

CHALLENGES IN FORECASTING, CHILE 2005

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**ABSTRACT:**When accepting an Avalanche Forecasting job on the other side of the hemisphere it is hard to know exactly what you are getting yourself into. E-mails and short phone calls help keep the details hidden, and often this is the desired effect because once you're there, you're there. My scenario: Eighty miles of high altitude dirt road (fifty miles of it littered with avalanche paths), four mine portals, one hundred twenty miners, fifteen beacons, a mining camp and a road camp all located in two separate drainages. Within a few days of my arrival I found myself alone. My forecasting tools: a handheld anemometer/ thermometer, and a couple homemade snow stakes. This presentation is about my experiences trying to keep a struggling mining operation alive during a big winter, and in the end how it came down to getting out alive.

**KEYWORDS:** Mining, Forecasting, Avalauncher.

Walking out of the mandatory orientation with all the other new State employees I checked the messages on my cell phone. Dan Howlett had called, I got in my government rig and called Howie back. He tells me that he got a call from New Zealand; Temple Basin was checking up on my references, this is good news. Then he asks me how serious I am about working there, he just got a call from a guy named Glenn looking for a Forecaster for a gold mine in Chile, apparently Jerry Roberts has turned down the job and they need a guy right away.

So I give Glenn Vitucci a call and after a quick telephone interview I'm hired. My 10 years of avalauncher experience (the mines only means of mitigation) has won me over all the other (zero) candidates. Over the next 2 weeks I am busy quitting my framing job, getting a passport, filling out the paperwork for a Chilean work visa, buying a plane ticket to Santiago, packing and practicing my Spanish of which I have one year of high school and a few Mexican surf trips under my belt.

In retrospect I should've been more careful, whose Glenn Vitucci, What's his forecasting experience, and what about this mine Pimenton, located on the Rio Colorado three miles from Argentina, all looming under the shadow of Aconcagua. Really none of it mattered, it was this snow geeks dream come true, and when the reimbursement for the money I spent on the plane ticket was wired to my account I knew it was real.

The quick and dirty winter history of Minera Pimenton is as follows:

Opening in 1994 the original plan of operation was that Pimenton was to be shut down during the winter months due to the high amount of snowfall and avalanches. During the winter of 1997 a helicopter was hired out to get company officials up to the mine to check for snow and perhaps avalanche damage. What they found was there Ore Processing plant had been whipped out by a avalanche and the mining camp had been crushed from the weight off the winter snow pack. This temporarily put the company out of business for a few years. South American Gold and Copper, which owns Minera Pimenton, got additional investors and new financing that allowed them to go back into business, with the condition that they operate year round. SAGC then hired Renée Leon, and Tim Lane to be Avalanche consultants for the renewed venture. Renée had the Processing mill dug into the mountain and reconstructed with a steep metal roof to shed off all avalanches. Two avalanche berms were built, one above the processing mill, and one above the mining camp. And finally two avalaunchers were purchased one for the mining camp and one for La Cumbre, the road maintenance camp 30 miles away. The first winter was extremely mild for Andean standards. The forecasters: Glenn Vitucci and Jake Amadon, were beginning to develop a snow safety program, but their enthusiasm waned when the snow pack never really developed. The first real storm that allowed for enough snow to take a ski tour didn't come until mid September. Soon after summer came and the avalanche season was over. The owners of the mine were happy they were able to operate during the dreaded Andean winter; they figured it would always be that easy.

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After the eleven-hour flight and going through customs I stumbled out of the airport to find a cabbie holding a card with my name on it. He took me to a nice hotel in town where I met up with Glenn. After our first, in-person, greetings Glenn got down to the regrettable business of informing me that he was sorry for tricking me into coming down to Chile, and I was soon going to hate him for ever involving me in the junk show called *Minera Pimenton*. He told me that he almost quit the week before and if it weren't for me he'd be back in the states already. Now that I was thousands of miles away from home and there was no easy turning back he laid out our forecasting nightmare. It was our job to forecast the slopes above the mine, the processing plant, the mining camp and over 50 miles of high alpine access road with an unknown number of active avalanche paths not yet mapped and with a total of a single 1 mild year history on these paths. We were responsible for the safety of over 100 miners, 50 support staff who lived at *Campmento Pimenton* and 15 road workers 30 miles away who lived at the road camp. To do all this, we had in our avalanche safety arsenal: 2 Avalaunchers, access to some random hand charges, 25 beacons, a couple snow stakes and a hand held anemometer. We had no remote weather sites, we were short 140 beacons for people traveling in avalanche country and we had no transportation to drive around to check out the other paths that towered above the road. We had to forecast all of that from extrapolation from what we were seeing at the mine. Glenn however was working on getting us our own *Avalanchisto* truck.

