

## POINT PAPER:

Personnel from Hanscom AFB, Bedford Massachusetts and Westover Air Force Base, Chicopee Massachusetts were assigned to maintain and fly the C-123K "Provider" cargo aircraft between 1972-1982, as members of the 731<sup>st</sup> Tactical Airlift Squadron and the 74<sup>th</sup> Aeromedical Evacuation Squadron of the 439<sup>th</sup> Military Airlift Wing, USAF Reserve. In 1982 the aircraft were retired to Davis-Monthan AFB Arizona for storage and several were provided various museums. Some contaminated aircraft were sold abroad and at least two to private domestic interests including Walt Disney Inc. for movie production.

Westover C-123K airplanes had been used in missions throughout the Vietnam War and nearly half were used in the Operation Ranch Hand operation to spray Agent Orange and other herbicides and insecticides, with spray tanks and other apparatus removed after the war. Post-war crews were unaware at the time of concerns involving the health issues of Agent Orange exposure, and when such concerns did develop in the medical community later in the 1970s, veterans were left unaware of having been exposed to dioxin.

Tests completed by the Air Force have detailed the presence of dioxin and other toxic agents still present on the 21 stored, surplus C-123K aircraft. These tests were completed as early as 1993, over 20 years after the last spray missions in Vietnam. Air Force reports were also generated in 1994, 1996, 1998, 2000 and 2008, all confirming the earlier report. In 2000 the GSA and the USAF prohibited any further sale or transfer of the aircraft. The aircraft were moved to a secure area within the Davis-Monthan storage area with restricted access to prevent dioxin exposure. In 2010 the aircraft were decontaminated by being melted into scrap metal ingots. Two spray aircraft remain on USAF museum display.

In May 2011, Air Force contamination reports were analyzed by Oregon Health Sciences University, which confirmed the toxicity reported by the tests. OSHU also confirmed that personnel who maintained and flew the aircraft were "*most likely*" exposed to the toxins in Agent Orange. Members of the units have developed Agent Orange-related diseases clearly related to their exposure over a long period flying and maintaining their C-123K aircraft. Aircraft tail numbers included 361, 362, 565, 571, 581, 583, 586, 592, 606, 607, 610, 629, 631, 633, 635, 656, 661, 663, 669, 680, 681, 683, 693, 695, 703, 706, and 707.

In 1996 Air Force documents included recommendations by senior leaders in the service, including the Air Force Judge Advocate General corps, to restrict information about C-123K/UC-123K Agent Orange contamination to "official channels only until more information is known". No aircrew or maintenance veterans have received any information, via official channels or otherwise, in the 15 years since Air Force tests that memo, or in the 18 years since the first tests proved contamination which put their health at risk.

Veterans, individually able to establish aircrew duties aboard these dioxin-contaminated aircraft, seek recognition of exposure to AO dioxins so the Department of Veterans Affairs will evaluate illnesses for service-connected disabilities. Presently the Department of Veterans Affairs recognizes Agent Orange exposure only for personnel in-country during the Vietnam War, plus a handful of locations where Agent Orange was known to have been used. No other DAV recognition is allowed of Agent Orange or dioxin exposure.

AIRCREW EXPOSURE TO AGENT ORANGE TOXINS  
PRESENT ON CONTAMINATED C-123K AIRCRAFT  
FLOWN POST-VIETNAM (1972-1982):

TO ESTABLISH THE FACT OF INDIVIDUAL VETERAN'S AGENT ORANGE  
EXPOSURE PER DEPARTMENT OF VETERANS AFFAIRS GUIDELINES

AND

TO SUBSTANTIATE A REPORT MADE TO THE SECRETARY OF THE AIR FORCE  
INSPECTOR GENERAL (SAF/IG PER AFI 90-301, 9 MAY 2011)



*"Patches" Tail #362 Air Force Museum  
Wright-Patterson AFB, Ohio*

6 JUNE 2011

## NARRATIVE:

The Air Force used UC-123K Provider cargo aircraft in Vietnam to spray Agent Purple and Agent Orange, now known to contain harmful toxins, in Operation Ranch Hand. Many of the aircraft sustained severe antiaircraft fire. In particular, UC-123K Tail Number 362 became famous throughout the Air Force and the aviation industry as "[Patches](#)", surviving over 1500 hits and earning seven Purple Hearts for her crews.

After Ranch Hand concluded, most of the UC-123K aircraft were converted back to their original C-123K configuration, which was simply the same airframe less the Agent Orange tanks and spray apparatus, and controls for spraying. The aircraft were distributed to several Air Force Reserve squadrons in the Eastern US, and others went to allied military forces such as South Korea.

Between 1972 and 1982, the 731<sup>st</sup> Tactical Airlift Squadron, part of the 439 Military Airlift Wing at Westover AFB, Massachusetts was assigned 24 C-123K aircraft, at least eleven known to be former spray aircraft...it could be more as Air Force records were better at identifying those aircraft which *were* used than which *weren't* used...a degree of confusion existed until the very last airplane was destroyed.<sup>1</sup>

The 731<sup>st</sup>, based first at Hanscom AFB, MA and later at Westover AFB, MA, flew their C-123K aircraft throughout the United States and to several foreign countries in meeting their training and airlift mission. Also assigned to fly the C-123Ks with the 731<sup>st</sup> was Westover's 74<sup>th</sup> Aeromedical Evacuation Squadron, which conducted medical evacuation missions and training for currency in that aircraft. Each unit had students, qualified crewmembers, flight instructor and flight examiners, with flight examiners being considered the more experienced and qualified in their duties. Aircraft commanders were also separately rated as fully qualified to fly the C-123K in that crew position.

The C-123K Providers were eventually retired in favor of the C-130 Hercules, and the 731<sup>st</sup> relocated to Peterson AFB, Colorado. *Patches* was flown by members of the 731<sup>st</sup> to its retirement at the Air Force Museum at Wright-Patterson AFB, Ohio (Dayton) to be recognized for an outstanding war record and a unique background of surviving so many hits, many of which went through the spray pipes and Agent Orange tanks allowing the aircraft to become repeatedly saturated<sup>2</sup>. For some years after its delivery *Patches* sat outside on a parking apron, and was later inside a separate hangar away from the main museum, and eventually brought inside the museum proper.

Prior to bringing *Patches* inside, in December 1994 the base conducted a [survey of the aircraft to determine its level of contamination](#), knowing it had been used in Operation

---

<sup>1</sup> [Air Force Recycles Vietnam-Era Aircraft](#), Press Release, Hill AFB, UT, April 2010, Ms. Barbara Fisher

<sup>2</sup> See Air Force Museum "[Patches](#)" Fact Sheet

Ranch Hand to spray Agent Orange. The 645 Medical Group/SGB contracted a qualified commercial firm specializing in such analysis, with the resulting determination that *Patches* was “heavily contaminated”. The report recommended personnel not enter or work inside the aircraft without Tyvek protective coveralls, respirators, limitation of exposure time, followed by decontamination. It also pointed out concerns for contamination of the ground from rainwater washing off *Patches*.<sup>3</sup> In any case, the recommendation was that the aircraft not have public access, either inside or immediately around the aircraft, even following extensive exterior cleaning and removal of all paint, inside and out. The contamination was considered hazardous, even more than two decades following its last Agent Orange spray mission, and after years of routine cleaning while flown by the 731<sup>st</sup> and 74<sup>th</sup>. Toxins had soaked into the very metal surface, under even the paint, of the C-123K. Although cleaned up, *Patches* would remain toxic.

In 2000 a private lawsuit was brought against the General Services Administration <sup>4</sup>dealing with the sale of some surplus C-123K aircraft stored at Davis-Monthan AFB. The [Finding 14165](#) of the GSA Board went against the complaint, however the government released numerous military documents referring to the contamination of the C-123K fleet being too hazardous to permit sale, and included as exhibits in the case several Air Force reports (not available to us at this time) of the dioxin as well as the confusion about which aircraft were, and which were not, used for spray missions in Operation Ranch Hand during Vietnam.

In December of 2003, a [study of C-123K Agent Orange contamination was prepared by the Air Force Institute for Operational Health](#)<sup>5</sup> estimating the cost of sampling the stored C-123KUC-123K surplus aircraft at Davis-Monthan AFB, Arizona. That report included several recommendations that any aircraft considered for surplus disposal first be fully decontaminated, because tests of sample aircraft at random **all** tested positive for dioxin congeners. Even with earlier decontamination efforts and after the years of cleaning during operational use since Vietnam, the report stressed, the aircraft could never be considered actually decontaminated, and the report author was concerned that their testing procedures may have actually underestimated the actual levels of contamination. They were also concerned about contamination of the soil and ground water beneath the aircraft.

In April 2010, the [Air Force eventually opted to address the contamination of the remaining C-123K aircraft by destruction of the entire fleet](#), taking special measures to protect the ground, shroud the aircraft, shred all metal, and melt the scraps into ingots. Some AFMARC research done at this time revealed that of the eighteen remaining aircraft, thirteen were found to be former spray ships,<sup>6</sup> a number far higher than any of the veterans who’d flown the aircraft expected. It was assumed by the former aircrews that only a few of the C-123Ks were spray aircraft, but the fact is that most were.

---

<sup>3</sup> [Memorandum](#) for 645 MedGrp/SGB from AL/OEMH, dated 19 Dec 94, principal writer Capt [Wade Weisman](#) USAF BSC

<sup>4</sup> [GSBCA 14165 Finding](#), GSA Board of Contract Appeals, 22 December 2000

<sup>5</sup> [Memorandum](#) from AFIOH/RSRE dated 31 Jul 03, by B. Cornell Long, Chief, Health Risk Assessment Branch

<sup>6</sup> [Press Release](#) dated April 2010, 75<sup>th</sup> Air Base Wing, Hill AFB Utah, by Ms. Barbara Fisher, USAF Civilian



**Summary:** C-123Ks, first used in Vietnam for spraying Agent Orange, remained contaminated with toxins from Agent Orange throughout their service life while flown at various US bases between 1972-1982. The aircraft, after 1982 stored as surplus, were sealed and in a separate area with restricted access due to toxins. They were contaminated to the point of the Air Force and GSA taking special measures to reduce soil and ground water contamination, with the eventual decision to destroy them to eliminate the environmental hazard they represented.

A number of different organizations and professional testing firms prepared many reports, memos and conference calls were referenced in many of the reports, and no challenge has ever been suggested within the Air Force, EPA or GSA as to the numerous findings of the C-123Ks being “heavily contaminated”, “extremely hazardous” and “extremely dangerous.”

It follows that aircrews and maintenance personnel assigned to the various C-123K aircraft, particularly those aircraft identified as Operation Ranch Hand Agent Orange spray aircraft, have been exposed to the various toxins referred to in the studies. Between 1972-1982 dedicated volunteer aircrew members flew these contaminated aircraft, in many cases, for hundreds of hours each. They spent hundreds, often even thousands of hours on the ground as well, as they prepared for missions, repaired the aircraft, cleaned it, dropped paratroops and cargo, conducted ground training, supported air shows, flew aeromedical evacuation, ate their flight lunches, slept during crew rest hours, and in many, many cases, even slept in the aircraft overnight during tactical operations.

