WARNING: EXPLOSIVE LCFUs

Goes the Unit

By AM1(AW) Eldred Leavitt, VFA-115

It was a normal day at NAS Lemoore, and the squadron was preparing for an upcoming detachment to NAS Fallon. The flight schedule was going smoothly, so my fellow AMEs and I began work on an 84-day inspection. The shop was filled with qualified people, and we all set off to get the inspection done quickly.

I started by checking on one of the items we would need to complete the job: a liquid-coolant-filtration unit (LCFU). As it turned out, the unit's fluid level was low and needed to be serviced. I had done this task a million times before, so I opened the bleeder petcock on the fluid reservoir to let out the pressure. Knowing it would be a while before the unit fully depressurized, I went back to the shop to complete some other tasks. About 15 minutes later, I returned to the unit and loosened the clamp on the reservoir lid to remove it. The clamp seemed to be stuck on the lid, so I tapped it with my ratchet to loosen it. Tap… tap… boom!

The lid now was off… and lying about 20 feet away. As for me, I was in severe pain from the direct blow I had received from the lid as it tried to reach low Earth orbit. With people rushing to my aid, I became aware I was bleeding from the mouth. A quick body check revealed that my bridgework and a few other teeth were missing; I also had a big cut on my right cheek. The folks in maintenance rushed me to the emergency room, where I underwent surgery to graft bone to my now cracked jaw and to sew up all the cuts. Four hours and 20 stitches later, the reality of what had happened set in.

No one really is sure what happened. Safety and QA surmised that the valve for the nitrogen bottle on the unit must not have been closed completely, and the unit partly pressurized in the time it took for me to go to the work center and come back. I think familiarity got the best of me. My comfort with the unit probably caused me to miss a very critical step. I say "probably" because the safety investigation into this incident revealed a number of peculiarities about the LCFU.

First, this incident was not a one-time event. Similar occurrences had taken place within the community before, but they hadn't been reported due to lack of injuries. Second, an LCFU had slowly pressurized itself, even with the nitrogen turned off! Other factors worth mentioning include the lack of a formal training or licensing program for the LCFU and the omission of a warning/caution in the AG-521AC-S74-100 about the possibility of an explosive departure. Consider these points the next time you operate this piece of machinery.

I was lucky to walk away from this incident. The outcome could have been much worse. This painful lesson has given me a new respect for a piece of gear that I have used for years. I hope most of the AMEs out there already have heard about this incident through my squadron's hazrep. If not, you know now. It is unfortunate that prior incidents were not reported. Had they been documented, it may have prevented this incident. It's often said, "Our maintenance manuals are written in blood," and this incident proves it.

The next time you see a hazard or have an idea for making a job safer, think of the Sailor whose blood inked this story and act before someone else gets hurt.

HAZREP AWARENESS— P 071719Z APR 05

SUBJ/AVIATION GENUSE HAZREP VFA 115 02-05
REF/A/DOC/OPNAVINST 3750.6R
REF/B/DOC/AG-521AC-S74-100
NARR/REF A IS THE NAVAL AVIATION SAFETY PROGRAM. REF B IS THE OPERATIONAL AND MAINTENANCE INSTRUCTIONS WITH MAJOR PARTS LIST FOR THE LIQUID COOLANT FILTRATION UNIT PART NUMBER LCFU-2AC-302-8.

ANALYSIS: INVESTIGATION INTO THIS INCIDENT REVEALED THAT IT WAS NOT A ONE-TIME EVENT. TWO SIMILAR INCIDENTS HAVE TAKEN PLACE WITHIN THE COMMUNITY DURING THE LAST YEAR. FORTUNATELY, THESE PRIOR EPISODES DID NOT RESULT IN ANY INJURIES. IT IS PROBABLE THAT MANY COMPARABLE NEAR MISSES HAVE OCCURRED IN THE PAST, BUT WERE NOT DOCUMENTED DUE TO A LACK OF INJURIES.

THE AME INVOLVED IN THIS EVENT WAS HIGHLY EXPERIENCED AND WAS SERVICING THE CART AS HE HAD ALWAYS DONE IN THE PAST. QUALITY ASSURANCE (QA) EXAMINATION SHOWED THAT HE WAS CONDUCTING THE SERVICING FROM MEMORY. INVESTIGATORS IN THE PRIOR CASES CONCLUDED THAT OPERATOR ERROR WAS CAUSAL TO BOTH INCIDENTS. IN THOSE CASES, THE INDIVIDUAL SERVICING THE LIQUID COOLANT FILTRATION UNIT (LCFU) DID NOT COMPLETELY BLEED OFF THE RESERVOIR PRESSURE PRIOR TO REMOVING THE LID ASSEMBLY. AN EXACT DETERMINATION AS TO THE CAUSE OF THIS INCIDENT WAS NOT MADE. IT IS PROBABLE THAT THE AME INVOLVED DID NOT COMPLETELY SECURE THE VALVE ON THE NITROGEN PRESSURE BOTTLE AT THE BEGINNING OF SERVICING. THIS ALLOWED THE RESERVOIR TO PARTIALLY PRESSURIZE AND RESULTED IN THE EXPLOSIVE DEPARTURE OF THE LID AT REMOVAL.