So after the encouraging pep talk Glenn and I took the subway to a little pub in Santiago, there we meet up with Tim Lane. I had never heard of Tim before, but I instantly knew I was meeting a legend. He's one of the big guys down in these parts. The list isn't long, Renée Leon, Tim and Frank Coffee; these guys keep this part of the world safe from avalanches, and they do it every year in less than ideal circumstances. They must enjoy the challenge. He asked me how Glenn fooled me into coming down here. Tim is one of those guys that every body likes. He took me aside and reminded me that being a forecaster down here, no matter how insane, is always an adventure, much better than swinging a hammer in the summer heat of the Northern Hemisphere. So after 5 rounds of *Piscos* we said good by to Tim and made our way back to the Hotel to meet with our boss the CEO of SACG Steve Houghton. The first impression I made must have been poor, I couldn't eat any of the fancy food in front of me and half way through dinner I had to excuse myself back to my room so I could pass out.

Luckily he completely understood when Glenn told him that we were just back from a visit with Tim Lane.

The next day we piled our gear into Houghton's Toyota and left Santiago early in the morning to head for the mine. To get to the mine you travel North from Santiago to Los Andes, from there you turn east and head up the international highway toward Portillo, just before Rio Blanco you take a unmarked dirt road heading North again, soon you come to a locked gate and check in with the gate keeper, his real occupation is goat herder. After this gate you are on mining lands. You still have to travel over 20 miles to get to avalanche country. When you get to the runout of the first slide path you are still surrounded by cactus and anemic cattle. From here you travel up 45 switchbacks all under 2 major slide paths to reach La Cumbre.



**Figure 1: Avalanche path above road to La Cumbre.**

La Cumbre consists of 4 containers: a kitchen/shower/bathroom, a dormitory, one houses the generator and the other acted as the avalauncher tower. The road clearing operation is centered out of this place, it's home away from home for 5 equipment operators, a foreman and a cook. Of the seven folks stationed here one is trained as an Artillero. The plan was that the forecaster, who lived at the mine and had no idea what the wind and snow at La Cumbre was doing, would call up and tell the Artillero which shots to shoot into La Cumbre Bowl. The Artillero would then do the mission and call back with results. Somehow they were always no results.

After some tea and biscuits we got back on the road and headed toward the mine. From La Cumbre the road travels along on a high plateau for about 18 miles at 11'000'. Here it passes under several unnamed, unrecorded slide paths. I only traveled it completely twice, I'd guess there were over 50 major paths along this part of the road. On

the drive there I kept asking Glenn what were the names of these paths, how and how often were we to control them? He didn't have any answers for me, finally he said that we're not even worried about these paths, just wait for what I'd see at the mine. Only one Path had a name, a big peak named Cruz De La Padre. For some reason, out of all the possible slide paths in the area, they chose this one to be their only problem. We got out and took a look. Yep, a big mean slide path alright, guess some day we'll put one those Avalaunchers on a truck and see what happens, plenty of time for that later.

To leave the high country you enter La Raspa, a series of rapidly descending switchbacks, that take you down 2,500' to the valley floor. Luckily there's no avalanche paths here but the narrow steep road make it's own set of dangers. Bottoming out at 8'000' from here you begin a slow gradual climb back up to the mine. In this zone you are usually out of the snow, you pass by derelict Shepard's huts and broken down earth moving machines; numerous great looking ice climbs hang off the cliffs above. You also pass under massive peaks that hold long clean slide paths right down to the river. No one in the truck new if these ever ran to the road, they doubted these would be a problem for us. They made me feel like a paranoid snow geek, but from what the Wasatch had taught me, these paths were not to be dismissed. Again I got the response " if you're worried about this, wait until you see the mine."

Slowly we worked our way up the river bottom and back above the snow line. After crossing the river twice we climbed up the last series of switchbacks past more abandoned machinery, fortunately, this part of the road strays away from the neighboring slide paths more or less. The first building that welcomes you to the camp is the vehicle maintenance shed, then around the next bend Campmento Pimenton. The camp is a large prefab building, surrounded by smaller similar metallic ones, which are in turn surrounded by High Altitude tents and Containers.

The first thing to do was to get my blood pressure checked by the camp paramedic (company rules). I failed my test. He told me he'd retest tomorrow and if I failed again I have to leave.

Next we met up with Mark Rawsthorne (the Britt), he'd been up here keeping snow records since April, I was replacing him so he could head back to start his ski patrolling job at Portillo. He began his Pimenton career years ago as a geology intern for the mine. He asked me how I got fooled into coming to forecast for this place. I was beginning to get really tired of that question. After

some more small talk we said our goodbyes to Houghton and the Britt, they were heading back to Santiago, it would be another 18-hour road day for the hard working CEO.

After we moved our gear into the forecaster container training began. I had a crash course in weather forecasting, which was done from looking at a number of weather sites on the Internet, which we got through a spotty satellite feed. Most of the predicted snow totals came from a meteogram, which is a computer generated forecast for your particular longitude, latitude and elevation; not very accurate. Next we went over to the snow study plot, there was the usual: 12, 24 hour and storm stakes but only a 100cm master stake, seemed a bit short to me. Our wind averages were taken from a 10 second reading from a hand held anemometer. From this I was supposed to extrapolate what the winds were doing on the ridges 3,000' above as well as 30 miles away at La Cumbre. Next Glenn showed me around the camp, the mess hall, rec room, offices, and the place where we hang our forecasts etcetera.