Veterans of the 74<sup>th</sup> Aeromedical Evacuation Squadron (now the 439<sup>th</sup> Aeromedical Evacuation Squadron), acting as retirees still subject to UCMJ and maintaining that they have unique military expertise in this particular aircraft, and of its history and employment during 1972-1982, and veterans of the 731<sup>st</sup> Tactical Airlift Squadron, acting as retirees still subject to UCMJ and maintaining that they have unique military expertise<sup>7</sup> in this particular aircraft, and of its history and employment during 1972-1982, conclude:

1. Aircrews have been exposed over a period of many years to Agent Orange and other hazardous toxins in the performance of aeronautical duties aboard the contaminated C-123K/UC-123K Provider<sup>8</sup>, an aircraft described by health authorities at Davis-Monthan and other facilities in their reports as “extremely hazardous and/or dangerous” and “heavily contaminated.”
2. None of the military or GSA reports about the contamination mention concerns about the aircrews and maintenance personnel who’d been exposed in the years before those reports, conference calls and scientific studies were prepared. The

---

<sup>7</sup> Writers of this report include in their C-123K expertise the certifications as aircraft commander, flight instructor, and stan/eval flight examiner. LtCol. Harris flew F4 aircraft over Vietnam before flying the C-123K, and is retired from the FAA. The writers are considered among the most experienced and qualified personnel in the USAF concerning the C-123K. All are Vietnam-era veterans and Major Carter and LtCol Bailey served during the Persian Gulf War and LtCol Bailey also was part of the 1966 occupation of the Dominican Republic and Operations Iraqi/Enduring Freedom. Both have earlier active duty enlisted service in the USAF and US Army.

<sup>8</sup> Flight records, flight orders, several completed VA Form 21-4138

Internet provides hundreds of juried articles and professional reports on similar contaminated workplaces or vehicles, and such articles typically deal not only with the hazard and its management, but also with the exposure (if any) of affected personnel. Yet, even the [Ranch Hand Summary delivered by an Air Force colonel, physician and flight surgeon](#)<sup>9</sup> failed to mention Air Force crews who flew the Provider post-Vietnam. Thus, seven questions, obvious to experienced aircrew members and health professionals now considering the situation, arise about the Air Force studies of the C-123K and Agent Orange toxins:

- A. Did the writers not believe aircrews had been exposed even through the crews had hundreds of hours aloft and in some cases many hundreds of hours more on the ground inside the “heavily contaminated” and “extremely hazardous” aircraft over a period of many years, experiencing intense physical contact with the airplanes? Did the writers and their organizations not consider that aircrews assigned to the contaminated C-123K/UC-123K had suffered exposure to toxins?
- B. Did the writers elect to avoid addressing the impact on assigned aircrews and for some reason, decide not to inform those aircrews of the harmful exposures? Was this in any way helpful to the aircrew’s health?
- C. Did the writers, although experienced members of the United States Air Force, not realize that aircrews had been flying the C-123K/UC-123K aircraft between the last time the airplanes were used for spraying Agent Orange in Vietnam and the time that the reports about the contamination were written? Did the writers’ breadth of professional knowledge not extend to understanding the aircraft they were examining and the use to which the Air Force had put it for those intervening years? Did they not note the airframe hours reported at the end of the Vietnam War and compare with the hours on each airframe when it went into storage, and realize that the hours added on since Vietnam would represent continued exposure for the aircrews?
- D. Did leaders throughout the Air Force not notice the absence of attention to aircrew exposure once these reports were circulated about toxic aircraft? Several different commands, several different bases, several different professional corps (line, BSC, MSC, MC), but no leader considered protection of the Air Force’s most important asset...Air Force people who had been exposed to toxins. As mentioned above, Colonel Fox in her *Ranch Hand Report* doesn’t discuss aircrews, an oversight for an experienced flight surgeon.
- E. Did the various JAG memos and other documents that recommended the contamination issue remain “within official channels” and referenced “political implications” result in a determination not to alert exposed aircrews, or was the failure to notify the aircrews an oversight, or was there a determination at some point that the aircrews somehow, fortunately, had not been exposed to any toxins, poisons, residues of

---

<sup>9</sup> [Ranch Hand Advisory Committee Final Briefing](#), Colonel Karen Fox USAF MC, 7 Sept 2006

Agent Orange while spending ten years flying their assigned “extremely hazardous/dangerous” aircraft?

- F. Was there a determination that the normal aircrew uniform of Nomex flight suit and boots typically worn by aircrews from 1970 to the present day protected the aircrews as well as the recommended Tyvek coveralls and respirators recommended for personnel working in or around the aircraft once toxins had been detected on them?
  - G. Air Force reports of the C-123K/UC-123K contamination recommended limiting exposure of workers inside the stored aircraft, followed by decontamination. Would aircrews flying the aircraft for hundreds of hours aloft, and working in them for thousands of hours on the ground in preparation for flight (repairs, training, orientation, configuration, loading/unloading, even sleeping aboard overnight during tactical deployments) have benefited from limited exposure guidelines, followed by decontamination? As they had not been advised about limiting their exposure, wearing protective clothing, and decontamination after exiting the aircraft, would their health have been served if they’d been notified of exposure to the established presence of dioxin and other toxins?
3. Many members of the 74<sup>th</sup> and the 731<sup>st</sup> now have a variety of Agent Orange related medical conditions, including a disproportionate number of diabetes, prostate cancers, heart disease, acute peripheral neuropathy (for which some had surgery during the years of service aboard the C-123K), and other ailments.<sup>10</sup> Deaths (from AO-presumptive conditions) are excessive for this population. Children of some female crewmembers have leukemia. We observed that there was a cluster of breast cancer cases among women nurses and medical technicians who flew the C-123K. Attempts are being made to contact aircrews from other bases which flew the C-123K during that time period and presumably also were exposed.

**Conclusion:** Numerous authoritative Air Force studies clearly detail the contamination throughout the C-123K/UC-123K fleet prior to its decontamination via destruction in April 2010. It is readily apparent that crews assigned those aircraft between 1972-1982 were intensely exposed to the Agent Orange toxins identified in those studies. While leaders did not understand the health impact of dioxin at the time, after the fleet’s retirement and by 1993 the toxicity of the aircraft was clearly established. Yet, it is apparent that no effort was made to address the medical impact upon Air Force crews who were left unaware of the toxins they’d been exposed to in the performance of their already-hazardous aircrew and maintenance duties. Especially considering that reports were being generated between at least 1993-2000, with years spent addressing the contaminated C-123K/UC-123K fleet but with no notice taken of the health of Air Force personnel involved with the aircraft, this constitutes a serious failure of the General Services

---

<sup>10</sup> [Memorandum](#), American Cancer Society, last revision May 2010

Administration, of the Air Force Medical Service and of senior line officers. Memoranda recommending restricting information about the contamination suggests questionable ethics of the [JAG officers involved](#). The lack of concern shown by the [general officers approving the reports](#) resulted in a negative impact on the health of the affected aircrews and their families.

## SUPPORT DOCUMENTS:

[Agent Orange and Cancer](#), American Cancer Society, last update May 2010

*VA Form 21-4138*, Statement in Support of Claim, several from former crewmembers

[Memorandum](#) for 645 MedGrp/SGB, dated 19 Dec 94

[Memorandum](#) for OO-ALC/LCD, Attn Mr Pitcher, dated 31 July 03

[Summary](#), C-123K Fleet, tail numbers, partial histories

[Finding 14165](#), GSA Board of Contract Appeals, dated 22 Sep 00 (cover page only)

[Fairchild C-123K Provider Fact Sheet](#), National Museum of the US Air Force, posted 11 Feb 2011

[Flight Records](#), Wesley T. Carter, Paul Bailey, John Harris and other veterans

[DD-1610](#) Request for and Authorization for TDY Travel of DOD Personnel, numerous individuals identified as crew aboard various C-123K including Tail # 362

[C-123K: Agent Orange Crew Exposure 1973-1991](#), web site printout

*AF IMT102 Inspector General Complaint*, Wesley T. Carter, complainant, filed 4 May 2011

[Ranch Hand Advisory Committee Final Report](#), COL (Dr) Karen Fox MC USAF, 7 Sept 2006

[Memorandum from Major Ursula Moul AF JAG](#), endores by Col J. Abbott, USAF JAG, 30 Oct 96

[Press Release](#), Hill AFB, Utah, describing the destruction of remaining C-123K/UC-123K aircraft at Davis-Monthan AFB, AZ, Apr 10

[GSA General Counsel](#), summary to court, acting on behalf of GSA and USAF, 20 April 2000

Memo, for LGR, protective gear required by base health officials, establishing aircraft as “extremely hazardous/dangerous” 7 Apr 96

Letter, Oregon Health Sciences University (Dr. F. Burman DVD PhD), 25 May 2011

May 25, 2011

To: The Secretary of the Air Force *and*  
Veterans of the C-123K Provider who Served Between  
1972-1982



This letter is in regard to aircrews and maintenance personnel who, between 1972 and 1982, were assigned to C-123K Provider aircraft formerly operated in Viet Nam as Operation Ranch Hand Agent Orange spray aircraft. These aircraft were considered to be “heavily contaminated” with dioxins based on testing that was performed on C-123K Providers in 1983, 1994 and 2000. One of these planes, nicknamed “Patches”, with tail number 362, has been partially restored and displayed in the air museum at Wright Patterson AFB, OH. Prior to its restoration, an environmental assessment was conducted on Patches in 1994 and dioxins were detected at an average interior surface concentration of 617 nanograms dioxin per square meter (ng/m<sup>2</sup>) (range of between 1400 ng/m<sup>2</sup> and 200 ng/m<sup>2</sup>) and exterior surface contamination of 2.2 ng/m<sup>2</sup> (range 4.1-0.3). Several congeners of dioxin were detected, each with varying degrees of toxicity; their levels were converted and reported as 2,3,7,8-TCDD equivalents, since 2,3,7,8-TCDD is the most toxic congener (see appendix 1).

I was contacted by former C-123K crew member Wesley T. Carter, Major USAF Retired, to answer the question: was he, as well as other Air Force personnel who flew, trained in and maintained C-123K aircraft, exposed to significant, excessive levels of dioxins during their assignments between 1972-1982? A direct and brief conclusion: Most likely.

To further answer this question, it can be assumed that the analytical results on samples taken from Patches are representative of all contaminated aircraft that were flown. It must be noted, however, that testing on Patches occurred more than ten years after decommissioning and more than 20 years after use in Operation Ranch Hand; therefore, surface dioxin contamination was likely higher during 1972-1982, where use and maintenance activities would have reduced surface contaminant levels over this period. Moreover, it must also be assumed that cabin air contamination, and thus inhalation exposure, would have been an additional significant source of dioxin exposure, although no analysis for air contamination was performed. It is notable in this regard, that John O. Harris, Lt. Colonel, USAFR Ret., stated, “Patches would smell of dioxin (Agent Orange) so badly that during the hot summer months we would have to fly with the cockpit windows open. During the winter months, when we turned on the heaters to warm the aircraft, the smell would be so bad we would have to fly with no heat” (see appendix 2). Without quantitative data on air dioxin levels, I will limit my

analysis to exposure from surface contamination, but will consider inhalation exposure from air contamination in my opinion, since this route of exposure would likely have been comparable, if not at least equally so, to dermal exposure from surface dioxin contamination.

