

Calibrating Nevada

(or, The Day the Russians Invaded Big Pine and the Black Rock Desert)

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Actually, they didn't really "invade" the Black Rock Desert, they were invited. It was all part of a scientific movement to try to get a verification scheme approved for the Strategic Arms Limitation Talks agreement (SALT) by the U.S. and Russian Governments. While the U.S. government didn't officially participate in the tests, they did allow the Russians to conduct experiments on U.S. soil. It was a joint effort by the Natural Resources Defense Council (US) and the Soviet Academy of Sciences (USSR).

This all took place in April of 1988. Several test explosions were detonated in Nevada. About eight months previously, test explosions were detonated and recorded near the Russian nuclear test facilities in Kazakhstan. These were done in an attempt by these two organizations to demonstrate that remote seismic monitoring could detect and verify if any nuclear tests were conducted by either country by analyzing the propagation characteristics of shockwaves from the sites. Seismic energy emanating from a given region will often have a distinguishing shape to the waveforms. (While not fool proof, the concept has merit.) While the Russian government felt it was feasible and some in the academic world agreed, our own government was of the opinion that on-site monitoring was preferable, mainly because the numerous explosive events that transpire on a regular basis would make it difficult to try to monitor for small nuclear events at a distance. The tests done previously near the Kazakhstan site indicated that the geology was more consistent there and it would have been harder to "hide" a nuclear test. The geology in and near Nevada is more complex, however, so the verification scheme there may not have worked as well. The NRDC was intent on getting our government to discontinue testing nuclear devices, but weren't having much luck. They saw remote monitoring as a way to detect and verify tests. Our government at the time possibly wasn't ready to discontinue testing. They were tolerant of the effort, but certainly weren't convinced that remote monitoring would work.

It should be pointed out that the U. S. government did do some research on their own in this area. See my article on *Seismic Shooting at Permanente*, located on the chapter website at www.iseegoldenwest.org/archive.html . That was one such test. Were they checking to see if Russia could cheat by masking a small nuclear test in the middle of a very large quarry blast? Or were they possibly attempting to find out if we could hide one of our own? Only they knew the real reason for the tests at Permanente.....

Supposedly, no government agencies were to be involved in these particular experiments in Kazakhstan and Nevada, but that argument didn't really hold water, considering the fact that the Soviet Academy of Sciences was actually a branch of the Russian government and the director of the Academy at the time, Evgeni Velikhov, was also a weapons consultant to President Gorbachev. "No government involvement" was the reported reason for my being asked to participate. The leading equipment for accurately initiating seismic test shots at the time had been developed by the U. S. Geological Survey at their Menlo Park CA Seismology branch. I had been working with the folks in Menlo Park, training their explosives crews, and had also been out on several seismic experiments with Jack Van Shaack, Ed Criley and their scientists and technicians. Although I wasn't thoroughly familiar with all aspects of their equipment, I did know how to operate it and was probably one of very few non-government people at the time who did.

The Soviet scientists arrived in Reno and traveled down to Big Pine, CA where they were to headquarter for the US half of the tests. In conjunction with their US counterparts, they set up a monitoring station at Deep Springs, which is located in a remote valley east of Big Pine on Highway 168 between Westgard Pass and Gilbert Summit. (The only current significant feature at Deep Springs is a small liberal arts college, student population: 26.)

The first test shot was located in the Black Rock Desert, east of Gerlach, Nevada. It consisted of a group of holes, loaded with a total of 20,000 lbs of explosive. US scientists had put the explosive requirement out to bid, but did not include any specifications as to detonation velocity, etc. As might have been expected, a large sale of bulk explosives was quite attractive and the bidders sharpened their pencils accordingly. Unfortunately, at some point, the price cannot be reduced further without adversely affecting the quality of the product. The explosive that the project purchased was a pumpable slurry that might have been ideal for a quarry or construction blast, but had a velocity that was too low to produce a really sharp seismic signal. In addition, the purchased explosive generated more gas than necessary, but this didn't adversely affect the test. It just made for a bit longer show after the blast. (I should point out that I had helped a client of mine bid on the explosives, but our seismic product, although better suited to the task, was beat out by the cheaper product. Considering the fact that the total cost of the explosives was a very small percentage of the overall project budget, this was a bit hard to understand. Cheap isn't always the least expensive...)