The next day we walked through the basin: to the processing plant, the mine, the exploratory drill rig, which currently was in a safe zone between to smaller paths in the upper basin. Then we took a quick look at the avalauncher and our explosives cache, which was located with the mines cache in a tunnel whose entrance was located under a sizeable path a mile away from the avalauncher tower. Hmmm might want to move those.

The mine had three entrances all stacked on top of each other a fourth tunnel well to the south was the pulverine (explosives cache.) At the base of the mine was an office, a welders shack, pumps and a master generator. Even in a storm with miners inside there still was a considerable amount of work needed to be done outside not to mention the trips to the pulverine to get more explosives which happened about twice a shift.



**Figure 2: Mine and it's 3 Levels, Pulverine to the left.**

After a few days of training Glenn took the Pimenton Highway back to civilization. Our work scheduling was supposed to work out so Glenn and I flip-flopped 10 days on and 10 off. This never happened. With Glenn gone it was time for me to put my skis on and get to know the place. The touring was great, endless slopes with no one to ski them but me. The snow pack was not great but not bad, the winter so far had been relatively dry but warm. Small .5 mm facets were found only on the due South facing slopes.

Only the 2 mine dogs took interest in what I was doing and pretty soon I had a couple of regular touring partners.

Skiing from Mt. Pimenton, the peak directly above the camp, I noticed a loader working on enlarging a switchback that was located in the convergence of two large South facing slide paths. No avi danger today, but I'll have to remember that spot on the road next time we get some snow.

Next day me and the dogs were checking out the slide paths above and alternate entrance to the mine from the south. From here we (I) made turns down to the river bottom then the slog back up the mining road to the camp. On the way up I saw the spectacle of the Connors boys moving their exploratory drill rig down the road. I couldn't imagine the work that must have been involved getting that thing up the entire Pimenton Highway. As I passed by I asked them where they were parking that pig. They pointed to the enlarged switchback I saw the day before. I told them they

couldn't park it there, an avalanche could hit it, snow was forecasted two days from now. There response was "eehh ya, we're Canadians, know a bit about snow too, think she'll be ok, ehh. I went about explaining why it was a real bad Idea to leave their million-dollar drill in that particular spot. There response was the same, ehh. I didn't surprise me that they didn't care much for my expertise, but how did it work around here anyways, in a lions den of avalanche paths, as a forecaster, wouldn't they need to get my permission, or at least get my advice before picking out a new pad for the drill. If I hadn't been touring on this side of the drainage I'd have no idea where that drill was getting parked. So I hustled up to the camp to talk to someone who could get to Connors boys to listen. I chose Mathew, the mine manager. I explained to him the situation and the inherent dangers. His response was, "oh, we have avalanches over there too eh? (He was also Canadian). Were not worried about those slopes, we've never seen them avalanche." "How long have you know the history of those paths," I asked. "Since 1999," was the reply. I tried not to laugh, 6 years of history. "That's not close to enough to make me feel any better about that drilling rig," I said. He shrugged me off and sent me on my way. If they're not going to listen to me then I guess is time to cover my ass. I spent the rest of that evening e-mailing the CEO, Connors, and Rio Tinto (the investors behind the drilling for Pimenton). Luckily I had taken photos the day before, so with the aid of photo shop I made it real easy for everyone to understand what would happen to the drill rig if it didn't get moved before we got a big storm, and the one on the radar was looking like a strong possibility.

I saw Mathew the next afternoon. "Looks like you went to the top on this one." "Yep," I said, "It's in a terrible spot."

"Well they're leaving it."

"That's fine, it's not on me now, and your going to loose your container office at the mine entrance if you don't move it too."

"That's been there for 2 years, I think it's fine."

"Just doing my job."

Just about this time the jet stream begins to raise northward. My forecasts sent to the corporate offices in Santiago begin to predict a lot of snow and wind for the next week or more. Avalanche forecasting in the Wasatch, all I have to do is call one of two meteorologists that are employed by the state and I get a detailed specific forecast for my canyon; weather forecasting is something I've never had to do for myself before. I hope I'm getting my forecasts right, at the same time I hope I'm

getting them wrong. For the first time in my life I don't want it to snow. I prepare for the storm by making a longer total depth stake out of bamboo and magic marker. Next I get the avalauncher rounds moved from the pulverine to the avalauncher shed, a story in itself. The mine prepares by getting its ore slurry (\$\$) trucked out of the mountains.

I get a conference call from Santiago, they want to pull the plug and move the drill rig, they ask if they still have a two-day window to get it done, it tell them they can try but its probably too late. So the decision is made to continue drilling and when I think it's time, the drillers will come back to camp, and the drill rig will stay. I'm relieved, first sign of some understanding.

