should be checked for satisfactory operation and condition of poppets and inlet screens.

A-05 Valve Movement (note this is done on the monthly)

A-006 Facility Condition

Perform a thorough inspection of facility. Check for the safe condition of stairways, handrails, ladders, walking surfaces and adequacy of area and access lighting in tank yard and on above ground tanks. Note any electrical deficiencies that are obvious safety and fire hazards. Note any unusual sounds or noises coming from pumps, motors, meters, control valves, and other mechanical devices that might indicate pending failure. Check condition of exterior paint covering facilities and equipment for protection and appearance. Check condition of wind sock, if available. Check condition of spill kit, making sure there are no leaks, rust or breaks. Check spill contents against inventory list. Replace missing or unsatisfactory items through Supply Chain.

A-07 Hose and Nozzle

Unroll delivery hose and inspect for deterioration, soft spots, tears and leaking connections. Inspect nozzle for condition and leaking. Inspect hose reel for correct operation and lubrication. Repair and report all defects and leaks. Check date of hoses and that they are within 10 years of manufacture.

A-08 Flow Rates

Check and correct maximum flow rates/ pressures for each function mode.

A-09 Fuel Leaks

Check the entire system of internal and external piping for any signs of leaks. Records results and report any sign of leaks.

A-10 Skid Level – Check module for level. Check for stressing on the pipe connections due to movement.



8.5 Fuel Delivery

FUEL DELIVERY 1st Shipment of Month	2nd Shipment of Month	CORRECTIVE ACTIONS
Date:		
Product:		
Shipper:		
Quantity:		
Sample Condition:		
API Gravity:		

Follow instructions as described in Section 2 ¶10.



9 APPENDIX C - FUEL VENDOR AUDIT FORM

The purpose of the Fuel Vendor Audit is described in Sec 2 ¶15 of this Manual. Positive audits result in approving a fuel vendor for use by Maritime Helicopters without having to perform a “White Bucket Test” prior to receiving fuel into a Bristow aircraft.

These instructions are broken into two parts: One for the Fuel Vendor Audit Checklist and one for the cover sheet which accepts the vendor for use.

This form is to be maintained by the Fuel Specialist and retained for the current year plus two years.

9.1 Cover Sheet

FUEL VENDOR AUDIT CHECKLIST

Vendor Name:	1	Phone:	
Contact Name:			
Address:			
Years In Business:	2	Number of Employees:	
Fuel Supplier:			
General Facility, Capability and Equipment Description:			
Other Customers:			
Type Audit: ☐ Initial ☐ Recurrent ☐ Follow-up ☐ Special			
Audited By:	3	Date:	
Corrective Action Required ☐ Yes ☐ No	Date Requested:	Date Due:	Date Received:
	4		
Approved for Use: ☐ Yes ☐ No	5	By:	Date:
Next Scheduled Audit Date:	6		
Comments:	7		
Records Accounting: ☐ Completed ☐ Findings	8		



1. **Vendor Information Block** – Insert name of vendor or FBO. Phone number, fax number and/ or email contact. Identify main point of contact that is responsible for the fuel system you are evaluating. Address should include all pertinent information for mailing purposes.
2. **General Information Block** – Ask how many years the vendor has been in business. How many employees at the date of this audit? Who is the vendor's fuel supplier? Provide a general description of the facility, its capabilities and brief description of the equipment installed. If the vendor has other major customers, who are they?
3. **Audit Information Block** – Mark if this is the initial (first) audit, a recurrent audit, follow-up from a previous audit to verify corrective actions are in place or special audit. A special audit may be the result of a request from management or an assessment as part of a Management of Change (MOC) prior to beginning a contract. Print who conducted the audit and the date of the audit.
4. **Corrective Action Block** – Check whether or not correction action is necessary as a result of the audit findings. If corrective actions are required, annotate the date you requested these, when they are due (agreed upon with the vendor), and the date you received confirmation from the vendor that the corrective actions have been implemented.
5. **Approval Block** – Check the block annotating the vendor has or hasn't been approved for use, your name and the date. Additionally, update the Approved Vendor List and notify the Director of Operations and Chief Pilot.
6. **Next Audit Due Block** – The next audit date may be in one year or sooner, depending on the circumstances.
7. **Comment Block** – Any additional comments should be placed in this block.
Additionally, use this block to annotate transferring information from this checklist and audit to the Bristow audit database, QPulse.
8. **Records Block** – This block is to be used when the audit is a self-audit. It provides a cross-check that all the paperwork has been submitted and checked.