In a memorandum regarding recommendations for protection of aircraft restoration personnel restoring Patches, dated 19 Dec, 1994, written by Air Force Staff Toxicologists Wade H. Weisman, Capt., USAF, BSC and Ronald C. Porter, GS-11, dioxin exposure guidelines were adopted based on guidelines developed by the state of New York in response to the infamous Binghamton State Office Building fire (see appendix 3). Re-entry concentrations, expressed as ng/m<sup>2</sup> of surface area or ng/m<sup>3</sup> air, are based on the EPA risk assessment paradigm from toxicity studies completed by the National Toxicology Program and validated by the Subcommittee on Dioxin, Committee on Toxicology in their 1988 report "Acceptable Levels of Dioxin Contamination in an Office Building Following a Transformer Fire" (1). The values for re-entry are 25 ng/m<sup>2</sup> and 10 ng/m<sup>3</sup> on surfaces and in air, respectively. At these levels of contamination, it is calculated that a 50 kg office worker working 250 days per year for 30 years would ingest 2 picograms per kilogram (pg/kg) dioxin per day for a cumulative lifetime ingestion of 750 ng. It is important to note that the air and surface contamination re-entry values are exclusive; exposure is to either air exclusively or surface contact. If both air contamination and surface contamination exist, then the safe re-entry level for each must be reduced (e.g. if air contamination is 5 ng/m<sup>3</sup>, then surface contamination can be no higher than 12.5 ng/m<sup>2</sup> in order to satisfy re-entry guidelines).

Using the guidelines cited above, it is calculated that surface contaminant levels inside the aircraft were approximately 25 times greater than exposure guidelines established by the state of New York. Therefore, the daily dioxin intake via dermal exposure would be calculated to be approximately 50 pg/kg body weight (0.05 ng/kg bw). At this level of exposure, it would take a 70 kg person 214 days to reach the lifetime ingestion limit of 750 ng dioxin. This calculation is conservative, inasmuch as the formula used by the state of New York to calculate the 2 pg/kg daily "safe" intake uses exposure parameters that would be typical of office workers in the office setting, whereas flight crews would be expected to have more intimate and varied contact with contaminated surfaces while conducting flight, maintenance and training activities. Moreover, inhalation must be considered an important exposure pathway. In contrast to the climate-controlled environment of an office building, aircraft are exposed to a variety of environmental extremes, such as heat, that would increase air dioxin concentrations. Without air contaminant data, no quantitative method exists to estimate the degree to which C-123K personnel were exposed via inhalation to dioxins. However, if one assumes that inhalation represents an exposure pathway



at least equal to that of the dermal pathway, then it would only take approximately 100 working days (800 work hours) to reach or exceed the recommended lifetime exposure limit of 750 ng.

C-123K crew members served for as many as ten years on this assignment. It would be impossible to quantify exactly how many hours each crew member spent within and around their aircraft. Total flight hours on contaminated aircraft can not account for the ground time spent on maintenance, training, sitting or sleeping on these planes. However, it is clear that thousands of hours of contact with contaminated aircraft are probable over a ten year period, particularly among the most experienced flight crew. Given the extent of dioxin contamination that was found, and based on the analysis above, it is my opinion that the personnel assigned to the C-123K Provider, particularly the most experienced crew, were more likely to as not to have been exposed to excessive levels of dioxins.

Fred Berman DVM, PhD  
Director, CROET Toxicology Information Center  
Center for Research on Occupational and Environmental Toxicology  
Oregon Health and Science University  
3181 SW Sam Jackson Park Rd., L606  
Portland, OR 97239-3098

Reference:

1. Doull, John, et al. 1988. Acceptable Levels of Dioxin Contamination in an Office Building Following a Transformer Fire. National Academy Press, Washington, D.C., 24pp.

# montgomeryadvertiser.com

## III reservists blame post-war 'spray bird' missions

12:00 AM, May. 29, 2011

In a complaint to the Air Force inspector general, a retired officer alleges health officials have known since at least 1994 of Agent Orange contamination aboard C-123 aircraft flown by reserve squadrons for a decade after the Vietnam War, and failed to warn personnel of the health risks.

After the Air Force stopped using UC-123K Provider aircraft to spray herbicide on the jungles of Vietnam, some of those aircraft, their spray tanks removed, were reasigned in 1972 to new missions at three stateside bases.

For the next decade Air Force reservists flew and maintained them. Last month one of the post-war crewmen, disabled retiree Maj. Wesley T. Carter, 64, of McMinnville, Ore., had a heart attack requiring surgery, and also learned that he has prostate cancer.

A medical service officer, Carter said he thought about the many hours he had served aboard foul-smelling C-123 "spray birds" after the war, flying out of Westover Air Force Base, Mass. So in recent weeks he conducted online searches, looking for any report of lingering Agent Orange contamination on these planes assigned

Reserve missions until 1982.

What Carter found alarmed him, enough he told me, that he began to contact crewmen from his squadron. The first five he reached had prostate cancer, Carter said. He heard of others who had died, most of them from more diseases that Department of Veterans Affairs presumes, at least for veterans of Vietnam, were caused by Agent Orange exposure.

Carter started a blog, [www.c123kcancer.blogspot.com](http://www.c123kcancer.blogspot.com), with links to reports and memos referencing dioxin contamination aboard C-123s flown by reservists after the war from Westover, Pittsburgh (Pa.) Air Reserve Base and Rickenbacker Air Force Base in Ohio.

One of the first disturbing documents found, Carter said, deals with a famous C-123, nicknamed "Patches" during the war because it was hit so often by enemy fire during spraying runs. Patches was one of three C-123s, among 16 aircraft of the 731st Tactical Airlift Squadron, known to

Advertisement

Print Powered By  FormatDynamics™

# montgomeryadvertiser.com

crewmembers as having sprayed herbicide during the war.

Carter found a report from 1994 showing that before Patches was put on display at the National Museum of the U.S. Air Force at Wright-Patterson Air Force Base, an analysis for toxins found that it was "heavily contaminated with PCDD," or polychlorinated dibenzodioxin, a human carcinogen.

So work crews that prepared Patches for display had to wear hazardous material suits and respirators, and the public would not be allowed to touch it. Yet Carter and crewmates had flown it often. He remembered its strong smell, like the inside of one Halloween mask he had worn as a kid.

By filing an IG complaint, Carter wants the Air Force to explain why, after learning C-123s flown by reservists were toxic, the service did not warn former crewmembers of their exposure and possible health risks.

Retired Air Force Reserve Lt. Col. John O. Harris of Mashpee, Mass., flew 2,700 hours as a C-123 command pilot for the 731st, from 1973 to 1981. Almost 400 of those hours were in Patches or in one of the other squadron aircraft that had sprayed in Vietnam. Harris, 67, has diabetes and peripheral neuropathy, both conditions on VA's list of 14 AO presumptive diseases.

"We knew it was there," Harris said of residual herbicide on some C-123 aircraft. "You could smell it on a hot day, or a cold day when the heaters were running.

You could smell it so bad you couldn't stand it."

Harris said he often flew with cockpit windows open. He compares the smell to wasp or roach spray. Vietnam vets in the squadron identified it as Agent Orange, Harris said. But no one back then understood the dangers of compounds used in the war to defoliate jungles and kill crops.

Neither Harris nor Carter served on the ground in Vietnam. Both men now believe reservists who flew or maintained these aircraft should be treated like Vietnam veterans with regard to Agent Orange-related presumptive diseases when filing VA compensation claims or seeking survivor benefits.

Several years ago Harris did file a claim for his diabetes, citing post-war exposure to Agent Orange on his missions with the 731st. He provided flight logs listing hours aboard "spray bird" aircraft. Both his claim and his appeal were denied, Harris said,

# montgomeryadvertiser.com

because he had not served in Vietnam.

Harris later remembered that, while flying F-4 Phantoms out of Thailand during the war, he had a two-hour refueling stop at Da Nang. He even recalled the guy he chatted with at the airfield that day. After finding him and supplying VA with his statement, Harris qualified for disability pay.

"Two hours on the ground with no Agent Orange in sight trumped 11 years and 400 hours of definitive exposure flying spray UC-123s," he said. Harris figures he caught a break and others haven't. So he has joined Carter's quest to find more colleagues and notifying of them of toxin exposure. They want to help those with AO-related ailments get VA care and compensation, and for spouses of colleagues who have died from these conditions get VA Dependency and Indemnity Compensation.

Besides the memo showing Patches was toxic, Carter learned the government in 1996 stopped a contract to sell some of these C-123s because of contamination. Another report indicates Air Force struggled over how to dispose of these aircraft, worried that even burying them could contaminate the ground. Some officials told Carter that last year the service tore apart and melted down remaining C-123 aircraft.

Asked to comment on this, on Carter's complaint and his blog, an Air Force spokesman, Jonathan Stock, said the service "is going to look into these claims" but

can't make any immediate comment. Also, VA Press Secretary Josh Taylor said VA will "carefully review this matter."

Marshall Hanson with Reserve Officers Association added, "This cadre of Agent Orange casualties needs to be recognized for the contamination risks they have been exposed to, similar to crews that initially flew the same C-123 aircraft. Agent Orange presumption needs to be re-examined to include all those who were exposed outside the Vietnam territories, both in the Air Force and the Navy."

*To comment, or write to Military Update, P.O. Box 231111, Centreville, Va., 20120-1111*



HEADQUARTERS  
AIR FORCE MATERIEL COMMAND

Office of The Staff Judge Advocate

Wright-Patterson Air Force Base, Ohio 45433-5001



Date: 30 Dec 96

Memorandum For: *BGEN Haines*  
*AFMCLG*

- *Sir, Concur with Gen Stewart*

- *The political risks, cost of litigation  
and potential tort liability to third  
parties make FMS disposition of contaminated  
aircraft imprudent*

*V/R*

OLAN G. WALDROP, JR.  
Brigadier General, USAF  
Staff Judge Advocate

MEMORANDUM FOR ESOH C&C IPT MEMBERS

30 Oct 96

SUBJECT: Alleged Dioxin Contamination in C-123 Aircraft

FROM: HQ AFMC LO/JAV

1. I will be unable to attend tomorrow's regular IPT meeting, at which the above subject will undoubtedly be discussed. I have a few concerns that I hope will be addressed.

2. First, the SSS for two-letter coordination bears a copy of my coordination on its reverse side and yet is not the same document that I reviewed. I realize that various organizations will have corrections and changes, but when a substantive matter changes, a prior coordination should not be copied without first notifying the parties. In particular, I am concerned with para. 2(a) of the revised SSS and para. 2 of the 30 Oct 96 memo from LG EV which now state a concern about whether we have notified the purported purchasers of these aircraft of possible contamination. I do not believe we should alert anyone outside of official channels of this potential problem until we fully determine its extent. Please pass this along to LG, who can pass this along to the GSA.

2. I want to reiterate JA's position that these aircraft should not be sold to the public if there is any dioxin contamination at an unsafe level, whatever that may be. Our potential liability is just too great, particularly when so few facts are known.

3. Please call me at 7-7088 if you require additional information.

*Ursula P. Moul*

URSULA P. MOUL, Major, USAF  
Assistant Staff Judge Advocate  
Directorate of Environmental Law

*Concur.*

*John M. Abbott, Col, USAF  
Director of Environmental Law*



AUTHORITY: 10 U.S.C. 8013, 44 U.S.C. 3101 and EO 9397

PRINCIPAL PURPOSE(S) To register a personal complaint relating to individual injustices or suspected Fraud, Waste and Abuse.

ROUTINE USE(S): Data provided are furnished to supervisors, commanders or inspectors in response to queries for resolution of complaints and to eliminate conditions considered detrimental to the efficiency or reputation of the Air Force.