The storm rolls in on the morning of June 9<sup>th</sup>. Nothing to worry about so far, I go out for a tour to get a look around, for some reason the dogs don't follow. After about a half hour climbing I stop to take a look around. I can't see anything except gray. I've never been in such a white out and it's barely snowing. I rip my skins and start to descend, I crash, I can't even make out the angle of the slope. In complete vertigo, I traverse left to find my skin track and follow in back in. I'm relieved to finally make out the shape of the mining camp. Lesson learned.

The snow picks up through the day, only about 6" of new. You feel silly holding a compass and anemometer to get 8mph for your wind data, when you can hear it howling from the ridge 3,000' above. I have no idea what it's doing up there but howling is howling and that's bad enough. I begin to get that feeling in my gut, it's not yet familiar to me, I'm still pretty green as a forecaster. I go talk to Mathew.

"How do we go about closing down the mine?"

"You're not closing her down, are you?"

"Thinking about it," I can tell he didn't like that, so I add "maybe in a hour or two." He goes on to explain to me that Pimenton is a 30 million dollar company, which is ma and pa in the mining industry. Starting now, this need to be the month that they turn it all around, they must make a profit or they'll be sunk again, so there needs to be no interruptions with the mining. I understand, I'm working with a new set of rules, I begin to understand why I'm here. We make a compromise; I will allow the miners to keep working (they're under ground anyways), if he pulls out all the support personnel working on the surface. We've now received 18" of 4%, it's 17:00. In a perfect scenario, between mining shifts I would have cleaned up the slopes above the mine with the

avalauncher, but I didn't have any rounds to waste. The cache log showed 80 avalauncher rounds, but digging around later I only found 27 tail fin assemblies. In case this storm lasted a week I needed every round I could spare to keep the mine and the camp protected.

Lying in my bed trying to sleep, I hear the wind outside start to pick up, It's beginning to blow hard down here now, wonder what it's doing up high? I get up and check the snow totals; eight more inches, better shut her down. It's 22:00 no time to be doing any rescues. I go inside and tell Mathew the bad news. "I gotta pull the plug." "Really, can't we go just a little longer?" "Sorry, we've pushed it as far as we can, we need to shut down now."

"...Ok, I'll radio and let them know, have everyone head back to camp....if we have to."

"Alright, I'm heading back to bed." I went back to my container and tried to get some sleep but found it impossible, the feeling in my gut wouldn't go away.

About midnight I awoke out of the semi-sleep haze, someone is pounding on my door.

"Ariba, Ariba, Avalancha, Avalancha!" I open the door, "donde?"

"A la minera." I got dressed like a fireman, grabbed my gear and was out. All right calm down, I try to tell my self, what's the panic the mines shut down everyone should be safe. There was a chained up pickup and driver waiting for me outside. "Adonde vamos?"

"La minera," he replied.

"Pero la minera es cerrado." He just kept driving.

"Donde es Mathew?" I ask. He points to the mine.

As we drive up I see miners everywhere outside, no one seems too panicked. Inside I'm freaking out, it's really coming down now, there are no less than 20 guys out here in the dark, maybe 2 or 3 of the bosses are wearing beacons and I have the only shovel. We drive over to three miners, they jump in, two of the guys are helping the third who seems really sick. We take them back to the camp. I protest that I need to stay but I'm Ignored. At camp the sick guy gets out and pukes then the driver and I head back to the mine. When we get back there I make out Mathew through the storm. "What's going on, why is everyone still here?"

"Well we couldn't close the mine down and a miner was caught in a slide." What did he mean they couldn't close the mine down? This was not the time or place for a explanation.

"Where's the guy that was buried?"

"You just took him back to camp."

What? "Ok, lets get everybody back to camp."

"Alright, but you and me need to go through the mine first."

My earlier order to close the mine down was taken as more of a suggestion and then ignored, even our compromise wasn't honored. A miner was driving from the second tunnel to the third, about 40' shy of the portal his truck was hit by a small avalanche, he unrolled the window and climbed out of the truck, then he was hit and buried by another slide. A miner just inside the portal after a while looked out side to see what was keeping his friend, he saw the buried truck and luckily he saw the fingers of the buried miner. He ran over and dug him out with his hands. His buddy was coherent but in bad shape. He radioed for another truck to come up and get them (this would be their fastest means of evacuation.) As the other truck drove up the mountain it was struck by another slide, the driver got out and made his way to the other two waiting in the portal. Then two miners helped their sick buddy through the mine down to the bottom portal, and that's when I was notified.

After everyone was evacuated to camp Mathew and I walked into the mine. "What are we doing," I asked. "We're going to try to dig out the trucks and get them inside the third portal."

"No way."

"Will you just come look?" I could tell he was desperate; losing those trucks would be a big blow for the struggling gold mine. I did want to see the inside of that mine, and maybe my cooperation would score me some points. If I said no he'd most likely go by himself.