9.2 Vendor Checklist

When checking each item, mark whether it is satisfactory, unsatisfactory or not applicable. If the item is available but not observed (such as fueling transfer), annotate "not observed". However, questioning the individual and having them demonstrate a procedure should satisfy an observable activity.

9.2.1 General

	SAT	UNSAT	N/A
1) General			
a) Operator's aircraft fueling manual available and current.			
b) Vendor adheres to operator's manual requirements.			
c) Refueling personnel are adequately trained for their duties.			
d) Adequate bonding procedures are used.			
e) Ability to trace origin of fuel in storage.			

- Verify the vendor's aircraft fueling manual is available to staff and current.
- Through observation and/ or questions, verify the procedures and practices in the manual are being used. One method is to identify a procedure and ask the vendor and/ or support staff to demonstrate that procedure.
- Ask to see employee training records. Are they current and in accordance with the vendor's fuel training program?
- Are adequate bonding procedures being used when fueling aircraft?
- Does the vendor have documentation to trace the origin of fuel that is stored at their facility? Is the documentation current?

9.2.2 Storage Facility

2) Storage Facility			
a) Necessary fire protection equipment available and serviceable.			
b) Smoking prohibited and signs posted.			
c) Tanks, distribution systems, filter vessels, hoses, valves, pumps, caps, and connections free of leaks, clean, and in good condition.			
d) Tanks and filter vessels sumped daily.			
e) Records are maintained on filter changes and date is noted on the filter vessel.			
f) Filter differential pressure checked on a daily basis and results recorded.			

- Are proper fire extinguishers available for use, within easy reach and serviceable? Are inspections current?
- Is the required signage posted at the storage facility?
- Ensure tanks, distributions systems, filter vessels, hoses, valves, pumps, caps and connections are free of leaks, clean and in good, serviceable condition.
- Verify the tanks and filter vessels are sumped daily.
- Check to see that records are maintained on filter changes and the date of the filter change is noted in some method on the filter vessel.
- Check that the filter differential pressure is checked on a daily basis and the results are recorded.



9.2.3 Quality Controls

3) Quality Control Records			
a) Fuel samples are taken, analyzed, and results recorded.			
b) Records of facility and equipment inspections are accurate, complete, and retained on file.			

- g. Are fuel samples being drawn and analyzed? Are the results recorded?
- h. Look at the inspection records of the facility and the equipment. Are these records accurate and complete? Are the records retained in a consistent manner?

9.2.4 Fuel Servicing Equipment

4) Fuel Servicing Equipment			
a) Adequate for servicing required.			
b) Adequately maintained.			
i) Bonding wires.			
ii) Hoses and couplings.			
iii) Filters.			
iv) Dead man control.			
v) Exhaust system.			
vi) Electrical system.			
c) Gauges indicating fuel delivery pressure are on a calibration program.			
d) Necessary fire protection equipment available and serviceable.			

4) Fuel Servicing Equipment (Cont.)			
e) Properly marked.			
i) No smoking.			
ii) Type fuel.			
f) Tanks and filter vessels sumped daily.			
g) Records are maintained on filter changes and date is noted on the filter vessel.			
h) Filter differential pressure checked on a daily basis and results recorded.			

- a. Is the equipment for fuel servicing adequate?
- b. Are the items listed here adequately maintained? Check condition of wires, hoses and couplings. Are the filters adequately maintained? Are exhaust vents clear of obstructions?
- c. Do the gauges on a calibration program? Verify dates of the last inspection and calibration.
- d. Is fire protection equipment available and serviceable? Is proper
- e. PPE available? Is there evidence of usage?
- f. Is the fuel servicing equipment correctly marked with applicable signage? Look for no smoking signage, fuel identification and hazardous chemical symbol signage displayed and in good condition.
- g. Are the tanks and filter vessels sumped daily?
- h. Check that records are maintained on filter changes and the date of change is noted on the filter vessel.
- i. Is there evidence that the filter differential pressure is checked on a daily basis and the results are records?



9.3 Finding and corrective Actions

Findings and Corrective Actions			
Item Number	Deficiency	Corrective Action	Due Date

Use this section to document any deficiencies or discrepancies found during the audit. The item number should refer to the item number on the checklist that was found to be unsatisfactory. This information can be used during the next on-site audit to validate the corrective actions are in place and that they are working.