

Hydraulic Fluid Purification



ASC/AAA and Air Force
Research Laboratory
Materials and Manufacturing
Directorate Joint FY 2001-2004
Pollution Prevention Project



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Problem



- Environmental Safety and Occupational Health Need 530
- Hydraulic fluid is the second largest AF waste stream
 - Currently it is illegal by T.O. to recycle hydraulic fluid
- AF hydraulic fluid consumption is 1.5M gallons/year
- 100% of “used” hydraulic fluid is disposed of as hazardous waste



Objective



Take a validated viable technology to purify aircraft hydraulic fluid that has been contaminated with particulate and/or water, and conduct a formal P2 project to complete transition of it into the field. This technology does not degrade the fluid's working properties or affect the fluid's additives.



Background

- This Is an Other Service Validated Viable Technology to purify hydraulic fluid, on Air, Land and Sea Systems
 - Army Uses it on CH-47, AH-64 Helicopters Wants to pursue it on the M-1 Tank
 - Navy Uses it on Carrier Based F-14s and F-18s Since 1991, on Submarines since 1965
 - AF Use Very Limited (Problem Solving Approach) - F-22 (Avionics Coolant), Space Command (Missile Erectors) Using Now - B-1, F-16 have used in Past,
 - Basic reason for project - Do Formal OUE/Field Demo of Process to Change General T.O. & Legalize AF-Wide Application, Current T.O. Disallows Use of Recycled Fluid



Anticipated Benefits



- Considerable Cost Savings - Air Force wide up to \$19.5 Million/Yr (Fluid Purchase and Disposal Costs)
- Can get Credit for Life Cycle Cost Savings as well
 - NGSL (Halverson Loader) \$4.9 Million, F-16 \$1.3 Million, (Preliminary Estimates Based on Current Usage)
- Dramatic Reduction in USAF's Number Two Hazardous Waste Stream
 - Potential Elimination of up to 10.6 Million lbs or 1.5 Million Gallons of fluid wastes per year



Current Project Approach



- Finish Tests on Effect of HFP Process on fluid properties
 - Run Baseline Pall and Malabar 2/3 System HTS Purified Fluid Pump Life Tests with MIL-PRF-87257- ESTCP Funds Requested
- AFOTEC Has Developed Master Test Plan
 - HFP TIM, 2 Follow- On Telecons & One Additional Planning Meeting with Lead MAJCOMs Were Held
 - Developed Project Plan used to generate OUE/Field Demo Test Plan - Currently in Coordination Will Be Worked From Top Down
- Qualify Purification by Doing T&E/OTE
 - T&E Malabar Units AFFTC (pre-prod units Starts 1 Apr 02)
 - Part of Acquisition Program at WR-ALC
 - OUE Pall at AFOTEC Det 1 Kirtland AFB NM possibly Base-Wide



Current Project Approach (Continued)



- Operational Utility Evaluation (OUE) at AFOTEC Det 1 with Pall & If Necessary Malabar Units (Phase I &II)
 - AFOTEC to Document all history/Joint Service Pall Tests for Verification and Validation of Purification Process on Systems that have used a purifier before & do proof of process (Phase I)
 - Phase II Includes Development/Documentation of Standard Processes, and changes to General T.O.s - and HFP tests on at least 4 Aircraft Types (One ea: Fighter, Airlifter, Bomber, Trainer - recommended F-16 and/or F-22, C-130, B-52, and T- TBD)
 - Malabar Tests would be part of that Acquisition Program Currently run by WR-ALC/LES
 - Both efforts (Pall & Malabar) to be Coordinated by AFOTEC



Current Project Approach (Continued)



- If OUE Phase II Successful, Continue Project with AFOTEC Monitored Demos/Field Trials (Phase III)
 - Depot Implementation (Two Purifiers each Depot)
 - Field Demos/Trials Rotating Demos Currently Planned
 - If ESTCP Funded Will expand to One or Two purifiers at each MAJCOM, At a Location of Their Choice
- If Phase III is Successful, Begin AF Wide Implementation - all MAJCOMS Will Then Start Their Own Implementation Projects
 - If Concept Works on Test Fleet, Begin Implementation on Other Aircraft and Ground Systems Large Aircraft First



Current Project Approach (Continued)



- Suggested Platform Implementation Order Based on Aircraft Size

- B-1 - ASC/YDE (3-5 locations) *
- B-2 - ASC/YSE (1 Location)
- B-52
- C-5
- KC-10
- C-17
- C/KC-130
- C/KC/135.



Current Project Approach (Continued)



- A-10
 - F-15
 - F-117 *
 - F-22 *
 - F-16 - OO-ALC/YP-LG Mod/PDM Line (1 Location) YPLD
Wants Depot Only
 - Next Generation Small Loader - ASC/GRG (19 Locations) *
 - Ground Systems TBD
- * Are Actively Interested in Participation



Costs



- Dependent on T.O. Change Costs, Process Verification and Equipment Needed
 - \$10K for Standard T.O Changes ?
 - Lab Will do Fluid Sampling & Pump Life Tests- \$400K
 - Approximately \$261K for OUE and \$540K for equipment acquisition & AFOTEC performing Demo/Field Trials
- Will Minimize Separate Purifier Purchases with New Test Stands (HTS) with Purification Coming on Line
 - Must verify New Stands Will work, Cost for that part of that acquisition program
 - Will Have to Buy Some Pall Units in Interim as New HTS Won't Complete Deployment until 2007(15-30 @ \$16.5K Current Estimate)



Future



- Coordinate & Submit Master Test Plan
 - MAJCOMs, SPOs, IMs, ALCs, etc
 - Needed to Obtain AFMC/CEVV Funding Support
 - Have Spent \$76K to do AFOTEC Generated Master Test Plan/Phase I Report
 - Draft Plan Acceptable, AFMC is Funding Phase II (\$250K) of Project, Pall Loaned Initial 2 OUE Purifiers as Demos
- Begin USAF Wide Implementation
 - Acceptable Plans will turn on OUE & Top Down Push for USAF Wide HFP Implementation
 - Units can pay for new stand alone purification equipment by reprogramming fluid purchase funds into support equipment accounts or wait for new HTS w/ OB purifier



Future (con't)



- Coordinate Stand Alone Effort with New Equipment Implementation
 - AFOTEC/Det 1 Will Coordinate All Test Efforts
 - WR-ALC/LES To Perform/Coordinate all Pall/Malabar Post OUE/Field Demo Equipment Purchases

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