"Sure, but when we get there, there's no promise we'll go out and get those trucks. Ok?" He agreed and we started our climb through the mine. After an hour the roar of the wind broke the silence. We'd made it to the third portal. I poked my head out of the tunnel and looked around. It was amazing, it was snowing so hard, we had just traveled through the mountain and were at 11,500' looking right into the heart of a rapidly loading slide path, it felt like I was looking a Great White Shark in the eyes, and there about 40 feet away I could just make out the red of the first buried truck, the atmosphere was moving sideways. "Death on a stick out there, we won't be able to save the trucks." Mathew stuck his head out, in one quick look his sense of duty to his fathers company died. "We'll have to cross our fingers for the trucks," he said "let's go back." I agreed. I was so relieved I didn't have to be the bad guy and talk him out of certain death.

Back at the camp I made sure everyone was accounted for and that no one was to go outside of the camp, then I was finally able to get some sleep. The next morning everyone was

wondering when they could return to the mine. It was still dumping out and I didn't have enough rounds to use on control work until there was a break in the storm. So we were interlodged until further notice. I soon became the most hated man in the camp. If the miners don't punch the time clock in the mine, they don't get paid, and to them I was the reason they weren't punching the clock today. It didn't matter their buddy almost died yesterday, they needed the money, and I am sure they figured avalanches was the least of their worries when it came to the long list of dangers encountered in the mine. About noon they raided my cache and took all of the rescue shovels. They laughed at the silly little plastic shovels, but that was all there was to use. They passed the time by digging out the camp. We stayed in interlodge through the day and night, the next morning there was a break in the storm. I woke up my Artilleros.

It was illegal for me, a foreigner, to handle explosives, so we had a few Artilleros trained to help fire the avalauncher.

Every round we made up had over a half-inch gap between the charge and the fin assembly. Who ever put the ferrules into the fin assemblies didn't get them all the way down so they were glued sitting up in their slot. We also added Recco reflectors, that I had brought from the states, to the rounds, unfortunately I didn't bring any super 88. We set up for the biggest path above the mine portals. The Artilleros wouldn't let me touch anything. As the shot left the barrel I could see all the electrical tape and RECCO reflector instantly get ripped off the round as it flew away. Dud. We got grief from the peanut gallery below watching from the open camp doors. The Artilleros loaded in another round, according to the betzel, we were still aimed at the largest path. "Fuego!" This shot flew well short of the starting zone but at least went off. No results. With the next shot I tried to adjust the pressure, the Artilleros refused, they had been instructed to do only what the data stated, and like good little robots they complied. So that's how the mission went; 50% dud rate, no direct hits and no results. Now I pretended like I was pissed, "no, give me that round!" Christian and Jaime just stared at me. I took the last round and loaded it into the breach. Christian grabbed me. I shoved him back, aimed the barrel, pressured up (added 25 additional pounds), took the safety off, "fire!" I opened the valve, the round exploded in the center of the biggest starting zone on the mountain. A class 3 ripped out, ran down the path and buried the mine portals. The Artilleros were chirping, they have never seen an avalanche before; they didn't realize until now that this is what was supposed to

happen when you do control work. The peanut gallery lets out a cheer too. We make up a few more precious rounds. Ok next shot, unbelievably the Artilleros try to stop me again as I position the next shot, I tell them I'm the boss of this gun, and I continue. Another class 3 rips out and sends down a big cloud were the stranded trucks probably are. Next shot, another class three that runs to the creek. Now the Artilleros are letting me have my way, I send up one last round to protect the pulverine, I get another class 3 that crashes down the slope sending a harmless dust cloud toward the peanut gallery. What a great mission. We walk back to camp a few hundred yards below.

Interlude was lifted and we loaded up in the Unimog and drove up to the mine. The avalanches, natural and controlled, had buried the mine about 10' deep, the top of the level 1 portal was just visible. Soon the cavalry arrived and miners everywhere were digging out. I was radioed from the office; apparently the exploratory drill had been hit, I was anxious to see this.

One the way down the hill to the drill we were stopped by a strange sight; in the slide path to our west there were hundreds of 5 gallon oil cans scattered about in avalanche debris running for a mile to the river, those were just the empty ones on the surface. Apparently the slide that hit the drill rig also clipped the vehicle maintenance shed and snatched up a few hundred empty and full oilcans and scattered them everywhere. "Does Chile have a EPA," I ask.

"Yes. Why?" Mathew defensively replied. "No reason." I later learned that at one time the river had been a trophy trout stream, also had salmon spawning in the fall. The streams been dead for a few years now, Too bad. Me made our way to the drill.