WHILE OPERATOR ERROR WAS A CONTRIBUTOR TO THE PRIOR INCIDENTS, AND A PROBABLE CONTRIBUTOR TO THIS INCIDENT, IT BECAME APPARENT THROUGH INVESTIGATION THAT THERE ARE A NUMBER OF INADEQUATE MANAGEMENT AND MAINTAINER CONDITIONS THAT ARE COMMON TO EACH. PRESENTLY, THERE IS NO FORMAL TRAINING ESTABLISHED FOR THE LCFU. SQUADRON AME'S RECEIVE TRAINING INTER-SQUADRON AND ARE NOT REQUIRED TO HOLD A GROUND SUPPORT EQUIPMENT LICENSE (GSE) TO SERVICE THE LCFU. REF B IS THE ONLY PUBLICATION THAT CONTAINS SERVICING INSTRUCTIONS FOR RE-FILLING THE LCFU'S MAKE-UP RESERVOIR AND IS USED IN ALL THREE LEVELS OF AIRCRAFT MAINTENANCE. REF B DOES NOT DELINEATE THE QUALIFICATIONS REQUIRED TO PERFORM MAINTENANCE OR SERVICING ON THE LCFU. ADDITIONALLY, REF B LACKS A WARNING/CAUTION ABOUT THE POSSIBLE IMPLICATIONS OF A RESERVOIR THAT HAS NOT BEEN FULLY PURGED.

THE DESIGN OF THE LCFU DOES NOT AID IN THE SAFE SERVICING OF THE RESERVOIR. THERE ARE NO CROSSCHECK PROCEDURES OR VISUAL MEANS THAT CAN BE USED TO CONFIRM A LACK OF PRESSURE IN THE RESERVOIR. A PRESSURE SIGHT GAUGE LOCATED ON TOP OF THE RESERVOIR WOULD GREATLY AID IN THIS DETERMINATION AND WOULD HAVE PROBABLY PREVENTED THIS INCIDENT. THE METHOD OF ATTACHMENT OF THE RESERVOIR LID IS ALSO A SAFETY HAZARD. CURRENTLY A CLAMP RING IS USED TO SECURE THE LID TO THE RESERVOIR. ONCE THAT RING IS LOOSENED, THE LID IS FREED FROM THE UNIT. A NEW DESIGN IS NEEDED. ATTACHING THE LID TO THE UNIT WITH A HINGE OR SAFETY STRAP CAPABLE OF RETAINING AN EXPLOSIVELY OPENING LID WOULD HAVE PREVENTED THIS AND ALL PRIOR INCIDENTS.

CONCLUSIONS: ALTHOUGH THE EXACT CAUSE OF THIS INCIDENT IS UNDETERMINED, IT IS EVIDENT THAT THERE ARE SEVERAL SAFETY CONCERNS ASSOCIATED WITH SERVICING THE LCFU. FROM THIS INCIDENT IT IS APPARENT THAT REFINED PROCEDURES, FORMALIZED TRAINING/QUALIFICATION, AND INCLUSION OF A PRESSURE GAUGE ON THE LCFU WOULD SIGNIFICANTLY REDUCE RISK WHEN OUR SAILORS OPERATE OR SERVICE THIS EQUIPMENT.

CO'S ENDORSEMENT: IT WAS DISTURBING TO LEARN THAT THIS SAME EVENT HAD TAKEN PLACE SEVERAL TIMES IN THE PAST AND WAS NOT FORMALLY DOCUMENTED. PRIOR IDENTIFICATION OF THIS HAZARD MAY HAVE PREVENTED THIS OCCURRENCE AND KEPT AN AME FROM GETTING HURT. WE MUST CONTINUALLY BE PROACTIVE IN OUR IDENTIFICATION, COMMUNICATION, AND MITIGATION OF HAZARDS REGARDLESS OF THE SEVERITY OF THE INCIDENT.

HAZREP reporting is the primary method of identifying hazardous trends that exist throughtout the Navy. Don't rely on another squadron's HAZREP to bring attention to a problem in your command.—Ed.