DISCLOSURE: Disclosure of your SSN is voluntary. Failure to provide the information will not adversely affect the resolution of your complaint but may delay the investigating officer in resolving the issue.

**SECTION I - TO BE COMPLETED BY COMPLAINANT**

NAME (Last, First, Middle Initial) [REDACTED]		YES NO	NA
GRADE Major, USAF Ret	RACECauc	<input checked="" type="checkbox"/>	HAVE YOU ASKED YOUR IMMEDIATE COMMANDER FOR ASSISTANCE WITH THIS PROBLEM?
SOCIAL SECURITY NO. [REDACTED]		NAMES AND/OR POSITIONS OF WITNESSES (Or others having knowledge of your allegations.)	
ADDRESS (Where response to this complaint will be sent.) [REDACTED]		LtCol Robert Karpinski, USAFR Ret MSGT George Gadbois, USAF Ret LtCol Paul Bailey, USAFR Ret LtCol Edward Kosakoski, USAFR Ret MSGT Richard Ricci, USAFR Ret Brig Gen Mike Walker, USAFR Ret G.Cornell Long, (then) Chief Health Risk Assessment AFMC LtGen John Hudson, USAF Ret, Director AF Museum MSGT Vincent McCrave, USAFR Ret CMSGT Charles Fusco, USAFR Ret Maj Alan Harrington, USAFR Ret LtCol David Zamorski, USAFR Ret Mr John Rowan, President, Vietnam Veterans of America Hon. Linda Schwartz, Commissioner for Veterans Services, State of Connecticut and President, National Association of State Directors of Veterans Affairs ..and others.	
HOME TELEPHONE NO. [REDACTED]	WORK TELEPHONE NO. (DSN) NA		
DESCRIPTION OF ALLEGATIONS (Please number each allegation and include who, what, where, when, and how. Continue on reverse.) <b>BACKGROUND AND ATTACHMENTS</b> I flew the C-123k Provider as an aeromedical evacuation technician between 1973 and 1980 while assigned to the 74AES, Westover ARB, MA (attached #1 flying hour summary). Last month I learned I have prostate cancer, and believe it to be related to the UC-123K configuration the squadron's fleet flew as in Vietnam, spraying Agent Purple and Agent Orange. Later, I qualified as a Flight Instructor and Flight Examiner. Looking for more information the Internet. I have located the AF Museum's bio of their C-123k "Patches" (attached #2) which, among other Providers, I flew for many hours. The aircraft is identified as an Operation Ranch Hand aircraft. In 1994 the Museum sought a review of dioxin swipe results by the 645Med Group. That organization arranged a consultative report from the Armstrong Laboratory of the Air Force Medical Service (attached #3) which reported that Patches was "heavily contaminated", and workers in or around it should wear protective Tyvak coveralls, HVAC masks, limit their exposure time, and decontaminate afterwards. Most of the C-123k surplus fleet is stored at Davis-Monthan AFB, AZ. All are sealed, and in a separate, restricted area. In 1996 the GSA sought to sell some of them (attached #4) but was blocked by the Air Force (described in Attached #4 as Exhibit 43-44, not available to me) because of proven dioxin contamination of the fleet. In 2003 the Air Force Institute for Occupational Health provided a consultative letter to OO-ALC/LCD regarding the Davis-Monthan C123k aircraft and various museums (5)			

I fully understand that I am accountable for knowingly making untruthful, malicious, libelous or slanderous statements.

SIGNATURE OF COMPLAINANT [REDACTED]	DATE 4 May 2011
-------------------------------------	--------------------

**SECTION II - TO BE COMPLETED BY INSPECTOR GENERAL STAFF**

FILE REFERENCE NUMBER	INITIALS	OFFICE SYMBOL	TELEPHONE NO. (DSN)
DATE OPENED	DATE FINALIZED	TOTAL PROCESSING DAYS	NUMBER OF TIMES THIS INDIVIDUAL'S COMPLAINT HAS BEEN ADDRESSED?
<b>COMPLAINANT STATUS</b>			<b>SPECIAL INTEREST COMPLAINTS</b>
<input type="checkbox"/> A. ACTIVE DUT	<input type="checkbox"/> F. AIR FORCE CIVILIA	<input type="checkbox"/> REPRISAL <input type="checkbox"/> SENIOR OFFICIAL <input type="checkbox"/> EOT <input type="checkbox"/> COLONEL <input type="checkbox"/> MENTAL HEALTH <input type="checkbox"/> FW	
<input type="checkbox"/> B. AIR FORCE RESERVE	<input type="checkbox"/> G. DEPENDENT/RELATIVE	<b>GRIEVANCE CHANNE</b>	
<input type="checkbox"/> C. AIR NATIONAL GUARD	<input type="checkbox"/> H. CIVILIA	<input type="checkbox"/> IG	<input type="checkbox"/> CONGRESSIONAL <input type="checkbox"/> HIGH LEVEL <input type="checkbox"/> DOD HOTLINE <input type="checkbox"/> AF HOTLINE
<input type="checkbox"/> D. CADET	<input type="checkbox"/> I. OTHER SERVICE	<b>FIVE MOST SIGNIFICANT ALLEGATIONS</b>	
<input type="checkbox"/> E. RETIRED MILITARY	<input type="checkbox"/> J. ANONYMOU	COMPLAINT CATEGORY	FINDING CODES    FINDING
PASCODE OF COMPLAINANT		PASCODE OF SUBJECT	
		S = SUBSTANTIATED	
		U = UNSUBSTANTIATED	
		I = INCONCLUSIVE	
<b>WORK DONE</b>			
AF LEVEL COMPLAINT RECEIVED	LOCAL IG	INTR HQ/IG	MAJCOM/I    SAF/I
AF LEVEL COMPLAINT ANSWERED	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CORRECTIVE ACTION TAKEN			
		CAT1 INVEST	ASSIST    REF OUT
		CAT2 INVEST	DIR RESP.    OTHER



and concluded that the aircraft were contaminated by dioxins and, in general, too contaminated even for burial unless de-contaminated first.

It should be clear to any aviator or other person familiar with military operations that as Air Force crews we spent many more hours aboard the C-123k than just the flying records would report. Personnel conducted initial ground orientation, static missions, aircraft repairs, configuration drills, taxi tests, all manner of activities requiring hundreds or thousands of hours of exposure to toxins inside the aircraft beyond just the hours aloft. Further, our use of the aircraft in a tactical situation often meant eating and even sleeping nights aboard the airplane. In all these activities, we wore normal Nomex flight gear except when conducting aircrew chemical task qualification, wearing chemical protective gear we really should have been wearing for dioxin protection!

**Allegations:**

1. Air Force agencies knew about the dioxin contamination of the C-123 fleet through a variety of studies and reports, exchanged between DoD agencies as well as the GSA from as early (and perhaps earlier) as 1993, yet failed to inform former crewmembers of the possibility of prior hazardous material exposure. The focus in those reports was solely the degree of aircraft contamination, the cost of possible cleanup, whether the display aircraft should be sealed, but absolutely no mention made of the most exposed group of potential victims (other than Vietnam veterans and Ranch Handers). When the first of these reports was prepared (1993), many of us were still on active duty or in active reserve status, and easily identified. Not a single word in any of these attachments mentions any concern at all about the health of the Air Force personnel already exposed through their duties aboard the C-123k Provider weapon system.
2. Air Force agencies considered "Patches" and other mothballed or museum Providers too contaminated to allow workers in or around them unless wearing protective clothing and respirators, yet failed to inform former crewmembers of the risks to our health from years of earlier duties aboard the aircraft.
3. Air Force leadership among those agencies failed to properly protect, via notification to former crewmembers and maintainers, affected Air Force personnel, most of whom are now retired or no longer in the military and whom it may prove difficult to locate.
4. The GSA was concerned solely with the resale of the aircraft and legal issues prohibiting the sale due to dioxin contamination, and that major agency failed to in any way take steps to then inform or protect former aircrews and maintainers.
5. This situation reflects a breakdown of scientific integrity, effective force management and sound medical practice to have the Air Force Medical Service and other DoD and Federal agencies aware of dioxin exposure hazards, yet fail to make any effort to alert, inform, examine, treat or in any way care for their primary group of affected personnel, the post-Vietnam aircrews and maintainers, and to be instead focused solely on cleanup issues and costs.

**Summary:** this is akin to having a variety of agencies discuss the unique environmental hazards of a chemical fire, yet failing to inform firefighters that that structure is uniquely dangerous. Firefighters already know fire is dangerous, of course, and can further take skilful protective measures in the presence of dangerous chemicals. However, C-123 crews and maintainers never knew about the dioxin and other toxin exposures we were subjected to in our duties. Leadership failed us during the period between 1973-1980, and particularly failed us as more and more reports were prepared without addressing any affected personnel.

Attach 2



Home > Fact Sheets > Fairchild C-123K Provider

## Fairchild C-123K Provider

Posted 2/15/2011 [Printable Fact Sheet](#)

The Provider was a short-range assault transport used for airlifting troops and cargo to and from small, unprepared airstrips. The rugged C-123 became an essential part of U.S. Air Force airlift during the Southeast Asia War, where it flew primarily as an in-theater airlifter and a Ranch Hand sprayer.

### Development

Designed by the Chase Aircraft Co. just after World War II, the C-123 evolved from earlier large assault glider designs. The prototype XC-123, basically a glider powered by two piston engines, made its initial flight in 1949. A second prototype was built as the unpowered XG-20 glider. Chase began manufacturing the C-123B in 1953, but the contract was transferred to Fairchild, which built about 300 C-123Bs.

Between 1966 and 1969, 184 C-123Bs were converted to C-123Ks with the addition of two J85 jet engines. These jet engines increased the C-123's payload weight by a third, shortened its takeoff distance, improved its climb rate, and gave a much greater margin of safety should one of the piston engines fail.

### Service

Providers entered service with the USAF's 309th Troop Carrier Group (Assault) in 1955, and this unit conducted several practice combat landings with U.S. Army troops. Other C-123Bs and C-123Js supplied USAF sites in arctic regions from the late 1950s into the mid-1970s.

The C-123's most important service, however, was during the Southeast Asia War. In January 1962, the first of many Providers were sent to South Vietnam to start the Ranch Hand defoliant program. Shortly after, a squadron of standard C-123Bs arrived to provide mobility to the South Vietnamese Army. By the fall of 1964, there were four USAF C-123B squadrons in Vietnam flying airlift and airdrop missions.

Providers constantly flew troops and supplies to small, dirt airstrips at isolated bases in South Vietnam. Their relatively large cargo hold and excellent short field performance made them essential to holding these widely-scattered bases. The CIA's Air America also operated about 35 C-123s in Laos.

C-123s sometimes flew other types of missions. Standard Providers flew night flare dropping missions to expose enemy attacks. Specially-modified C-123s flew night operations with floodlights, radar, and night-vision equipment.

As the war in Southeast Asia wound down, the U.S. transferred some of its Providers to the South Vietnamese Air Force and the Royal Thai Air Force. The remaining USAF C-123s were transferred to the Air Force Reserve, which flew them into the mid-1980s. Other operators of the Provider included the U.S. Coast Guard, the Philippines, South Korea and Venezuela.

### The Museum's Aircraft: Patches

The C-123K on display saw extensive service during the Southeast Asia War as a sprayer, and Ranch Hand personnel developed a strong symbolic attachment to this aircraft. The aircraft took almost 600 hits in combat, and it was named Patches for the damage repairs that covered it. Moreover, seven of its crew received the Purple Heart for wounds received in battle.