The whole body of the rig was buried with the boom sticking out above the surface, no real damage was done, the snow had been so unusually light that all the avalanche had done was just bury things, not smash them to bits. There was soon a small army of miners digging out the drill rig. Their boss handed me a shovel, I shook my head and handed it back. "I warned you this would happen." He didn't speak English. I took a bunch of pictures then left. I got to admit that secretly I was glad it happened, no damage was done but now maybe they'd listen to me. Hopefully they can get that thing out of there before the next wave hits, according to my rookie weather forecast there wont be time, next wave scheduled to hit late tonight and will be as big or bigger than what we just saw.

Sure enough, the next wave hit us hard. Storm totals were up to 60 inches by the 12<sup>th</sup>. With the lack of avalauncher rounds, there was nothing to do but wait. Slowly the miners were realizing that this predicament wasn't my fault, and they became friendlier. It was tiring to be constantly questioned as to when to snow was going to stop. My answer always got bad responses; next week, maybe. Everyone was ready to go home. Digging out continued, but soon there was nowhere left to put the snow. I thought the camp might collapse again, like it had in '97, but it never did. By the 17<sup>th</sup> the storm total was 129" @ 7.5" water, 6% water content, still very light, unbelievably light for maritime snow. That morning there was a small break, the sun never popped out but the snowing had almost ceased. We went back to the Avalauncher. I felt the need to knock down some snow was worth burning through a few rounds. Using the new data we acquired from the last mission, we knocked down 4 thundering avalanches using up 9 shots (4 duds). We couldn't see anything but they sounded real big, and I guessed they were probably class 4's.

I toured up to the mine, Mathew followed behind on snowshoes. By using my probe, and then shoveling down when the length of the probe was swallowed by the debris, we found the entrance of the mine about 16 feet down from the surface. No attempt was made to shovel the mine out this time. I couldn't help but point out the office container thrown into the creek.

Next I went down the ridge to look at the drill. There'd been no new avalanches, the drill was still hanging in there. The sky kept lifting and soon it was light enough for a helicopter to fly up to us with some supplies: food, cigarettes, Avalauncher rounds, and fin assemblies were brought up. As the heli climbed up to the camp, the pilot found he was over weight for the thin air, so some boxes of onions and potatoes were sacrificed out the window. As the helicopter approached everyone came out to the cleared lower parking low to watch. I think someone told them cigarettes were coming.

The best part was when one of the dogs greeted the ship by trying to jump and bite the spinning rotors. The pilot unloaded the powered-up ship indifferent to the jumping dog. Every time the dog jumped she came to within inches of the blades. My first instinct was to run down there and grab the dog, I ignored it and took pictures of the unreal scene. After the gear was unloaded, the Canadian drillers got in the ship and left. Although my drinking buddies left with the helicopter, my avalaunchers arrived in their place.



Figure 3: Miesha jumping for the blades.

That night I assembled the tail fin assemblies the correct way, with the ferrule pressed down all the way flush. After that I had no more duds.

The morning of the 18<sup>th</sup> I awoke to ice pellets smacking against my window, I got outside to measure 6" of the stuff @ 20% water weight. At this time we had over 9 feet of dry snow lying on slopes that we hadn't heard from yet. If this heavy snow kept up we were in for big trouble.

By noon the interval snow stake read 8 inches, I measured 32% water weight, heaviest snow I've ever heard of, and it's still in crystal form, not rain mixing with snow. By the 17:00 observation I have another 4 @ 20%. The feeling in my gut intensifies, I stay up and watch it snow. At 01:00, through the haze of the lit parking lot I watch a 40" slab peel off of a 10 degree shed. Signs of Instability! I should have been shooting an hour ago! I race into the dorm where my Artilleros sleep, wake them up and tell them to get the Avalauncher ready. Then I interrupt Mathew from his virtual multiplayer computer war game and tell him I'm shooting for protection above the camp. He calls a timeout over his head set, the other office boys groan and look up from their computers. "Do you really think it's necessary now."

"Yes," I tell him. "I want to get everyone in the camp and put them in the rec. room."

"Hold on, I don't think so, it's one in the morning."

"Go outside and look at the shed out front of the office and come back here and tell me what you think."

He ran out, more groans came from the computer lit faces. He ran back in, white as a ghost. "Now I'm scared, I wish you didn't show me that." He then sent word to the other outlying dorms, and by the time we we're ready to shoot every one was

buttoned up in the rec. room; it was (I hoped) the safest place to be.

We shot eight rounds up on Mt. Pimenton, no avalanches, at least nothing audible. We lifted the maximum interlodge, and went back to camp. I awoke the next morning to calmer weather, by first light the skies were lifting. The storm was at last over. The forecast was for high and dry for at least a week. I thought of immediately waking my Artilleros and shooting. Then I stopped, this will be a day of avalanche hunting to remember, no harm in waiting for more light and clearing, I want to see these monsters when they run.

I had to put my skins on to make it to the tower, and the Artilleros had to wear snow shoes to make the 200 yard walk. It was the most impossible upside down snow I'd ever been in. It took me over 30 minutes to check my snowstake: 22" @ 4" of water. The Grand total in ten days was 154" @ 13.5" water. More importantly 32" of 20% fell on top of 122" of 6%. I was going to do my best to bring it all down.

