DOCKET NO. SA-510

EXHIBIT NO. 11C

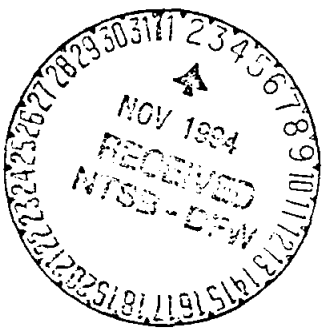
NATIONAL TRANSPORTATION SAFETY BOARD

HYDRAULIC FLUID SAMPLING/TESTING

USAir

405-JRK-94-010
ATA 29-00

Greater Pittsburgh International Airport
Pittsburgh, PA 15231



October 24, 1994

National Transportation Safety Board
Attn: Hector Cassanova
1200 Copeland Road
Suite 300
Arlington, TX 76011

SUBJECT: USAIR B737-300/-400 HYDRAULIC FLUID SAMPLING/TESTING

Dear Mr. Cassanova:

Fluid samples are taken consistent with Boeing requirements specified in the B737-300/-400 AMM section 29-15-00 (copy attached), which also includes the sampling procedure.

USAir uses Skydrol LD4 hydraulic fluid manufactured by Monsanto. When a sample is taken, it is sent to Monsanto's chemical laboratory at the following address for analysis:

Monsanto Chemical Group
800 N. Lindbergh Blvd.
St. Louis, MO 63167
Attention: Joe Giardina

Test results are sent by Monsanto to USAir's Engineering Department.

Very truly yours,

Walter T. Winkler
Manager - Systems Engineering

Attachment

cc: G. Kemp
M. Rudo
J. Kania
R. Lochran
G. Snyder

HYDRAULIC SYSTEMS A, B, AND STANDBY - INSPECTION/CHECK

1. General
   A. This procedure has one task. This task does a check of the hydraulic fluid.
   B. The operational environment of the airplane hydraulic system can affect the service life of the hydraulic fluid. You make a decision to take a sample of the hydraulic fluid for analysis if you find that it is necessary from your service experience. Make sure that the fluid analysis results agree with the fluid specification limits shown in Table 601. If the fluid properties are greater than the limits in Table 601, replace some quantity of fluid with new fluid until the fluid properties agree with the limits shown. You make a decision on the quantity of fluid to be replaced.

TASK 29-15-00-206-001

2. Hydraulic Fluid Check
   A. General
      (1) You must do the steps in this procedure to clean the bottles which will hold the fluid samples. If you do not do this, it is possible the fluid samples will not be correct. You must get two fluid samples from each hydraulic reservoir. Get one sample in a polyethylene bottle which has a capacity of one pint. Get the other sample in a glass bottle which has a capacity of one or two ounces.

   B. Equipment
      (1) Polyethylene Bottle (capacity of 1-pint and a polyethylene screw cap with a seal) - Commercially Available
      (2) Glass Bottle (capacity of 1- or 2-ounces and a polyethylene screw cap with a seal) - Commercially Available
      (3) Clean Polyethylene Bags (to hold the bottles) - Commercially Available
   C. Consumable Materials
      (1) B00129 Isopropyl Alcohol, approximately 1-pint, put through a micronic filter membrane
      (2) B00083 Petroleum Ether, approximately 1-pint, put through a micronic filter membrane.

(3) E00011 Nitric Acid (20% by volume), approximately 1-pint
(4) G01061 Distilled Deionized Water, approximately 1-pint

D. References
(1) 12-12-00/301, Hydraulic Reservoir
(2) 29-15-00/201, Hydraulic Systems A, B, and Standby

E. Access

TABLE 601
Hydraulic Fluid, BMS 3-11, Property Limits

FLUID PROPERTIES	IN-SERVICE FLUID LIMITS	TEST PROCEDURE
Visual	Must be transparent. No phase separation or precipitation. All colors are satisfactory.	Visual
Specific Gravity 25°C/25°C	0.995 - 1.066	ASTM D941
Percent of Water by weight	0.1 to 0.8	ASTM D1744 or Infared *[2]
Neutralization No. mg KOH/gm	1.5 max.	ASTM D974
Viscosity, cs at 100°F	6.0 to 12.5	ASTM D445
Organic Contamination	Not Found by Infrared	Infrared *[1]
Elemental Contamination		A Procedure with the Precision that Follows:
Calcium	50 ppm max. *[2]	± 4 ppm
Potassium	50 ppm max. *[2]	± 2 ppm
Sodium	50 ppm max.	± 3 ppm
Chlorine	200 ppm max.	± 20 ppm
Sulfur	500 ppm max. *[2]	± 10 ppm