Patches was accepted by the USAF in 1957 as a C-123B, and it went to Vietnam in 1961 to fly as a low-level defoliant sprayer. In 1965, it was redesignated to UC-123B. At about the same time, Patches became a dedicated insecticide sprayer to control malaria-carrying mosquitoes, and in 1968, Fairchild converted it to a UC-123K.

Patches came back to the U.S. in 1972, and served in the Air Force Reserve as a C-123K until it was retired to the museum in 1980.

### TECHNICAL NOTES (C-123K):

**Engines:** Two Pratt & Whitney R-2800s of 2,500 hp each and two General Electric J85s of 2,850 lbs. thrust each  
**Load:** 60 fully-equipped troops, 50 stretcher patients or 24,000 lbs. of cargo  
**Maximum speed:** 240 mph  
**Range:** 1,825 miles  
**Ceiling:** 28,000 ft.

[Click here to learn more about the Down in the Weeds: Ranch Hand exhibit.](#)

[Click here to return to the Southeast Asia War Gallery.](#)

### Photos



DAYTON, Ohio -- Fairchild C-123K Provider at the National Museum of the United States Air Force. (U.S. Air Force photo)

[Download HIRes](#)

### Related Links

- Listen to "Ranch Hand and the C-123" by Jeff Duford (00:46:59)

### Inside the Museum

[Search](#)

search fact sheets  [Find it!](#)  
[Advanced Search](#)  
[View All RSS](#)

[Tell Us What You Think](#)

[Website Survey](#)

[Categories](#)

[Museum Fact Sheets](#)  
[Museum Exhibits](#)  
[Online Historical References](#)

[Museum Foundation](#)

[Foundation Membership](#)  
[Museum Store](#)  
[IMAX Theatre](#)  
[Valkyrie Cafe](#)

[Related Links](#)

[U.S. Air Force](#)  
[Dept. of Defense](#)  
[Air Force Materiel Command](#)  
[Wright-Patterson AFB](#)  
[Air Force History](#)  
[National Aviation Heritage Area](#)  
[Race to Dayton's Amazing Aviation Places](#)  
[Aviation Museums](#)  
[Freedom of Information Act](#)  
[Accredited by AAM](#)

[Connect](#)



Attach 3



DEPARTMENT OF THE AIR FORCE  
ARMSTRONG LABORATORY (AFMC)  
2402 E. Drive  
BROOKS AFB, TEXAS 78235-5114

MEMORANDUM FOR 645 MedGrp/SGB

19 Dec 94

FROM: AL/OEMH

SUBJ: Consultative Letter AL/OE-CL-1994-0203, Review of Dioxin Sampling Results from C-123 Aircraft, Wright-Patterson AFB, OH and Recommendations for Protection of Aircraft Restoration Personnel.

1. 645 Med Group/SGB requested we review the dioxin swipe sampling results from a C-123 aircraft located in the museum annex at Wright Patterson AFB, OH. Restoration efforts are planned for the aircraft for eventual display at the museum. The complete restoration process could take 18 months to complete. Initial concern was raised by museum staff to 645 Med Group/SGB prior to restoration since the aircraft was reportedly used in defoliation efforts in Viet Nam and carried agent orange. Three swipe samples were collected from horizontal surfaces within the interior of the aircraft and one sample was collected on the underside of the port side wing. All four samples tested positive for dioxin congeners. The museum staff have secured the aircraft to prevent entry.
2. On 20 Nov 94, AL/OEMH personnel viewed the aircraft and were shown actual sample locations. At that time, museum staff reported that the tanks used for the actual spraying operation were also located on the installation along with the spraying booms. The museum also planned to restore the tank and booms and connect them back to the aircraft. The tank and control mechanism were found in a restoration staging area near the museum. Access to the tank is not limited. The tank is sealed with no indication about the contents. Swipe samples have yet to be collected from the tank.
3. The samples were analyzed by Pace Incorporated Environmental Laboratories for congeners of dioxin, the polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). Because 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) is the most toxic PCDD congener, the results from the swipe samples were used with the congener specific Toxicity Equivalence Factors (TEFs) to calculate the 2,3,7,8-TCDD toxicity equivalence (TEQ) for each swipe sample. The sample results, TEF, and TEQ for each sample are reported in Table 1. An independent review of the data by Dr John Stanley, Midwest Research Institute, verified the accuracy of the results and indicated that, based on the relative abundance of specific congeners, the source was likely from agent orange (Attch 3).
4. The state of New York (Department of Health) developed recommended re-entry exposure guidelines for PCDDs and PCDFs after the infamous Binghamton State Office Building fire

involving wide spread contamination of PCDDs and PCDFs through the ventilation system resultant from PCB transformer fires. The New York concentrations, expressed as nanograms per meter square of surface area, were developed using the EPA risk assessment paradigm based on results of toxicity studies completed by the National Toxicology Program (NTP). The method used by New York to develop their recommended concentrations and the values were validated by the Subcommittee on Dioxin, Committee on Toxicology (COT) in their 1988 report "Acceptable Levels of Dioxin Contamination in an Office Building Following a Transformer Fire". The value for re-entry is 25 ng/m<sup>2</sup> (for surface contamination), and was calculated based on exposure parameters of 2 pg/kg per day ingestion (surface ingestion and/or inhalation) by a 50 kg person working 250 days per year for 30 years. The accumulated lifetime ingestion would be 750 ng. In the COT report, it is recognized that the lifetime ingestion would not likely be reached with the requisite exposure parameters for office workers and, therefore, the 25 ng/m<sup>2</sup> level is considered conservative. The guideline was based on reproductive risks and carcinogenesis with cancer risks derived from the studies conducted and reported by Kociba et al. (1978) and the 1982 NTP bioassay data.

5. According to the COT report, humans can exhibit chloracne from short-term exposures to high concentrations of PCDDs. Other, less well established effects in humans include: altered heme synthesis, changes in liver function tests, peripheral neuropathy and changes in serum lipid concentrations. Cancer study results are inconsistent, with some showing an increase in soft tissue sarcoma and no increase in others. Additionally, studies of industrial workers who were exposed to higher concentration of PCDDs have not shown a consistent pattern of increased risk of cancer. None the less, the New York re-entry level of 25 ng/m<sup>2</sup> is correlated to a reported lifetime cancer risk estimate of  $9 \times 10^{-8}$  to  $2 \times 10^{-4}$ .

6. Interpretation of Sample Results: The results from the samples collected within the interior surfaces of the aircraft are likely to be representative of other locations of limited traffic near the agent orange spraying equipment. The swipes were collected from locations somewhat protective of routine crew movement and routine historical maintenance. Therefore, these samples are most likely not indicative of the surface contamination throughout the entire cargo area of the aircraft. Extensive sampling of the interior of the aircraft to fully characterize the extent of contamination would be prohibitively expensive. Based on the exposure parameters used by the state of New York, and using 18 months as the entire exposure period for aircraft restoration crew and a 70 kg man, exposed for 250 days per year for 1.5 years, the calculated daily intake concentration would be 29 pg/kg with a corresponding surface contamination level of almost 360 ng/m<sup>2</sup>. This would only be an acceptable level for a lifetime exposure if restoration personnel had no additional lifetime exposure. Additionally, the 25ng/m<sup>2</sup> exposure concentration was calculated based on an office worker's casual contact with contaminated surfaces. What this calculation does show is that the re-entry guideline of 25 ng/m<sup>2</sup> is based on very specific exposure parameters and measured concentrations, and a higher surface contamination could be acceptable.

7. Safety and Health Recommendations for Restoration Personnel: Due to the uncertainty in measured PCDD concentrations on the interior of the aircraft representing the average contaminant concentrations, the anticipated aggressive restoration techniques, the length of time restoration personnel will be involved in the project and the identified potential adverse human



health impacts, exposure to restoration personnel from contaminated dirt and paint should be maintained at the lowest possible exposure levels. This would include a combination of personal protective equipment, modified work practices, and containment of the contaminated dusts within the aircraft and appropriate decontamination. Because of the nature of contamination and the irregular nature of the contaminated surfaces, decontamination of the entire interior of the aircraft (either with or without additional sampling), is not recommended. Additional controls that should be implemented for the duration of the interior surface preparation of the aircraft are as follows:

a. Provide a containment for the aircraft to reduce the transport of dusts to the exterior. This would include thoroughly masking cracks and small holes, and sealing off other portions of the aircraft presumed to be free from contamination (i.e the cockpit). The containment should also include an area for decontamination of clothing and hands for the workers.

b. Restoration personnel actively involved with interior surface preparation should wear Tyvek coveralls and full-faced high efficiency particulate air filters (HEPA). In general, controls implemented during an asbestos removal project would be appropriate in this situation.

c. Air should be sampled for total dusts during surface preparation activities to document the levels of dust.

d. Collect at least one additional swipe sample in an area thought to be free from PCDD contamination (i.e the cockpit area).

e. Provide appropriate training as required for respirator use (and fit-testing if needed), decontamination of protective clothing and self after removal of protective clothing, and appropriate work practices to minimize dust. These work practices include:

1. Remove stored items from the interior bay of the aircraft and decontamination with either hexane soaked rags, or soap and water. The bags of material stored in the bay should be removed, and the plastic bags discarded. The aircraft canopy should be decontaminated with soap and (mimal) water. Any decontamination materials should be handled as dioxin contaminated wastes.

2. Minimal scraping of painted surfaces in preparation for painting. Mechanical sanding should be completely avoided, and hand sanding minimized. Surface areas covered with grease or oil should be decontaminated with hexane and cloths and treated as dioxin contaminated wastes.

3. Sealing of scraped surfaces with commercially available sealing mixture. Once the interior of the aircraft is painted, appropriate labeling should indicate that surfaces beneath the painted surfaces are dioxin contaminated.

f. Once the aircraft is restored, viewing by tourists should be limited to the exterior of the aircraft only. The interior of the aircraft should not be used to store any materials or spare parts.

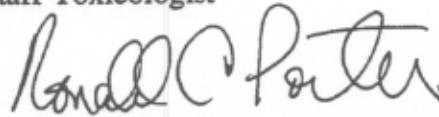
g. We recognize that our recommendations do not result in the complete decontamination of the aircraft. These recommendations are made to limit exposure to aircraft restoration personnel, limit the amount of dioxin contaminated wastes generated, and not require extensive, additional dioxin sampling. However, the interior of the aircraft must be conspicuously labeled so that personnel involved in any future restoration of the aircraft will be aware of the dioxin contamination under the painted surfaces.

8. Spray Solution Tank and Associated control equipment: Since the tank has not been sampled and the interior contents are unknown, the first step would be to collect surface swipe samples from the exterior of the tank and the distribution control equipment. The interior of the tank should be inspected, if there is no standing liquid, the tank should be assumed to be heavily contaminated and swipe sampling is not recommended. If there is free standing liquid in the tank, a sample should be collected for analysis, and if positive for PCDD, removal of the liquid would be necessary. Since the tank has been exposed to UV radiation from being stored outside, it is possible that any contamination on the exterior that was exposed to sunlight may have been adequately degraded. Therefore swipe samples should be collected from less accessible locations. The stainless steel webbing covering the flexible pipe and permeable surfaces could be assumed to be heavily contaminated. A representative swipe sample should be collected from these surfaces. These recommendations for the tank are based on the assumption that the tank will be included in the restored aircraft or will be turned into DRMO for excess. For either of these scenarios, it will be necessary to measure the extent of surface contamination.

