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The Perils of Paul: Near Disasters in Airborne Radiochemical Sampling

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Beginning with the Trinity test in July 1945, Laboratory radiochemists have collected debris from nuclear tests by various means. At Trinity, two United States Army Sherman tanks were used. One tank was a launch platform or several rocket-propelled scoops. Each scoop was attached to a wire so that the scoops could be retrieved. A second Sherman tank was fitted with lead shielding and driven into ground zero. Beginning with Operation Crossroads and continuing throughout atmospheric testing, aircraft were used to fly in and around mushroom clouds to collect debris. One of the first aircraft to be used for this purpose was the famous Flying Fortress of World War II, the B-17. These sampling operations were dangerous for both the aircrews flying the recovery operations and the ground crews that handled, packaged, and transported the debris to Los Alamos. During the 1948 Sandstone test series, three LANL radiochemists received beta burns while recovering filter papers from one of the B-17 sampler aircraft.

Sample recovery from B-17

As testing continued, the B-17 sampler fleet gave way to a succession of jet-propelled aircraft, including the twin engine B-57 bomber. The B-57 was capable of high altitude sampling, a must as device yields increased. The B-57 was used extensively beginning with Operation Hardtack I. Paul Guthals, the LASL project leader for sampling operations, flew on many of the B-57 sampling missions. Two such missions, one flown over the Nevada Test and one in the skies near Johnston Atoll, again proved the dangers involved in collecting airborne test debris.

B-57 with wing pods sitting on a flight line.

Filter paper being inserted into wing pod of a B-57.

The first incident occurred in October 1961. Guthals and the B-57 pilot, USAF Captain Tom Davis, were flying a low-level sampling mission against the Mink shot of Operation Nougat. Because of the nature of the Mink shot, Guthals had been given special permission to fly at a very low level, less than thirty meters over the desert surface. As Guthals recalled some years later:

> "The day was dreary with an overcast of clouds about 3 kilometers MSL (Mean Sea Level). The aircraft was approaching surface zero from the south at about 15 meters above the surface [and at] 370 kilometers per hour, then climbing to about 150 meters and circling for another pass at surface zero. Some 12 or 13 such maneuvers had been successfully completed when suddenly the aircraft struck something at about 150 meters above the surface. Equally sudden came the realization that the aircraft had collided with an unpainted, galvanized 150 meters instrumentation

tower adjacent to our flight path over the Yucca Lake Valley."

After making several emergency May Day calls, the damaged bomber headed to nearby Indian Springs Air Force Base and an anticipated emergency landing. When the aircraft reached Indian Springs, bad weather prevented a landing and the plane proceeded to Nellis Air Force Base, where it landed without incident, despite "considerable wing and canopy damage." Guthals and Davis were ordered to stay in the aircraft until the base Disaster Control Officer arrived on scene. Since it was very possible that the damaged plane could be contaminated, both Guthals and Davis were allowed to exit the aircraft and monitor it for contamination. Fortunately, the plane was not contaminated.

When the B-57 hit the instrumentation tower, the sampling apparatus, which was attached to the wing, was torn off and the tower destroyed. Immediately, the Laboratory's Scientific Director, Alvin Graves, dispatched a rad-safe survey team to locate the apparatus, which they did without incident. Graves also contacted Guthal's wife to say, in guarded language, that she was not to worry if a news story about the accident was broadcast.

The second incident occurred a year later when Guthals and USAF Major Clyde Young were flying against the Chama shot of Operation Dominic. Chama, a thermonuclear device, would be fired just before dawn on October 18, 1962. Predawn detonations allowed observation of the fireball against a dark sky followed by daylight for sample collection. Guthals and Young flew from Johnston Atoll and reached their predetermined orbit around the expected drop point of the Chama device. Upon arriving on station, they attempted, unsuccessfully, to contact the Test Control aircraft for their final orbit coordinates. This lack of contact was serious because the zero point of an air dropped nuclear device was difficult to precisely determine and subject to last minute changes. Only the Test Control Aircraft radar could coordinate the flight paths of the sampler aircraft. Guthals and Young were flying blind. As Guthals recounted the situation, the countdown proceeded and was monitored by Young and myself.

"As the countdown neared its critical final few minutes," Guthals and Young decided "to fly the aircraft on a heading of 360^0 as opposed to the present heading of 120^0. This choice was made since our last known position was north of the zero point. Our decision was broadcast in the blind to the Test Control Aircraft." They received no response, and "the countdown continued and the device was released without any regard to our position and whether, in fact, we were safe." Guthals and Young were safe, being about 80 or more kilometers north of the zero point and flying away from the detonation. The shock wave hit the B-57 tail-on, which was, as Guthals noted, "a very safe condition" given the yield of the device and the distance from the zero point. As Guthals told his boss, LASL Scientific Director William Ogle, there had been "a serious oversight in precipitating this incident."

Although USAF Brigadier General John Samuel, commander of the sampling operation, took immediate action, relieving those officers he thought responsible, such an incident would not happen again because atmospheric testing, itself, was coming to an end after nearly sixteen years. No longer would Air Force or Los Alamos personnel of fly against mushroom clouds.