Mr. Velikhov and several other Russian scientists spoke reasonably good English, but most of the rest and almost all of their American counterparts couldn't communicate except through Larry May of the University of California who acted as interpreter.

I drove up from Nevada City very early on the morning of the first test blast. After driving through Reno and Sparks, I proceeded east to Fernley and then north on 447, past Pyramid Lake (a story in itself..... for later) to Gerlach. I stopped at Bruno's Gas Station in Gerlach to refuel. At the time, Bruno's was the only fuel available. Matter of fact, if you needed to spend the night, Bruno's Motel was the only place one could stay. The only meals were at Bruno's Café and, if you wanted to gamble, it had to be at Bruno's Casino. Bruno Selmi had basically bought the whole town shortly after coming over from Italy. I'm sure that the town has grown since, but back then Bruno's was the only game in town.

After fueling, I drove east into the Black Rock Desert, following the marked turns until I reached the test shot site. Ed Criley was already there with the shooting equipment in a USGS van. To preclude any potential problems, Ed had covered the government license plates on the van with black garbage can liners. After checking over everything with Ed, I set up my video equipment and one of my blasting seismographs. My seismograph was used to record strong motion rather than to record the timed arrivals of wave types.

The shooting equipment that the USGS had developed in Menlo Park probably covered several decades of technology. Solid state electronics played a large part and, although the actual initiation signal was triggered by a time signal from a satellite, the firing capacitors were charged by hand-cranking a magneto. Regardless, this all worked very well and the magneto did eliminate the possibility of dead batteries in the shooting box. If I remember correctly, the equipment also included a sophisticated recorder that would record the exact instant of firing along with recording a master time signal.

All of this was necessary because, in addition to the project scientists' recording equipment, numerous seismic lines had been set out in an attempt to learn more about the underlying geology of the region. To do so, shot timing had to be very accurately coordinated. It was common at the time that, when a large seismic shot was planned, the USGS, several universities and even some oil companies would participate with money and equipment. All of this was to try to gather as much useful geophysical information as possible from such an event.

Part of the Russian team arrived at the test site via helicopter, leaving the rest of their team and part of the US team to handle the recording duties at Deep Springs. Numerous TV stations had cameramen and reporters on hand and several even had helicopters of their own in the air.

With about five minutes to go before the planned detonation, I started my video camera recording and set my seismograph to monitoring. Ed and I finished the last minute checklist on the equipment and, with about two minutes to go, I cranked the magneto to make sure the capacitors in the shooting box were fully charged. Someone was counting down the seconds to the blast over the radio.

With about 15 seconds to go, I made sure the firing switch was in the automatic position and pulled up on the safety interlock. At exactly 11:00 a.m. local time, the shot detonated successfully. Shortly after, the first surface wave rolled through the area where we were standing. It is quite visible in my videotape. In addition, the camera and tripod were jolted slightly and then settled down, continuing to record the aftermath of the shot.

While Ed and I started stowing some of the USGS gear, the Russian scientists broke out the vodka and drank a toast to the success of the blast. They also wanted to go down to the shot point (about 1000 feet away) to see what it looked like, but we discouraged them from doing so.

The initial blast resulted in some ejection of gas, mud and water from the holes, and we figured there was more to come. As it turned out, we were more than right. In timing my complete videotape of the shot, mud and water continued to sporadically erupt from the holes for a little over five minutes after the blast. When the explosive detonated, it had generated a rather large gas bubble under the desert floor. There was only one way for the gas to escape and that was through the boreholes. Two or three would spurt mud for a few seconds and then everything would go quiet. Suddenly a couple more would eject mud and steam. It would have been hilarious to have watched their reaction if we had allowed anyone to approach before it was safe to do so.