9. Conclusions: The interior of the C-123 aircraft under discussion is heavily contaminated with PCDDs. The aircraft is scheduled for repair by museum personnel with eventual plans to put it on display. During restoration, museum personnel could be exposed to dioxin contaminated dusts. The cost of congener specific dioxin analysis and the slight increase in characterization of contamination in the aircraft, limits the additional samples that should be collected. Swipe samples should be collected from the exterior of the tank and spraying equipment. All work practices should be conducted to limit the generation of dust, following the recommendations discussed in this report.



WADE H. WEISMAN, Capt, USAF, BSC  
Staff Toxicologist



RONALD C. PORTER, GS-11  
Staff Toxicologist

Attachments

- 1. References
- 2. Table 1 - Sample Results
- 3. Letter, Midwest Research Institute

23  
51

## References

1. Kim, Nancy K., and Hawley, John, 1985. Re-Entry Guidelines, Binghamton State Office Building. Bureau of Toxic Substances Assessment. Division of Environmental Health Assessment, New York State Department of Health, 22 pp.
2. Doull, John, et al. 1988. Acceptable Levels of Dioxin Contamination in an Office Building Following a Transformer Fire. National Academy Press, Washington, D.C. 24 pp.
3. Kominsky, J.R., 1988. Health Hazard Evaluation Report No. HETA-86-092-1870, 50 Staniford Street Office Building, Boston, Massachusetts. 55pp.
4. Kociba, R.J., et al. 1978. Results of Two-year Chronic Toxicity and Oncogenicity Study of 2,3,7,8-tetrachlorodibenzo-p-dioxin in Rats. Toxicology and Applied Pharmacology, 46:279-303.



Table I

Dioxin Sampling Results C-123 Aircraft  
Wright Patterson, AFB, Converted to 2,3,7,8-TCDD Equivalents  
Reported in Nanograms per sample

Congener	TEF	IK1355-1 Interior(midship)		IK1355-2 Interior(tail)		IK1355-3 Interior(tail)		IK1355-4 Exterior(wing)		IK1355-5 Exterior(wing)	
		Reported	Equivalent	Reported	Equivalent	Reported	Equivalent	Reported	Equivalent	Reported	Equivalent
2378 TCDD	1	14.22098	14.22098	2.06846	2.06846	2.40728	2.40728	0.04015	0.04015	0.00255	0.00255
12378 PeCDD	0.5	0.32149	0.16075	0.12507	0.06254	0.12687	0.06344	nd	nd	0.001	0.0005
123478 HxCDD	0.1	0.16579	0.01658	0.0482	0.00482	0.04856	0.00486	0.00072	0.000072	nd	nd
123678 HxCDD	0.1	0.13799	0.01380	0.04	0.00400	0.03734	0.00373	nd	nd	nd	nd
123789 HxCDD	0.1	0.09205	0.00921	0.02299	0.00230	0.0167	0.00167	nd	nd	nd	nd
1234678 HpCDD	0.01	0.58138	0.00581	0.12867	0.00129	0.08619	0.00086	nd	nd	nd	nd
OCDD	0.001	1.5384	0.00154	0.60159	0.00060	0.31904	0.00032	0.03717	3.72E-05	0.00697	6.97E-06
2378 TCDF	0.1	0.09596	0.00960	0.02567	0.00257	0.02618	0.00262	nd	nd	0.00061	0.000061
12378 PeCDF	0.05	0.01578	0.00079	nd	nd	0.0045	0.00023	nd	nd	nd	nd
23478 PeCDF	0.5	0.01995	0.00998	0.00542	0.00271	0.00682	0.00341	nd	nd	nd	nd
123478 HxCDF	0.1	0.04878	0.00488	0.01603	0.00160	0.01472	0.00147	0.0034	0.00034	nd	nd
123678 HxCDF	0.1	nd	nd	0.00513	0.00051	0.0049	0.00049	0.0024	0.00024	0.00021	0.000021
123789 HxCDF	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
234678 HxCDF	0.1	0.02658	0.00266	0.00512	0.00051	0.00615	0.00062	0.00261	0.000261	nd	nd
1234678 HpCDF	0.01	0.11585	0.00116	0.0448	0.00045	0.03968	0.00040	0.00928	9.28E-05	nd	nd
1234789 HpCDF	0.01	0.01388	0.00014	nd	nd	0.00366	0.00004	nd	nd	nd	nd
OCDF	0.001	0.14735	0.00015	0.04777	0.00005	0.04129	0.00004	nd	nd	nd	nd
<b>Total TEQ</b>			<b>14.458</b>		<b>2.152</b>		<b>2.491</b>		<b>0.041</b>		<b>0.003</b>
Sample Area			100cm <sup>2</sup>		100cm <sup>2</sup>		100cm <sup>2</sup>		100cm <sup>2</sup>		100cm <sup>2</sup>
Mass/Area			1400ng/m <sup>2</sup>		200ng/m <sup>2</sup>		250ng/m <sup>2</sup>		4.1ng/m <sup>2</sup>		0.3ng/m <sup>2</sup>

63

A3  
)

FROM: **MRI** Midwest Research Institute  
425 Volker Boulevard  
Kansas City, MO 64110 USA

Pages, including cover page:

TO: Ron Porter, PhD  
Armstrong Laboratory  
Brooks AFB, TX

Date: November 19, 1994

FAX NUMBER: 210-536-2315

VOICE NUMBER: 210-536-6127

FROM: John Stanley

FAX NUMBER: (816) 753-5359

VOICE NUMBER: (816) 753-7600 ext 1160

REFERENCE: Review of Data for Dioxins

Ron

I have reviewed the data summaries that you provided to met on Friday, November 18, 1994. The data were generated via method 8290 ( a high resolution MS approach) using a VG Autospec (an instrument of high quality and good sensitivity). Samples analyzed were swipes (or wipes) and data appears to be reported in units of picograms/wipe or pg/WP.

Based on the data presented and the information on the method and instrumentation, my impression is that you have a reliable data set from which to work. Some observations regarding the data indicate that the primary source for some samples (such as IK1355-1) is likely from an agent orange type background. This is based on the fact of the prominence of the 2,3,7,8-TCDD in relation to total TCDD and the relative contribution from the other PCDD and PCDF congeners and homologs. The other response for PCDDs and PCDFs are likely from a different but contributing source. It is difficult to say much more from the data presented. The fingerprints from the detailed HRMS data packages would provide much more input regarding the potential sources of the other compounds.

The levels reported for samples IK1355-2 through 4 should be easily seen, particularly for 2,3,7,8-TCDD. The levels reported for the method blank (MB-IK1355) and sample IK1355-5 are likely approaching detection levels. I am presuming that sample IK1355-5 is a field blank as the levels are very close to the laboratory method blank (prepared from filter paper). It is not possible to say much about the MB level or number 5. However, I am assuming that the tetra and penta levels are reflective more of background in the filter matrix rather than glassware carryover cited in the narrative.

Hope this information is useful to you. If there are questions, please call.



(Attach 5)

**DEPARTMENT OF THE AIR FORCE**  
**AIR FORCE INSTITUTE FOR OPERATIONAL HEALTH (AFMC)**  
**BROOKS CITY-BASE TEXAS**

31 Jul 03

MEMORANDUM FOR OO-ALC/LCD  
ATTENTION: MR PITCHER

FROM: AFIOH/RSRE  
2513 Kennedy Circle  
Brooks City-Base TX 78235-5116

SUBJECT: Consultative Letter, IOH-RS-BR-CL-2003-0031, Cost Estimate for Sampling of C-123s for Dioxin

1. On 14 May 03, the Health Risk Assessment Branch of the AF Institute for Operational Health (AFIOH/RSRE) participated in a conference call to discuss disposition of 18 UC-123s that were likely used to spray Agent Orange during the Vietnam War. As a result of discussions with HQ AFMC/SGBB, OO-ALC/LCDP and HQ AFMC/LG, AFIOH/RSRE was requested to construct a cost estimate for wipe and soil sampling for dioxin analysis to support decision-making and ultimate disposal of these aircraft.

2. Background

a. In 1994, AFIOH/RSRE (then AL/OEMH) evaluated a C-123 aircraft located in the museum annex at Wright-Patterson AFB, OH (AL/OE-CL-1994-0203, 19 Dec 94). Museum personnel planned to restore the aircraft and staff raised concerns prior to restoration since the aircraft reportedly carried and sprayed Agent Orange to support defoliation efforts in Vietnam. Four samples were collected (3 inside, 1 under the wing); all four samples tested positive for dioxin congeners. At the time, museum staff secured the aircraft to prevent entry. The tanks and sprayers, stored at a separate location, were not sampled. AL/OEMH staff made recommendations to limit exposure to aircraft restoration personnel and allow the public to view the exterior of the plane. The recommendations would not result in the complete decontamination of the aircraft.

b. In Mar 1997, AL/OEMH provided an initial evaluation of additional C-123's stored at the Aerospace Maintenance and Regeneration Center (AMARC) at Davis-Monthan AFB in Tucson, AZ. At the time, the planes were being considered for sale. The AL/OEMH report (AL/OE-CL-1997-0053) recommended full characterization of the level of contamination in each plane prior to release. It also recommended that planes with contaminant levels that exceed risk-based cleanup criteria be fully decontaminated as a requirement for transfer. However, AL/OEMH identified several uncertainties in the analysis including unknown levels of contamination for individual planes, herbicide analysis was performed rather than dioxin analysis (which may have under-estimated the actual results), and unavailability of a state or federal reference value for allowable surface contamination.

3. Three elements were considered in constructing a cost estimate for the current request: dioxin analysis, personnel costs and other direct costs. These will be considered and discussed separately.

A 5

a. Dioxins were common contaminants in the production of 2,4-D and 2,4,5-T, chlorophenoxy herbicides which were two of the herbicides used in a mixture called Agent Orange. The best known and most toxic of the dioxin congeners is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). AFIOH's environmental chemistry laboratory, AFIOH/SDC, contacted several laboratories to solicit cost estimates for the analysis of 2,3,7,8-TCDD, as well as the full dioxin congener list. We believe it more practical and wise to test any collected samples for the full congener list (\$750/sample) rather than 2,3,7,8-TCDD alone (\$375/sample). While this doubles the cost, it will more fully support the human health risk based decision-making for the final disposition of these planes.

b. In the 1997 report, AL/OEMH recommended a minimum of ten wipe samples per plane to characterize dioxin contamination-we continue to support that recommendation in these cost estimates. Additionally, since these planes are stored outdoors, there is some concern that any potential dioxin contamination on the planes may have migrated to the soil below. While photodegradation and volatilization from surface soils should mitigate soil concentrations of dioxins and potential exposures, we have included these as well. Therefore, we propose 10 wipe samples per plane, 2 wipe samples per sprayer unit (that held the herbicide mixture), 2 soil samples under each C-123 airplane and 2 soil samples under each sprayer unit (if applicable). Total analysis costs for the full congener list for 48 samples is \$180,000 (Atch 1).

c. Personnel costs were determined based on FY03 contractor rates. Our proposed labor categories include a program manager, project manager, senior scientist, senior technician, junior technician, and mid-level administrative support. The total projected effort is 263 hours for a total cost of \$16, 236 (Atch 1).

d. The majority of the other direct costs (ODCs) include typical office support such as reproduction, phone calls and shipping, as well as travel expenses, and also include an estimate for hazardous waste disposal. The cost estimate for waste disposal is \$10,000 . This expense would be required to dispose of waste solvents used for sampling or decontamination, as well as any other wastes generated during the sampling efforts. The total estimate for ODCs is \$15,000.

