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Transcript
Armed Forces Study Danger of Hydraulic Fluid in Military Equipment
LLOYD DOBYNS, co-host:
The most dangerous job you can have in the United States is to work for the fire department. The reason is obvious, working around raging fires can be hazardous to your health. But suppose you had a fire and there was no fire department to call. Then the fire would be even more hazardous to your health. And then suppose that you knew that the machine that you had to work with might burst into flame at almost any time. Not every time of course, not even often, just sometime. For fifteen years or more that’s the situation faced by crews on American military planes and tanks. And as Steve Delaney reports for the moment at least, the threat is as real as it ever was.
STEVIE DELANEY: The once promising Air Force B-70 Bomber at the end of a routine test flight in California. Fire in the landing gear, hydraulic fluid leaked into the hot brakes. That time they got the fire out, this time they didn’t. Last fall this junk was a B-52 bomber. What was almost surely a hydraulic fire on landing totaled it. But the Air Force doesn’t have exclusive rights to the problem of flammable hydraulics. American tanks use hydraulics to swing the turret and the cannon and they have trouble too. Multi Ashkenazi commanded an American built tank in the Arab-Israeli War of 1973. In the Israeli Armored Core, a grim joke spread through the tanks in that war. ‘What’s the difference between an American tank and a Zippo lighter? The tank ignites on the first try.’
MULTI ASHKENAZI: You see the fire and you don’t know what happened in this moment. You see only the fire and you not feel nothing.
DELANEY: This stuff did that, hydraulic fluid. It’s called cherry juice. And it burns easily, hotly, tenaciously.
ASHKENAZI: You see the fire and the instinct it tells you jump out because the fire comes with you.
DELANEY: When a hydraulic line ruptures, fluid under high-pressure sprays out like an aerosol. Here’s what happens when it’s ignited. Ed Snyder tests hydraulic fluids for the Air Force.
Can you demonstrate how you determine the burning capacity of this stuff?

ED SNYDER: Well you take a wick that has been saturated with the fluid under test and insert it in this motor driven arm. Then the motor takes that wick through the ignition source and you count the number of cycles until ignition and burning occurs. This as you saw ignited within two passes through the flame.

DELANEY: None of that is news to the Pentagon. As early as 1946 the Army Air Core got a warning that cherry juice was a fire hazard. It still is. And since 1965 hydraulic fires have cost the Air Force more than $200 million in equipment losses and those were non-combat losses. In Vietnam, planes, helicopters and lives were lost to small arms fire, which hit only the hydraulic system. But in most modern aircraft the hydraulic system is hard to miss. Here’s a sketch of the hydraulic blood stream of an F-4 phantom jet. These lines are just as widespread in other planes. In 1966 with Vietnam losses mounting the Air Force was told to find something better. 1967, the Six Day War, the Israelis lost a lot of men in tank fires, but could not be sure they were hydraulic in origin. The Israelis believe in tanks as the ultimate ground control weapon, and in those days they hit a lot of American tanks.

Gen. ISREAL TAL: Tanks are the most important thing.

DELANEY: General Isreal Tal, more or less retired, the father of the Israeli Armored Core, the Hyman Rickover of the tank world. He complained to the Pentagon about those fires. 1973, the Yom Kippur War, Multi Ashkenazi’s war. This time the Israeli’s new 800 men died in tanks, 300 of those burned to death, a lot of them in hydraulic fire in American tanks. General Tal took those figures to the Pentagon and General Creighton Abrams listened. He was Army Chief of Staff, a tough tank man himself and he said do something. This is what they did, lemon juice. Safer they say, or is it.

SNYDER: The fire resistant fluid is more difficult to ignite in this test. The other fluid ignited within two cycles through the flame and now we’ve gone over five.

DELANEY: So therefore it’s an improvement over the originals.

SNYDER: Yes. It’s a safer fluid to use. You can see it much more resistant to ignition. There we go, it’s finally started.

DELANEY: Still flammability is hard to measure. If lemon juice passes some tests, it flunks others. In this case they sprayed cherry juice against a metal surface heated to 1700°. Now the lemon juice, same surface, same temperature.

Is this stuff truly fire resistant?

RON PATEK (Systems Engineer, U.S. Army Tank Command): It is fire resistant in the sense that it is flammable at higher temperatures than this is, but it is not totally inflammable.

DELANEY: Would less flammable be a more accurate word than…?

PATEK: Yes, yes.

DELANEY: At one point Army scientists tried to have the fire resistant label taken off lemon juice, but the Air Force thought its version of the new fluid was so good that in 1971 an official film was circulated touting its virtues. They called it 83282.

Unidentified Man (File Footage): The 83282 on the other hand did not ignite readily, and while it did not burn after some little time, it did not propagate or spread to any extent. Proving conclusively that it is a far safer hydraulic fluid to use in aircraft and missile systems than the 5606.
DELANEY: In this Air Force test there is a difference. Fire a bullet at a can of cherry juice, fireball. Try it with lemon juice, no fireball. And what seemed to be on that basis of full-speed changeover to the new stuff.

Unidentified Man (File Footage): The Air Force has given the F-4 aircraft top priority for substituting the less flammable mill age 83282 hydraulic fluid for the 5606 type.

