Taking the Fall

The Sierra Cooperative Pilot (SCPP) began field operations in the central Sierra Nevada in the winter of 1976-77 during a major drought. For the previous three years annual precipitation had been averaging between 20 to 50% of normal. Most reservoirs in the State had been drawn down to their lowest levels in years. Aircraft flights along the foothills and high country of the Sierras showed empty reservoirs in many places with dry, brown floors upturned to the cloudless skies.

Water rationing had been implemented in the Fall of 1977 when my wife and I moved to the Lake of the Pines id-way between Auburn and Grass Valley, California. I purchased a new home in a lake development where rationing had prevented the previous owner from watering the “lawn.” Three inches of dust surrounded the house and a few dying bushes hunkered in the shade trying to draw every drop of moisture from the ground. During the first few months in our new house our four children were covered with red dust which they tracked into the house and coated the shower and tub at bath time.

Even in the Sacramento Valley nearby where the most heavily-watered farmland in the world exists, irrigation was kept to a minimum. That year only watering of trees was permitted. No irrigation of field crops like hay, rice, and tomatoes were allowed. The land was essentially fallow waiting for the rains to return.

It was an ideal time to begin a cloud-seeding research project. The weather pattern was certain to change, if not that year, then the next. Any multiyear program would be certain to receive credit for breaking the drought. And that was certainly what happened. Most of the public welcomed the SCPP with open arms at the beginning, hoping that our cloud seeding efforts would bring more rain. Even the Sierra Club sent a representative to our public forum supporting our research efforts.

During the second year of our studies, rain began to fall again. The public assumed SCPP had a major role in this change. Even my family thought I was responsible for the increased rainfall and the greening of our lawn. My son Daniel,

who was about four at the time, was fully convinced of this. He had seen a large red, cardboard drawing I had placed in my office with the notation underneath, *Weather Button*. One day while watching the rain on our back porch he said to my wife, "Daddy must have pushed the button."

Of course, the SCPP had little or no effect on the amount of rain because we were only releasing occasional lines of seeding materials ten miles or so long for our tests. To produce a significant increase in precipitation, seeding operations need to cover an area of hundreds of square miles continuously during storm events. Even so, on the outside chance that our seeding activities might contribute to flooding, we adopted suspension criteria under which all research activities were stopped. These criteria were based on the lateness of the spring season, the amount of snowpack in the mountains, the most recent amount of precipitation, and the amount of water storage space left in Folsom Reservoir. Even flights to simply measure natural cloud conditions were suspended to avoid the public perception that we were in any way contributing to potential flooding.

During the second year of field activities the rain returned to near normal. In the third year the rainfall was above normal, and the reservoirs were filled rapidly. In fact, in 1978-79, the equivalent to the average annual precipitation fell in the central Sierra Nevada in one month. The snowpack exceeded twenty feet, covering the rain gages on the twenty-foot towers we had installed to measure precipitation in the high country.

Occasionally, a fixed storm track will occur like that in 1978-79, in which a series of storms march across the Pacific Ocean from near Hawaii and dump precipitation on the Sierra Nevada. This pattern, called the *Pineapple Express*, may last for a month or more dropping rain and snow almost continuously on the same region. A drought which has lasted for several years can be broken in less than a month under these conditions.

The suspension criteria were exceeded in the Spring of 1979 when storms continued to batter the West Coast and the Sierra Nevada. After several weeks of snow in the high country, the storms became warmer, causing rain to fall on the snow and turn the snow into liquid. Water flowed down creeks and rivers throughout the Gold Country rapidly filling Folsom Reservoir. The level of the

North Fork of the American River crested at 200 feet above flood stage. The bridge from Auburn, California to Placerville was covered for several days and traffic had to be diverted many miles out of the way. Standing on an overlook to the river one could hear large rocks and boulders being swept downstream in the flood waters. Their movement downstream on the granite bottom of the river sounded like a huge freight train. Later, after the water receded, the distribution of rocks and boulders in the canyon had been completely rearranged.

