Cold War Experiences from the ‘other’ side, Part 3

(As published in The Oak Ridger’s Historically Speaking column the week of April 20, 2020)

As promised, here is the rest of the story about Bob Schultz and his experiences at nuclear weapons tests. Enjoy!

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In the spring of 1963, I departed the Army and the Nuclear Defense Laboratory and stepped into a private radiochemical company, Isotopes Inc. located in Westwood, NJ. I was immediately sent to the Tonopah Test Range to lead their field team for *Operation Roller Coaster*.

Operation Roller Coaster was a joint United States/United Kingdom series of four non-nuclear detonations of plutonium bearing weapons. The project was designed to supply real life information concerning the nature and extent of local and downwind plutonium contamination. This data was also needed to help establish criteria for the transport and storage of plutonium based nuclear weapons.

Basically, the idea of the test series was to ‘blow-up’ (we called it one point detonate) Stockpile type nuclear weapons under various conditions to see what would happen to the plutonium in the event of an accident. We needed to know what type of particles would be formed and how they would be dispersed.

Sounds like a strange test for this day and age, but that’s what we did! How would you like to write the Environmental Impact Statement for that test series today?

The test series called for four different weapon storage/transportation configurations. For one test, the weapon was placed on a pad and the high explosive in the weapon was one-point detonated – right out in the open environment.

As expected, the weapon blew apart and the innards, including the Plutonium, scattered and were carried downwind. In two of the tests, the weapons were placed in bunkers typical of those the US used in Europe.

In one of tests, the bunker had multiple weapons, thus testing the safety of having several weapons in a bunker in the event of a high explosive accident. The fourth test utilized typical transportation vehicles and protection methods.

Three of the events, *Double Tracks* and *Clean Slate I and III*, released plutonium to off-site areas in detectable quantities. My company’s expertise was in fallout sampling, thus we had the contract to perform all of the onsite fallout sample collection.

Sample collectors were arranged in four, 120-degree arcs starting about 50 yards from the test pad and going out to 600 yards. To collect the samples after the test, my technicians and I donned full anti-C suits and full-face respirators. We walked out to each sample collection station carefully collecting, protecting and labeling each sample.

As the tests were ran at night sample collection started at daylight and ran through the hotness of the Nevada sun. We employed both fallout and particle sampling devices. The samples were then taken to radiochemical laboratories for radiometric and particle size analysis.

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These tests obviously resulted in contamination that has required corrective action. Clean-up has been taken on two of the four sites. It should be noted that with a half-life of 24,000 years the remaining Plutonium contamination is not going away soon.

The Tonopah Test Range is currently used for nuclear weapons stockpile reliability testing, research and development of fusing and firing systems, and testing nuclear weapon delivery systems.

With the signing of the *1963 Limited Test Ban Treaty* all atmospheric testing was stopped by the United States, United Kingdom and Soviet Union. Since Isotopes Inc.’s weapons thrust had mainly been in fallout collection and the measurements arena we reoriented our technical team toward underground test detection.

The program we worked under was called *Vela Cloud Gap.* It was a program run by the United States Department of Defense and the Arms Control and Disarmament Agency. The purpose of this program was to "test the technical feasibility of potential arms control and disarmament measures".

An underground test sets off a shock wave much like an earthquake – thus geophysicists can identify the epic center of where the event occurred but they cannot tell whether it was caused by nature or man with a nuclear weapon. The arms control agreements under discussion between the United States and the Soviet Union were to involve on-site inspections to determine/prove whether a shock wave was caused by nature or a nuclear weapon.

Many sensing and measurement techniques were brought forth by the private nuclear sector. Thus, the Vela program was implemented to evaluate and determine which of the techniques would actually give proof of a nuclear detonation. The Technique Evaluation Tests were carried out at the Nevada Test Site, Colorado, Mississippi and Amchitka Island Alaska.

These tests plus a myriad of tests at the Nevada Test Site are all stories and experiences unto themselves. The Isotopes Inc. technique utilized the collection of air samples and analyzing them for the Noble gases, Xenon and Krypton. By measuring the isotopic ratios at the time of collection and calculating back to the time when they would have been generated, one can determine if they were formed at the time of shockwave thus verifying whether an event was an earthquake or nuclear detonation.

The first big “Proof of Pudding” test was the first test of *Project Dribble* named *Salmon.* The nuclear weapon for this test was placed in a salt dome about 1,000 feet below the surface of the ground at a site near Hattiesburg, MS.