Several minutes after the blast, a radio message came from Deep Springs asking if the shot had gone off on schedule. Apparently, their equipment hadn't seen it. This resulted in a bit of scrambling around and checking on the accuracy of the shot timing. The shot had detonated exactly on time (as anyone familiar with the USGS equipment knew it would). Deep Springs was approximately 230 miles south of the shot point, or about 3.5 degrees in seismology parlance. The initial P wave should have arrived at Deep Springs roughly one and one quarter minutes after the shot, with the S waves and surface waves following shortly thereafter.

Eventually, after carefully looking through the recordings at Deep Springs, traces of the shot were found. Of course, this good news was followed by another vodka toast by the Russian scientists.

I took down my video camera and, after everyone who was interested in my seismograph and its tape had either looked them over or photographed them, I packed up my gear and prepared to depart for home. The Russians climbed aboard their helicopters for the flight back to Big Pine to prepare for the next day's shots.

After the shot point had been checked for safety issues, Ed and I left too. We were probably among the last to depart.

I got home in time to watch the evening news, but could find nothing on any of the TV channels about the test shot or the Russians. I guess it wasn't big enough news for the folks around Sacramento and San Francisco.

The next day, the last two test shots were fired. One shot near Broken Hills, NV used 32,000 lbs and was located approximately 120 miles from Deep Springs, closer to the Nevada Test Site. The resulting waveforms from these two shots were also recorded at Deep Springs. The "non-government involvement" idea had faded away after the first shot, so I didn't need to attend the last two shots and Ed Criley detonated them. I had to leave for another consulting gig the day after the first shot, so I wasn't present for the last two.

One evening, a couple of weeks later, I was in our kitchen mixing a couple of adult beverages and Claudia was watching the MacNeil/Lehrer Newshour on TV. Suddenly, she called out, "That's your butt!" I went into the living room to look and, sure enough, there on TV was footage of me cranking away on the magneto in the back of the USGS van. Later shots showed Keith Priestly and me checking out my seismograph and going over the tape.

What followed on the Newshour after coverage of the test itself was a somewhat politically-oriented interview with a US government representative and also the head of the Soviet Academy regarding the pros and cons of that type of nuclear test verification. To me, it wasn't as interesting as the shot process itself, but then I've never cared much for political dissertations anyway.

Now, some of you may also be aware that Nevada's Black Rock Desert is the current home of Burning Man, a celebration that is held each year during the week preceding Labor Day weekend. I won't go into the various things that are being celebrated at Burning Man. If you like to live free and more than a little loose, it might be for you. If, however, you cringe at the thought of a guy serving you a sweet roll and coffee while wearing nothing but a small apron, you might be well-advised to pass. The whole scene at Black Rock is extremely dusty. The participants apparently really enjoy it though, as the celebration has become quite popular. When Claudia and I make our annual sojourn up to Bishop Creek on Labor Day weekend, we pass numerous dust laden vehicles coming home from Burning Man. I would have stopped at the first car wash to clean things up, but they seem to like to wear the dust as some sort of evidence of where they've been.

At the time that these scientific tests were conducted in the Black Rock Desert though, Burning Man was still taking place on a nude beach near San Francisco. It moved to Nevada in 1990, a couple of years after the test.

Ed and I may be the only Golden West Chapter members to have their backsides shown from the Black Rock Desert on national TV, but at least they were fully clothed.....



Wes & Ed with the USGS equipment



Instant of the shot



Checking to see what we've got on the conventional blasting seismograph.



Keith Priestly (University of Nevada at Reno) checking the readings.



Mud geysers shortly after detonation.



Sporadic eruptions, even after 3 minutes.