DELANEY: And that’s twelve years ago and you’re still working on changing over the hydraulic fluid in F-4’s.

BILL JIMENEZ (Air Force Engineer): At that time, one of the F-4’s was changed over to this fluid.

DELANEY: One plane.

JIMENEZ: One plane, and pilot reports was not very positive, so the program didn’t go very far.

DELANEY: So essentially in 1971, one pilot complained about the results of his test and the whole thing came to a stop.

JIMENEZ: Well, there was no program to convert at that time.

DELANEY: In fact, the real program to convert to the somewhat safer fluid did not begin in earnest until 1979, after still more fire losses. The Navy reacting to its age-old fear of fire at sea changed over several years ago and reports no problems. But neither service has ever put the fluid through a real world test. Lab testing is not combat. Here’s the bullet test again. Cherry juice does. Lemon juice doesn’t. So lemon juice is safer? But here’s an army test with a different caliber bullet, cherry juice and lemon juice. Result, three fireballs out of four and a lot of conflicting recommendations.

Did anybody load up an airplane with the stuff, fly it as a drone and shoot at it to see what would have happened?

JIMENEZ: No, not as far as I know. Of course, the laboratory has done a lot of tests on the ground, which I’m sure you’ve seen.

DELANEY: Yea, we’ve seen tests in which they fill up a canister half way with hydraulic fluid, pressurize it to twice the normal atmosphere and then shoot at it. But in a plane, it’s running at three thousand pounds per square inch of pressure, and that is something of a different set of conditions isn’t it?

JIMENEZ: There might be some different parameters. That’s true.

DELANEY: There is one place where real world testing goes on almost constantly, the Middle East. Israel’s battlefields have become the operational testing grounds for a lot of American weapons, including tanks. When they fail there, the results are not measured on computer print outs, but in lives.

Did you know that the fire had touched you?

ASHKENAZI: Yea. I know all the time what happened to me and after two months, I see what happened to me, exactly what happened and you must learn to live in the new face and the new life.

DELANEY: Among the lessons, which the Israeli’s have learned in the course of all the wars in their short history, is something about how to put a design the machinery of war. They are now building in this country the Merkava tank. It is a combination of high technology and the application of the bitterly won lessons of battlefields.

And what came out of that crucible is a chillingly efficient machine. Deadly when hitting, and survivable when hit. There’s more armor. Ammunition is stored in special boxes for safety. The engine is upfront, all
that for more crew protection. Last summer in Lebanon, there were Merkava tanks lost, but not from fires. There are no new Multi Ashkenazi’s from the war in Lebanon.

What did you do to the hydraulic fluid?

Gen. BEN ZION BEN-BASAT (Israeli Ordnance Corps): We isolated it. We isolated the hydraulic fluid to the highest extent possible from the crew. So even if it is hit, and a fire is caused, the fire won’t get to the crew compartment.

DELANEY: Is the hydraulic fluid fire resistant?

BEN BASAT: No hydraulic fluid, which can be used in the present technology, is fire resistant.

DELANEY: The Israeli’s, who are probably the world’s ranking experts on tank warfare’s, simply designed around the fire hazard, while trying to develop a completely fire proof solution. The Americans tried to do the same thing with the new M1 tank, but there have been hydraulic fires. The turbine engine runs hot and vibrates. Not long ago it was shaking hydraulic hoses loose. Fire in the engine compartment, even with a supposedly safer lemon juice. That’s been changed, and no more American tanks use cherry juice. But it is now nine years since General Creighton Abrams blew his stack and demanded a fix and it’s been over fifteen years since the Six Day War.

If it’s been known for the last fifteen years, lets say, since the Six Day War, that hydraulic fluid is a serious fire hazard in a tank. How come it’s taken this long to come up with one that won’t burn?

PATEK: Well, I guess-- first of all I don’t anybody really believed it was that serious fifteen years ago.

DELANEY: Was this tank designed bearing in mind the lesson of the ’73 war?

PATEK: To the extent that it was possible, yes. We did not have a better hydraulic fluid available at that time. In case of fires, we went with what we had as an interim fix, with the idea of…

DELANEY: This stuff?

PATEK: Yes, this stuff, the FRH.

DELANEY: That’s an interim fix?

PATEK: That’s an interim fix. Yes sir.

DELANEY: Meanwhile, the program that your running now is kind of a temporary fix until something better comes along?

JIMENEZ: Well, you might think of it that way. That’s true. Although, the temporary fix may last for years.

DELANEY: What the armed forces are now calling a temporary fix was once touted as the answer, especially by the Air Force.

Unidentified Man (File Footage): Proving conclusively that it is a far safer hydraulic fluid to use in aircraft and missile systems than the 5606.

DELANEY: This summer the army will begin field-testing a new fluid, which it hopes will be the ultimate answer to the problem of hydraulic fires. The Air Force has a long-term answer to, an exotic fluid that simply won’t burn, period. But that’s for the next generation of planes, the ones not yet on the drawing boards. In the mean time, American tanks and planes will continue to use flammable hydraulics and will continue to have fires even without being shot at. This fire was only last fall and the total B-52 was using the same old volatile hydraulic fluid that went into it on the day it first flew back in the 50’s.