We were ready with our first shot by 09:00. It was my best single avalauncher mission ever. Every shot peeled away bigger and bigger slides; my Artilleros were howling with laughter, high fives were flying around the tower like a dugout after a grand slam. After the last shot I radioed the camp, I ask to talk to Mathew, I felt like gloating a little bit. "He's asleep senior."

"WHAT!!!!?" my finest moment missed by the person who needed to witness it most, who should be caring the most, The guy who should be wiring his Dad to tell him that I needed a big fat raise sleeps. It's now 10:00. Oh well, why wake him now, I'll sneak out for a tour before he awakes and busies me with some other task.

I climb up Pimenton to look for results, and to get a good look at the shattered appearance of the mine. The dogs can't keep up in the deep snow and soon turn back. A slide has filled the berm above the Ore Plant, and another one has tested out the avalanche proof design of the building (good job Renee, it worked). I spot a blown in fracture up higher on the mountain, this one in range of the avalauncher, I naturally take credit for this one from last night's shoot.

Up to the ridge for a few pics, then down to visit the Drill. I felt safe skiing the giant swath carved out by the debris as I make my way down. Now and then I'm startled by the sounds of avalanches across the canyon as they come crashing down to the river as the north side warms up; this is in an area where SAGC wants to put a second camp.



The drill rig is easy to spot, it's been hit by a massive slide but its mast is still in place though badly twisted. The outer shell of the drill has been smashed to pieces leaving its guts exposed, maybe a total loss, I don't know. This morning I tried some over the hill blind fire shots for protection, I don't take credit for this slide. We'll be calling it a HS-N-R4-D4 running to the creek 3,100'. I head back and tell Mathew the news. I think by now, no one really cares for much else but getting out of there.

With the forecast cooperating we should be out here soon. Not really. Like I stated before SAGC was small struggling mining company, cost had been spared on the snow removal equipment. Now began clearing the road at a glacial pace.

Well, At least for me my work was done, after a few quick reports I was out touring. I spent the next week exploring the drainages around Pimenton. Me and the dogs logged countless miles skiing all over the upper drainages. After a few days the road crew had made it a few miles down the Rio Colorado where they ran into a massive wall of debris. During the storm, avalanches fell from a few of the bigger peaks along the river corridor hopelessly blocking the road. These class 5 slides started out as dry avalanches, but somewhere along their paths turned into wet snow slides. My theory for this is heat from kinetic energy and/or friction from such a long violent avalanche turned it into a wet slide in its lower track. I've been told from respected educators that this is impossible, most likely the avalanches came in contact with wet snow lower in the track, that's why they turned wet. Despite their superior education and accepted theories, I don't buy it. Through the binoculars I saw massive crowns at 13,500', at the river where I stood the snowpack was dry all the way to the ground. In the lower third of the path the track showed gouge flow signs, then like a slow wet slide it oozed down onto the road and stopped, lacking the energy to cross the 15' wide road and slide down the remaining 40' to the river, Leaving its total mass of debris piled upon the road 30' high and about a half mile long.

When I was brought down to see this, they had spent the last day clearing out about 20' of the road. And I could see another massive slide parked on the road a mile away. I told them to build the road on top of the debris, well worry about it later in the spring. They all agreed, and soon we were getting somewhere.

From the other side of the Pimenton Highway work from La Cumbre was slow, Glenn was holding down the fort, and as acting more of a boss than just an avalanche forecaster. He was dealing with

broken equipment, supply shortages and a pleasant little mutiny. The road workers from that side were just getting the job done. The road workers from the mine told me they were digging for their lives, they wanted to get the hell out before the next storm hit.

Once the road crew got to La Raspa, and were out of the avalanche zone for now, I commenced my exploring. The only bummer was that I left my camera charger in Santiago because I didn't think I'd be away for this long.

I had to remind myself that touring around this place was very dangerous. It wasn't the snow; it was the most stable I've ever seen, the danger lay in the remoteness. If I got hurt out there, there was no one coming for me. If somehow I could radio the mine, which usually went out of range of the little Motorola, with my poor Spanish skills it was highly unlikely that I could explain to them where I was, I guess Mathew could translate, odds were he'd leave me out there. Then if somehow they knew I was hurt and my location, then who among them could get to me. There were only a few random pairs of snowshoes at the mine, and then if I'm fortunate enough to make it back to the mine, then what? The roads closed. Bottom line: don't get hurt.

On the morning of the 26<sup>th</sup> I put out the weather forecast; new storm coming. Then grabbed a lunch from the cooks, and headed out. The dogs and I were trying to ski to Argentina. It was a great day, some of the safest and steepest skiing I've ever done. At the pass that made up the boarder, there was a giant tripod looming out of the snow, some kind of boarder marker; I couldn't guess how they got it there. In the afternoon we headed back, when I got within radio range I heard a lot of chatter on the radio, better hurry back. The dogs and I hustled back up the switchbacks to the mine to find the place in chaos, a happy chaos. Even the toughest Miners were hugging each other and crying. The road was very close to opening and we were leaving. I noticed Mathew carefully packing his truck with a couple computers. "What's going on?" I asked.