4. The total estimated cost for sampling and analysis of the C-123s at AMARC is approximately \$211,000. Without better understanding the regulatory environment, as well as the expected final disposition of the aircraft (melting, burial, etc), it's difficult to know if the proposed scope of this effort is adequate to characterize any potential contamination. Additional regulatory requirements may increase the scope and cost of such efforts. We highly recommend consulting with the appropriate regulatory authorities to better predict any other requirements. We have included a list of these potential issues that might result in additional requirements/costs (Atch 2).

5. If you have any questions, please call me at DSN 240-6121, Comm (210)536-6121.



G. CORNELL LONG  
Chief, Health Risk Assessment Branch

Attachment:

1. Sampling and Analysis Cost Estimate
2. Potential Issues Related to Data Quality Objectives

15  
3

**SAMPLING AND ANALYSIS COST ESTIMATE**

Dioxin Analysis					
Wipe Samples	# Units	# Samples/Unit	# Samples	Cost/Sample	Extended Cost
Aircraft	18	10	180	\$750	\$135,000
Sprayers	6	2	12	\$750	\$9,000
<b>Soil Samples</b>					
Aircraft	18	2	36	\$750	\$27,000
Sprayers	6	2	12	\$750	\$9,000
<b>Total Analysis Costs</b>					<b>\$180,000</b>

Personnel Costs			
FY03 Rates			
Labor Category	Labor Rate	Project Hours	Extended Cost
Program Manager	\$155.51	8	\$1,244.08
Project Manager	\$130.61	10	\$1,306.10
Senior Scientist	\$124.39	15	\$1,865.85
Senior Technician	\$63.16	120	\$7,579.20
Junior Technician	\$34.18	90	\$3,076.20
Mid Admin	\$58.23	20	\$1,164.60
<b>Total Labor Costs</b>			<b>\$16,236.03</b>
<b>FY04 Labor Rates</b>			<b>(add 4% to FY03 costs) \$16,885.47</b>

Other Direct Costs	
Reproduction	\$100.00
Phone calls	\$300.00
Shipping	\$300.00
Hazardous Waste Disposal	\$10,000.00
Travel (2 Trips x 2)	
Air	\$2,800.00
Lodging (10 nights)	\$1,000.00
Rental Car	\$500.00
<b>Total Cost, ODCs</b>	<b>\$15,000.00</b>

**TOTAL ESTIMATED COSTS = \$211,236.03**



A 5  
6

## POTENTIAL ISSUES RELATED TO DATA QUALITY OBJECTIVES

Most environmental sampling or data collection events rely on the development of data quality objectives (DQOs). DQOs are the output of a process that defines "the purpose of the data collection effort, clarifies what the data should represent to satisfy this purpose, and specify the performance requirements for the quality of information to be obtained from the data." (USEPA, *Data Quality Objectives Process for Hazardous Waste Site Investigations*, EPA/600/R-00/007, January 2000). These outputs are then used to develop and optimize a data collection design that meets performance criteria and addresses other constraints.

One of the most important aspects of the DQO process is to identify and include relevant stakeholders, such as managers, technical staff, and regulatory authorities in the planning process. There are potential pitfalls associated with not including regulatory authorities in early planning discussions preceding the proposed C-123 sampling events. We have identified a few of the potential issues that might arise if regulators are contacted only after the sampling has been accomplished. Since C-123 disposal is a unique event, it may be beneficial to engage a regulator, if only informally, to discuss these and other potential issues of interest.

1. Incomplete contaminant characterization. This cost estimate only includes sampling and analysis of dioxin congeners. It is likely there are other materials found in or on the plane that might warrant additional investigation such as pesticides, metals, radiologicals and chromates. In this case, additional samples would need to be collected.
2. Insufficient sampling design. We have identified a minimum of 10 samples per plane, plus additional soil samples. Depending on the final disposition of the planes, this might be too few, especially if the planes were to be buried and could potentially be categorized as hazardous waste. Additionally, the plan may not include the proper or sufficient number of sampling locations to characterize contamination. Again, additional samples would need to be collected.
3. Relevant cleanup reference values/health standards. If samples are collected and dioxin is detected in the samples, it is not clear what the reference value will be. The 1994 AL/OEMH report and a recent report on the characterization of particulates found in apartments after the destruction of the World Trade Center both reference a 1988 National Academy of Sciences value for surface contamination. However, this number was derived for re-entry of office workers after a fire--it is not clear how relevant this value would be for the C-123's. In short, in the absence of a reference value, a positive detection of dioxin would only confirm its presence and provide little information regarding safe disposal of the aircraft.



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS AIR FORCE SECURITY ASSISTANCE CENTER (AFMC)  
WRIGHT-PATTERSON AIR FORCE BASE OHIO



05 AUG 1997

MEMORANDUM FOR SAF/IA

FROM: AFSAC/CV  
1822 Van Patton Drive  
Wright-Patterson AFB OH 45433-5337

SUBJECT: Potential Dioxin Contaminated UC-123 Aircraft Transferred Under the  
Military Assistance Program (MAP)

1. A number of UC-123 aircraft transferred to various foreign countries during the early to mid-1970s under the Military Assistance Program (MAP) may have been contaminated by residual pesticides/herbicides (including substances such as 2, 4-D; 2,4,5-T; and dioxin). Some of these aircraft may still be in use today and could represent a health hazard to their operators. We believe recipient countries should be informed; however, such a pol-mil decision best rests with your office. To date, this information has not been shared with either country or SAO personnel.
2. A number of C-123 aircraft were modified to the UC-123 configuration to perform a variety of spraying missions. Some of these modified aircraft participated in Operation Ranch Hand in Southeast Asia during the Vietnam war. Research of Air Force archives and local HQ AFMC aircraft transfer records has identified the suspect aircraft by tail number. Unfortunately, these records do not tie specific tail numbers to particular recipient countries. We believe the following countries may have received suspect aircraft: El Salvador, Korea, Taiwan, and Thailand. Our sketchy records indicate that a number of the aircraft may have been originally targeted for Cambodia but were redirected to Thailand. Attachment 1 provides a listing of the suspect MAP aircraft.
3. This issue came to HQ AFMC's attention upon the General Service Administration's (GSA) attempt to sell a number C-123 aircraft located at AMARC, Davis-Monthan AFB AZ. Upon preparing the aircraft for movement, the presence of pesticides and dioxin was detected in one of the aircraft. Adopting a conservative approach to mitigate the potential health risk, all aircraft were assumed to be contaminated unless records research subsequently revealed the aircraft had not performed a spraying mission in Southeast Asia. A point paper with accompanying documents is provided at attachment 2. Due to environmental concerns and disposal cost considerations, AMARC is moving the 21 aircraft in their possession to an open area within its fenced yard and sealing them for long-term storage.

## UC-123 Aircraft Suspected of Dioxin Contamination

Serial No.

#	Y	Tail R Number	Processing Station	Lost in Combat	Lost in Accident	Museum Program	At AMARC	Military Assistance Plan (FMS)	Notes
10	54	605	PHAN RANG BIEN HOA TAINAN TAN SON NHUT DA NANG NAPIER				X		
11	54	607	PHAN RANG BIEN HOA TAIPEI DA NANG TAINAN TAN SON NHUT NAPIER				X		
12	54	608	PHAN RANG					X	
	54	618	PHAN RANG BIEN HOA TAIPEI DA NANG TAINAN TAN SON NHUT NAPIER				X		
14	54	624	TAN SON NHUT TAIPEI					X	
15	54	628	PHAN RANG BIEN HOA TAIPEI TAINAN TAN SON NHUT DA NANG NAPIER				X		
16	54	630	BIEN HOA TAN SON NHUT	X					
54	633	PHAN RANG BIEN HOA DA NANG TAINAN TAN SON NHUT NAKHON PHANOM				X			This aircraft is currently on display at the Robins AFB Museum.



## UC-123 Aircraft Suspected of Dioxin Contamination

<u>Serial No.</u>		<u>Y</u>	<u>Tail</u>	<u>Processing Station</u>	<u>Lost in</u>	<u>Lost in</u>	<u>Museum</u>	<u>At</u>	<u>Military</u>	<u>Notes</u>
#	R	Number			Combat	Accident	Program	AMARC	Assistance Plan (FMS)	
18	54	635	DOTHAN NAPIER					X		
19	54	685	DOTHAN NAPIER					X		
20	54	693	PHAN RANG BIEN HOA TAINAN DA NANG TAN SON NHUT NAPIER					X		
21	54	698	PHAN RANG UBON						X	<i>Cambodia</i>
22	54	701	PHAN RANG BIEN HOA DA NANG TAIPEI NAPIER					X		
23	55	4511	PHAN RANG BIEN HOA TAINAN DA NANG TAN SON NHUT						X	
24	55	4520	PHAN RANG BIEN HOA DA NANG TAIPEI NAPIER					X		
25	55	4525	PHAN RANG BIEN HOA TAN SON NHUT TAIPEI						X	
26	55	4532	PHAN RANG BIEN HOA TAINAN DA NANG NAPIER					X		
27	55	4544	NAPIER					X		

## UC-123 Aircraft Suspected of Dioxin Contamination

Serial No.

#	Y	R	Tail Number	Processing Station	Lost in Combat	Lost in Accident	Museum Program	At AMARC	Military	Notes
									Assistance Plan (FMS)	
28	55	4547	PHAN RANG BIEN HOA DA NANG NAPIER					X		
29	55	4564	PHAN RANG BIEN HOA TAINAN DA NANG TAN SON NHUT TAIPEI NAPIER						X	
30	55	4570	PHAN RANG BIEN HOA TAN SON NHUT TAIPEI NAPIER						X	
55	55	4571	PHAN RANG BIEN HOA TAIPEI DA NANG NAPIER					X		
32	55	4577	PHAN RANG BIEN HOA TAINAN					X		
33	56	4362	BIEN HOA TAINAN			X				This aircraft is currently on display at the Wright-Patterson AFB Museum.
34	56	4371	PHAN RANG BIEN HOA DA NANG					X		
35	56	4373	PHAN RANG BIEN HOA TAIPEI DA NANG TAINAN	X						
56	56	4375	TAN SON NHUT PHAN RANG						X	El Salvadore
37	56	4384	BIEN HOA DA NANG						X	

### MAP Aircraft Listing

<u>Aircraft Serial No.</u>	<u>Transfer Date</u>
54-576	29 May 73
54-578	13 Jul 73
54-584	29 May 73
54-591	29 May 73
54-608	Sep 71
54-624	29 May 73
54-673	12 Jun 73
54-698	22 Jan 75
(Note: Records indicate that aircraft may have been originally delivered to Cambodia but was subsequently transferred to Royal Thai Armed Forces.)	
55-4506	29 May 73
55-4511	12 Jun 73
55-4525	29 May 73
55-4564	12 Jun 73
55-4570	3 Dec 74
(Note: Records indicate aircraft was retransferred to Royal Thai Armed Forces on 22 Aug 75.)	
56-4375	22 Mar 84
(Note: Records indicate aircraft was transferred to El Salvador.)	
56-4384	Jul 71
56-4386	31 Jan 73
57-6289	29 May 73



**DEPARTMENT OF THE AIR FORCE**  
 HEADQUARTERS, AEROSPACE MAINTENANCE AND REGENERATION CENTER (AMARC)  
 DAVIS-MONTHAN AIR FORCE BASE, ARIZONA

6 Jun 96

MEMORANDUM FOR GSA

FROM: AMARC/CD

SUBJECT: C-123 Aircraft

OPTIONAL FORM 99 (7-90)

**FAX TRANSMITTAL** (U7) **Pages: 2**

To: <i>AMARC</i>	From: <i>Mark G. Johnson</i>
Dept./Agency: <i>AMARC</i>	Phone: <i>415-555-0210</i>
Fax #: <i>801-655-0210</i>	Fax: <i>415-555-0210</i>

NSN 7540-01-31727388 5099-101 GENERAL SERVICES ADMINISTRATION

1. AMARC was notified in April 1996 of a completed sale of 19 C-123 aircraft, serial numbers 54-0711; 55-4517; 55-4535; 55-4567; 54-0583; 54-0585; 54-0586; 54-0605; 54-0607; 54-0618; 54-0628; 54-0635; 54-0701; 55-4520; 55-4532; 55-4544; 55-4547; 55-4571; and 55-4577.