The object of this test was to blast a huge cavity in the salt dome and then later explode a second smaller weapon in the huge cavity to see if the shock wave could be muffled. Our job was to see if we could detect the nuclear blast using our Noble gas-isotope detection technique.

The downhole weapon was detonated on October 22, 1964. We had calculated that it would take about three days for the Xenon and Krypton to migrate and outgas to the surface. Three days later we detected our first radioactive Xenon near an area we had determined to be a potential leak area – we were excited that our technique had succeeded.

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The next sample we ran was the background sample that we had collected in Hattiesburg that morning – strangely it yielded the same levels of radioactive Xenon as the sample from the test site. We rapidly collected an air particulate sample and discovered fresh fission products in the general area – obviously not from our underground *Salmon* test.

What we were detecting was the leading edge of the radioactive cloud from the Chinese test detonated on October 16th. We saw that radioactive cloud circle the world and come by six times. This was the only test we participated in that we were not able to detect fresh radioactive Xenon – the Chinese cloud masked any local leakage.

The second smaller shot, *Project Sterling*, was detonated two years later and we were able to detect it. An interesting side note: about 400 residents were evacuated from the area for the first test. They were paid $10 per adult and $5 per child for their inconvenience.

Another exciting shot was in 1965. It was the *Long Shot* test on Amchitka Island, one of the Aleutian Islands in southwest Alaska. This test exploded an 80-kiloton bomb 2,300 feet below the surface of the ground.

This was the first test supervised by the Pentagon and not the Atomic Energy Commission. It was really a trial run for bigger things to come – the one megaton *Milrow* test in 1969 and the five-megaton *Cannikin* shot in 1971.

But small as the *Long Shot* weapon was, there were immediate problems. My laboratory discovered, while stripping the Nobel gases from the swamps and ponds, that tritriated methane had been formed.

Tritium is formed as a fission product during the nuclear event; this tritium was taken up by the bio-organisms which produce methane. Despite claims by the Pentagon that the test site would not leak, radioactive tritium and Krypton-85 began to seep into freshwater lakes almost instantly. This evidence of radioactivity leakage was kept secret for five years.

Knowing that nuclear testing was about to stop I redirected my career towards reactor safety at the Idaho National Laboratory. Thanks for allowing me to share my story.

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I hope you enjoyed Bob Schultz’s amazing career story. As I have said before, one just never knows what the story might be of any person you meet in Oak Ridge. For fun sometime, just ask someone to tell you their story and be prepared to be amazed!

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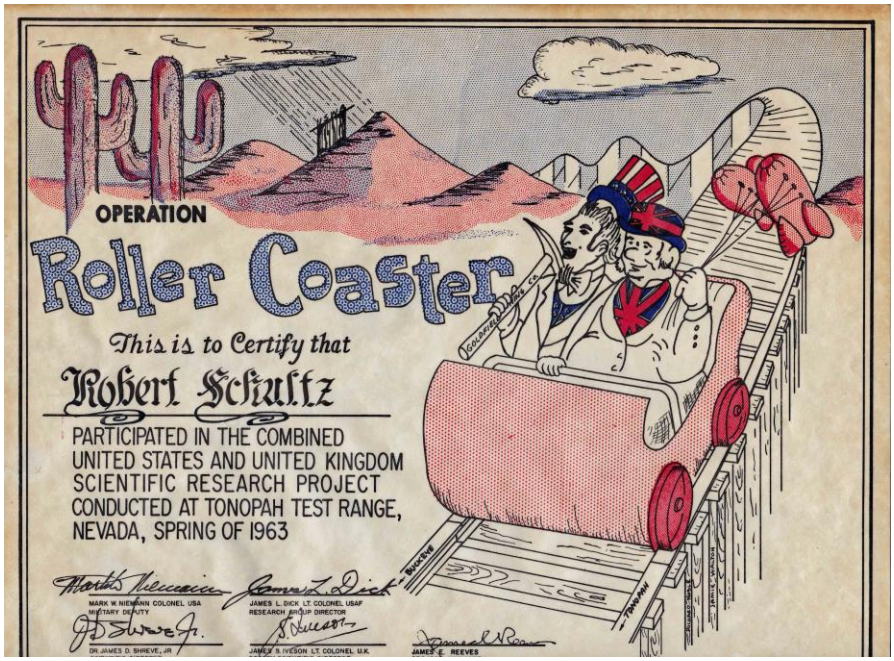
Bob Shultz



A certificate issued to Bob Schultz in reference to the Operation Roller Coaster nuclear test