"Road will be open by late tonight, we're packing up to leave."

"What's with the computers?" Around me everyone was packing up everything of value.

Mathew looked at me, "with the next storm coming we're evacuating everyone."

"And the computers," I add.

He dug deep, "Well...there are banditos who know these canyons like the back of their hands, if they find out that there's an abandoned mining camp they'll come around the back ways and loot this place."

“Mathew, we’re pulling the plug on this place aren’t we? I’ve toured all around this place, there are no backways. We can’t get anywhere around here without a half million dollars worth of equipment clearing a path for us, and tomorrow some horsemen will magically appear to loot the place?”

“Yep, you’d better hurry and pack all your fancy avalanche things, we’re leaving in an hour.”

I ran up to the container and started packing. When I brought my stuff to the parking lot I felt like a little rich girl with my personal belongings far out numbering everyone else’s. “My job requires a lot of gear,” I try to explain, “Howie made me bring a RECCO Detector.” No one understands me; I’m thrown a few sideways looks. Every one is still busy cleaning the place out. I go into our snow safety corner, I pack the anemometer, CAA guideline book, and the leftover RECCO reflectors which should’ve been duct taped into the boots of the road workers, ‘Damn it Ramón.’

I write one last entry into the weather and avalanche log; “26/6/05 (that’s how they do it in Chile) Abandoning Campmento Pimenton. Figuring I’d never be back I wrote some words of wisdom. “The avalauncher pressures located in this here log are good, you can trust them. When making a closure make sure to cover your ass, get a signature of the manager and e-mail a notice to the office in Santiago. Good luck and don’t bet money against Chile on soccer games with the miners, you might win. –matt.” After that I ran outside, the convoy was ready to leave. It was impressive, they packed up everything, and even the dogs were coming. The men were giddy, I don’t think any of them realized that they’d be soon losing their jobs, but I didn’t know for sure either.

We were on our way about dusk. I got to ride shotgun in the first truck to assess the avalanche danger, there was going to be none, but I kept my mouth shut because I didn’t want to be crammed in the back with 4 of the guys from the office. It took forever to get anywhere, we moved in convoy style, stopping and waiting for the slowest rig. Vehicles broke down and were quickly repaired or abandoned. A truck got stuck crossing over the avalanche debris bridge, someone had to go back and help him out. The whole time the boys were chirping, so happy to be going home to their wives and to be out of the mountains. Most swore they’d never come back; time to get another job anyways. They didn’t get much of a choice in the matter.

We moved on and were soon going up La Raspa; such an impressive stretch of road, then on to Cruz De La Padre. I got out and took a look around, making to men think I was about my work, some of them got nervous. “Esta bien, vamos.” We moved

on. When we got to La Cumbre signs of the approaching storm were appearing. Everyone got out to greet the crew at the road camp. I told Mathew that we’d better get down out of the reaches of La Cumbre before we start partying. Then I ran into Glenn. “You hate me yet?” He asked.

“Dude, why would you knowingly ever come back to work here.”

“I guess I’m crazy.” It was good to talk to another person in English besides Mathew, and even though I felt like Glenn had hung me up to dry, it was really good to see him. He told me he’d be buying the first round of Piscos tomorrow. As we worked our way down the switchbacks of La Cumbre, the storm hit, Glenn and I waited at the bottom until everyone was out. We all had narrowly escaped getting trapped again.

In Los Andes the CEO was waiting for us, he seemed glad to see me, he told me I did a great job. It felt good. Thinking back on the whole fiasco, I realized how easy it had been to have left a good impression. Everything I warned them about happened, not because I was that good, but because what they were doing was so completely the wrong thing, and then it snowed 3 feet of heavy snow on top of 9 feet of fluff, and (borrowing a line from Bruce Tremper) the stack of magazines came sliding off the coffee table. I could have forecasted that mess as a first year ski patroller because it was just that obvious, they however; didn’t know better and thought I was some kind of avalanche whiz kid, and I let them, why not?

I never made it back to the mine. I spent the rest of the summer split between writing insurance reports about the avalanche damage for the company, and forecasting for the futile road clearing efforts. Only got stranded one more time. Glenn made it back to the mine while I was at La Cumbre. I don’t think they were able to locate to mine portals.

The final nail went in the coffin when the insurance company challenged SAGC’s attempt to collect on an ‘Act of God’ clause. September 8<sup>th</sup> I was finally released of my contract and sent home with a bonus. When Steve Houghton asked me if I would come back the following winter. I told him no way. To this he answered “you don’t have to tell me yes but don’t say no.” I agreed to those terms.

A week later back in Utah I was never so happy to be swinging a hammer.

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