2. As you know, all aircraft must be demilitarized before release from AMARC. During the demil process on C-123 54-0585 and 55-4571, employees experienced a burning sensation and could smell chemical odors. Upon further investigation by the AMARC safety office and base bioenvironmental office, it was determined that these aircraft could possibly contain hazardous chemicals.

3. Our bioenvironmental personnel cannot release these aircraft until completely tested for harmful materials. This testing will take approximately 21 days at a cost of \$1,250.00 per test sample or 72 hours at a cost of \$3,750.00 per test sample. Each aircraft will require approximately 10 test samples.

4. Recommend you notify your customers and take action as necessary until these aircraft can be released.

*Ralph F. Schoneman*  
**RALPH F. SCHONEMAN**  
 Executive Director

1 Atch  
 Cost Estimates for Aircraft Test Samples

①



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS AIR FORCE SECURITY ASSISTANCE CENTER (AFMC)  
WRIGHT-PATTERSON AIR FORCE BASE OHIO



05 AUG 1997

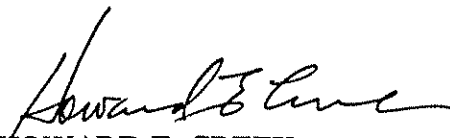
MEMORANDUM FOR SAF/IA

FROM: AFSAC/CV  
1822 Van Patton Drive  
Wright-Patterson AFB OH 45433-5337

SUBJECT: Potential Dioxin Contaminated UC-123 Aircraft Transferred Under the  
Military Assistance Program (MAP)

1. A number of UC-123 aircraft transferred to various foreign countries during the early to mid-1970s under the Military Assistance Program (MAP) may have been contaminated by residual pesticides/herbicides (including substances such as 2, 4-D; 2,4,5-T; and dioxin). Some of these aircraft may still be in use today and could represent a health hazard to their operators. We believe recipient countries should be informed; however, such a pol-mil decision best rests with your office. To date, this information has not been shared with either country or SAO personnel.
2. A number of C-123 aircraft were modified to the UC-123 configuration to perform a variety of spraying missions. Some of these modified aircraft participated in Operation Ranch Hand in Southeast Asia during the Vietnam war. Research of Air Force archives and local HQ AFMC aircraft transfer records has identified the suspect aircraft by tail number. Unfortunately, these records do not tie specific tail numbers to particular recipient countries. We believe the following countries may have received suspect aircraft: El Salvador, Korea, Taiwan, and Thailand. Our sketchy records indicate that a number of the aircraft may have been originally targeted for Cambodia but were redirected to Thailand. Attachment 1 provides a listing of the suspect MAP aircraft.
3. This issue came to HQ AFMC's attention upon the General Service Administration's (GSA) attempt to sell a number C-123 aircraft located at AMARC, Davis-Monthan AFB AZ. Upon preparing the aircraft for movement, the presence of pesticides and dioxin was detected in one of the aircraft. Adopting a conservative approach to mitigate the potential health risk, all aircraft were assumed to be contaminated unless records research subsequently revealed the aircraft had not performed a spraying mission in Southeast Asia. A point paper with accompanying documents is provided at attachment 2. Due to environmental concerns and disposal cost considerations, AMARC is moving the 21 aircraft in their possession to an open area within its fenced yard and sealing them for long-term storage.

4. This organization's point of contact is Larry Brown, AFSAC/IPS, DSN 787-1132 extension 4181.



HOWARD E. CREEK  
Colonel, USAF  
Vice Commander

Attachments:

1. MAP Aircraft Listing
2. Point Paper w/2 Atchs

cc:

SA-ALC/LF  
HQ AFMC/LGM-AVDO  
HQ AFMC/LG-EV  
HQ AFMC/DRT



### MAP Aircraft Listing

<u>Aircraft Serial No.</u>	<u>Transfer Date</u>
54-576	29 May 73
54-578	13 Jul 73
54-584	29 May 73
54-591	29 May 73
54-608	Sep 71
54-624	29 May 73
54-673	12 Jun 73
54-698	22 Jan 75
(Note: Records indicate that aircraft may have been originally delivered to Cambodia but was subsequently transferred to Royal Thai Armed Forces.)	
55-4506	29 May 73
55-4511	12 Jun 73
55-4525	29 May 73
55-4564	12 Jun 73
55-4570	3 Dec 74
(Note: Records indicate aircraft was retransferred to Royal Thai Armed Forces on 22 Aug 75.)	
56-4375	22 Mar 84
(Note: Records indicate aircraft was transferred to El Salvador.)	
56-4384	Jul 71
56-4386	31 Jan 73
57-6289	29 May 73

**POINT PAPER  
ON  
SALE OF AIRCRAFT CONTAMINATED WITH DIOXINS**

**ISSUE**

- AMARC/CD requested assistance from AFMC/CV, 11 Oct 96, in determining whether ten C-123 aircraft, potentially contaminated with dioxins (considered carcinogenic) and sold by GSA, can be released as sold, decontaminated and released, or destroyed.
- GSA sold aircraft for the State Department, but inadvertently sold AF owned aircraft as well.
- Additionally, determine who has financial responsibility to fund decontamination or disposal.

**BACKGROUND**

- There were 21 C-123 aircraft located at AMARC.
  - Ten aircraft were sold to Western Aviation and National Aircraft.
  - Three are being held at AMARC for FMS customers.
  - Eight others are stored at AMARC.
- The State Department Bureau of International Narcotics Matters (INM) obtained two C-123 aircraft from the Air Force in 1986/7, but they also used nine Air Force C-123s located at AMARC as parts donors.
  - The department declared the two INM aircraft and the nine parts donors as excess in 1995.
- As a result, GSA sold ten of the eleven aircraft used by the State Department in Mar 96, even though under current DoD Demilitarization procedures, the nine C-123s that belonged to the Air Force should not have been sold as stated in DoD 4190.21-M1.
  - Two of the ten aircraft sold were released to a buyer who in turn resold them to Disney.
    - According to AMARC and historical military research offices, aircraft were assumed to be clean because aircraft were not stationed in SE Asia and no spraying equipment attached, which would suggest likely use in herbicide application.
  - AMARC tested one of the aircraft held at AMARC after the sale, which indicated dioxin contamination, prompting them to inform HQ AFMC of the situation.

- The safety and bioenvironmental functions at Davis-Monthan, servicing AMARC, and HQ AFMC have concluded that the contamination could represent a health hazard, which must be mitigated before the aircraft can be released.
- There are no current threshold limits, decontamination procedures, or disposal methods that have been established by EPA or OSHA as far as disposal or human exposure levels are concerned.

## CURRENT STATUS

- A HQ AFMC Environmental, Safety and Occupational Health IPT focus group began meeting 28 Oct 96 to address the AMARC/CD request.
- To date, the group has recommended the following:
  - Advise AMARC to hold all the C-123s that were sold, on-site, till further notice.
  - An AFMC memo be sent to GSA requesting that the sale be terminated.
  - Request AMARC conduct a cost analysis of different options to dispose of the C-123s.
- HQ AFMC LO/JAV sent a memo, 18 Dec 96, to GSA, requesting they terminate the sale.
  - GSA has officially agreed to cancel the sale of the aircraft currently in AMARC's custody.
    - They don't think anything can be done about the aircraft already released to Disney.
  - JAV is also preparing memos to be sent to the two buyers of the aircraft (including the Disney aircraft) informing them of the Air Force decision to cancel the sale.
    - These memos are a preliminary response to the broader issue of notifying the ultimate holders of C-123 aircraft of the possibility of dioxin contamination.
- A memo from AFMC/LG (who are OPRs for this issue) to AMARC/CD, coordinated by appropriate 2-letter directorates, including CE, was signed out 10 Jan 97 (Attachment).
  - Memo asked AMARC to develop cost information for the following two disposition options:
    - Demilitarize/destroy the C-123s and dispose of in a landfill, per approval of the state of Arizona.
    - Seal the aircraft and store at AMARC for the long-term.
- AFMC/LG has received a response from AMARC/CD (Attachment).
  - Response provides costs for demilitarization and disposal of uncontaminated aircraft, and cost of "sealing" or "cocooning" (complete seal with no openings) the aircraft at AMARC.

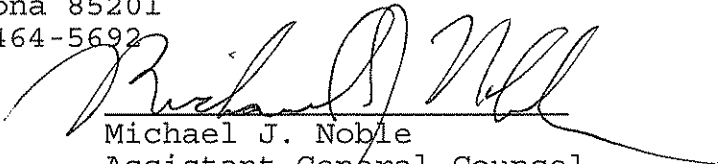
- Based on the AMARC response, the ESOH IPT focus group recommended, 21 Feb 97, that AMARC develop a long-term disposal plan with sealing the C-123s as the preferred option.
  - AMARC will need to work with their host base, Davis-Monthan, to develop a plan which should be approved by the state of Arizona.
  - State may require another course of action depending on their position on cleanup/containment of dioxin.
- AFMC/LG-EV will notify AMARC to provide AFMC with an Air Combat Command (i.e. Davis-Monthan) and state approved disposal plan and associated costs.
- Meanwhile, AFMC/LG-EV continues to examine historical records, such as missions and former airfield locations of the C-123s, to determine the number of aircraft used in defoliation operations and their locations.
  - Aircraft will be assumed to be contaminated if they were used in such operations and/or have records indicating spray systems were/are attached.
  - Normal demil and disposal will apply if aircraft are proved to be uncontaminated based on history of use or sampling.
  - Based on records from the Alfred F. Simpson Historic Research Center, Maxwell AFB, 38 C-123s, including 18 at AMARC, but excluding those sold to Disney, are suspected of being contaminated based on use in SE Asia and being equipped with spray apparatus.
- Based on the C-123 disposal plan due from AMARC, the ESOH IPT will investigate financial responsibility for disposition costs of the suspected dioxin contaminated C-123s.

**Attachment:**  
**AMARC/CD memo w/Attachment**

CERTIFICATE OF SERVICE

This certifies that on June 1, 1999, the General Services Administration's supplement to the appeal file was sent via facsimile transmission to the following:

Otto S. Shill, Esq.  
Jackson White Gardner Weech & Walker  
Attorneys At Law  
40 North Center Street  
Suite 200  
Mesa, Arizona 85201  
FAX: 602-464-5692

  
Michael J. Nobile  
Assistant General Counsel  
Personal Property Division

June 1, 1999