Large quantities of water were spilled from Folsom to avoid invading the reserved space behind the dam. If the reservoir had been allowed to become too full, an even larger flow upstream would have caused the spill rate to exceed the capacity of the downstream channel and create major flooding. Fortunately, the event in the Spring of 1979 never reached that point. But, even the moderate spill rate used caused minor flooding in the Sacramento area for several weeks.

The SCPP had already suspended all operations about a week before the river crested, but because parts of Sacramento were under water and it was continuing to rain, several of the local television stations asked to interview me as the field director. I reluctantly agreed to a live interview for the five o'clock news. I suspected that they were going to ask questions which would imply that SCPP had had a part in causing the flooding. However, I felt the responsibility of responding to the public's questions.

I was asked to meet the television crew on the roof of the State's Water Resources building in downtown Sacramento. This was an impressive location for such an interview because the radome for the U.S. Weather Bureau's weather radar was there and the panorama of clouds over the Sierra Nevada could easily be seen from this twenty-story building. When I arrived atop the building the television crew had already set up their remote antenna on the street with a hookup to the roof. The newswoman instructed me to stand near her on the edge of the building so that the camera could view the clouds and mountains behind us as she asked questions about our seeding operations. A television monitor was set up, so we could see the news crew back at the station and the live lead-in to my interview.

I was beginning to feel trapped! I was facing a live interview. I could see the flood water covering parts of Sacramento below me. And I was expecting some

tough questions on my role in causing, if not at least, contributing to the flood. As the news anchor back at the station began to lead in to my interview, about a minute of video footage was shown of storm damage from San Francisco, just 100 miles to the west. The footage showed mud slides, torrents of water and rain, and buildings sliding off cliffs near the ocean. During these images he narrated the scenes with dramatic stories of people being swept to their deaths and millions of dollars in storm damage.

Then the monitor showed my interviewer and me on the roof as he turned the interview over to her. She asked her first question which was, "You are the field director of the SCPP with headquarters in Auburn, California. You have been conducting cloud seeding for the past several weeks. Do you think your operations have contributed to the recent flooding we have experienced in Sacramento?"

I was taken aback by the directness of the question, particularly following the gentle description of the planned interview she had led me to believe she was going to conduct. As I gathered my thoughts and nerve to launch into a response, the monitor suddenly went dead. I hesitated a moment while the technician flipped switches, banged on the equipment, and cursed. After a few attempts to reestablish a connection with the station, he informed us that the batteries had gone dead and they could not complete the interview. I was never so relieved to be let off the spot in my life. I felt as if I had been about to *take the fall* for all of cloud seeding at that moment. Surely, God must have intervened to save me from major foot-in-mouth disease.

But, this was not to be the last time I was called upon to defend our project. A few days later I received an irate phone call from a woman who insisted that she be allowed to talk with the director of SCPP. She had called several offices of the Bureau of Reclamation in Sacramento until she had finally been referred to me. I tried to convince her that we were not still seeding the clouds and causing her back yard to remain full of water.

I tried my best to convince her that we had suspended seeding operations over ten days before and that we weren't even flying our cloud physics aircraft for fear it might cause some people to think we were still doing cloud seeding. She

told me that she didn't believe a word I was saying, that at that very minute she could see our aircraft flying over her house.

"How could you possibly see our aircraft over your house," I said, "Our aircraft are all in the hanger at McClellan AFB."

"I don't believe you," she said. "I can see several planes seeding the clouds right now! They are leaving long, white trails of seeding material behind them as they fly into the clouds. Every time, just before a storm comes, I can see your airplanes in the sky, seeding the clouds. After a few hours, it starts to rain. This has been going on for weeks, now. I want you to stop!"

I finally caught on. What she was seeing was high-flying jet aircraft leaving contrails in the sky. The high humidity's ahead of each storm caused the exhaust from the engines of the aircraft to become visible. She had identified a cause-and-effect relationship but had reversed it and attributed it to SCPP. The contrails were caused by the storm. The rain was not caused by the contrails. But, I had no success in convincing her that the aircraft she was seeing did not belong to SCPP and they were not causing the rain. After about an hour, she finally got tired of haranguing me and hung up. I guess somebody must *take the fall*!