*[1] If you think there is contamination, do the procedure in Boeing Document D6-24429, An Analytical Method for Contaminates in BMS 3-11 Fluids and Their Mixtures Using Differential IR Spectroscopy.

*[2] Contamination is a quantity that is more than that in the new fluid. Compare the data from the fluid analysis with the limits put on the new fluid. The precision of ± 10 ppm is applicable to the total values in the range from 0 to 1000 ppm. In the range from 1000 to 3000 ppm, the precision will decrease to ± 50 ppm with some equipment.

F. Clean the Bottles

S 116-002

(1) Do these steps to clean the polyethylene bottle:
   (a) Clean the bottle fully in a solution of liquid detergent and hot water.
   (b) Flush the bottle two times in hot potable water that does not have minerals.
   (c) Flush the bottle two times in deionized water which was distilled two times.
   (d) Drain the water from the bottle.
   (e) Dry the bottle in the air of a laminar flow bench in a clean room.

      NOTE: If a laminar flow bench is not available, put the bottle in a clean dry room, with the top in a down position. Keep all persons from the room until the bottle is dry and you put a cap on it.

   (f) After the bottle is dry, install a cap on the bottle.
   (g) Put the bottle in a new polyethylene bag.
   (h) Seal the bag with a knot or tape.
   (i) Identify the bag.

S 116-003

(2) Do these steps to clean the glass bottle:
   (a) Flush the bottle in a solution which has 20% by volume of nitric acid.
   (b) Flush the bottle two times in hot potable water that does not have minerals.
   (c) Flush the bottle two times in distilled water.
   (d) Flush the bottle with clean isopropyl alcohol which was put through a filter.
   (e) Flush the bottle with clean petroleum ether which was put through a filter.
   (f) Dry the bottle in the air of a laminar flow bench in a clean room.

      NOTE: If a laminar flow bench is not available, put the bottle in a clean dry room, with the top in a down position. Keep all persons from the room until the bottle is dry and you put a cap on it.

   (g) After the bottle is dry, install a cap on the bottle.
   (h) Put the bottle in a new polyethylene bag.
   (i) Seal the bag with a knot or tape.
   (j) Identify the bag.

G. Prepare for the Check

S 866-015

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. THE AILERONS, RUDDERS, ELEVATORS, FLAPS, SLATS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Supply hydraulic power to the hydraulic systems with the electric pumps (Ref 29-15-00/201).

S 866-016

(2) Operate all of the flight controls 6 to 8 times to mix the hydraulic fluid.

S 866-017

(3) Remove hydraulic power from the hydraulic systems (Ref 29-15-00/201).

NOTE: Get the samples of the hydraulic fluid not more than one hour after you stop the hydraulic system.

H. Procedure

S 686-004

(1) Open the sampling valve on the reservoir to supply a smooth flow of fluid.

S 686-005

(2) Drain a minimum of one pint of hydraulic fluid before you get a sample.

S 686-006

(3) Remove the caps from the bottles.

S 686-007

(4) Put one bottle in the fluid flow but do not touch the sampling valve.

S 686-008

(5) When the bottle is full, remove the bottle from the fluid flow.

NOTE: Do not close the sampling valve while the bottle is in the fluid flow. This can loosen the contamination and cause it to get into the sample.

S 686-009
(6) Fill the other bottle.

S 686-010
(7) Install the caps on the bottles.

S 686-011
(8) Close the sampling valve.

S 436-012
(9) Safety the sampling valve with a lockwire.

S 936-013
(10) Identify the bottles with this data:
(a) Airplane model
(b) Airplane number
(c) Hydraulic system number
(d) Date
(e) Location.

S 616-014
(11) Fill the hydraulic reservoirs (Ref 12-12-01).