

Jackpile and Sohio Western Mining Memoir

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CHAPTER 1

In March, 1977, I had a job interview for a Mining Engineering position at the Jackpile Mine located on Laguna Pueblo, New Mexico with ARCO-Anaconda. We drove over to Farmington, left baby daughter Addie with Granny Pecoraro and went to Laguna by way of Gallup (down old US666) and through Grants via I-40. Jackpile was the largest surface uranium mine in the world and was going into some increased surface production and underground development in response to the rising price for U_3O_8 or “yellowcake”. The mine had been in production since 1951 and so was one of the first of the “Colorado Plateau” uranium producers. The price increases were in response to a high demand for a spate of newly planned nuclear power plants.

I met with Erwin Green, PE who was the Engineering Manager and Alex Cortez, who was a deputy manager. Erwin showed us the company housing that was offered. The housing area for salaried employees also had on staff an elementary school teacher and classroom building. The houses were really old but only cost \$40/month. While I took a tour of the mine, Michael Black’s (an underground engineer from Idaho) wife showed off the campsite; my spouse Joyce looked at the houses and started to cry. Since I was trying to get to Albuquerque so I could begin my MBA program, we thought it better to commute from Albuquerque (about 60 miles one-way) and Alex Cortez offered to include me in his car pool. I was offered the job and accepted it and the moving van loaded up our stuff from Cedar City, UT for the move to Albuquerque. The other people in the department were Ike Peacock, Chester Cheromiah, Roger Mourich, Ken Pino, Doug Gordon, & Z. Earl Arlin was the mine superintendent for a while, John (?) Nelson ran the P-10 underground engineering, with engineers Ron Ringhand and tech Chris Cherrywell and Andy Anderson was the underground superintendent and later James Manning & Cisco Apodaca got hired.

I commuted to work in a car pool with Alex Cortez, Conrad Lucero (a carpenter from Laguna Pueblo at that time; Mr. Lucero was later a Governor of the Pueblo in the early 1990’s)

and a draftsman (name I can't recall) from the P-10 underground mine. The commute got pretty old but I was able to go to UNM at night. Not long after, Cortez left for a job in Wyoming and took his brother, brother-in-law (Allen Bowden who I carpoled with for a while) with him (they were contract surveyors from Marmon Engineering in Laguna). Erwin brought in a friend (Bob Chambers) from Montana who had been temporarily assigned to Anaconda's Twin Buttes operation outside of Tucson, Arizona. Bob was close to retirement. He used to be in the National Guard in Butte, Montana and told us he had had Evel Kineval in his unit. Said he was the biggest jerk he'd ever met.

As Chambers was getting to retire, Tobe Leigh, a mine planning engineer from the newly closed Yerington Copper Mine in Nevada, came to work with us. Tobe was also getting close to retirement and when the Chief Engineer position came open, he wanted to know why I hadn't put in for it. I told him I didn't have the experience. But when he left, I sort of got it by default. Chester Cheromiah was a draftsman who had spent many years around Ganado, AZ and knew Navajo. After I got promoted, he used to call me "Natahni" which is a Dine' word for "chief". I also was called "Olsen Nez" for "tall". Chester had been in the army in WW II and landed at Normandy on D-Day. He said he didn't remember much about running up the beach because he was so scared he sort of blocked it out of his memory. Chester's family apparently had, at one time, the property which overlaid the Paguate ore body, which was huge. They could have qualified for the royalties but the documents on the claim of ownership were never accepted or recognized and he missed out. Another time at the mine he half-jokingly said: "You white men stole my land, drafted me to fight for it, and now you're hauling it away in railroad cars!" Quite a commentary on his history.

George Bassett was the new superintendent after Earl Arlin went back to Bluewater mill site; Tom Woods had gone to United Nuclear and assistant superintendent Emerson Riley stuck around to help George. George had transferred over when Yerington was closed and Emerson was from one of the Laguna villages. Tom Dailey was the on-site personnel contact and a very nice old man.

Michael Black had earned his mining engineering degree at Idaho, I believe. He said when he was up there, he was on a mine rescue team that got called out during the Sunshine mine disaster (in 1972) where there was a pretty bad underground fire that killed 91 people. Apparently the mine fire had smoldered for some time in some old worked out areas and everyone knew about it and it wasn't that uncommon in sulfide deposits to oxidize and generate a lot of heat and fire. It was thought that the bulkheading work would contain it OK but something happened and, according to Mike, it was the carbon monoxide and gases released in the breach that actually killed most of the people, not the heat and any flames. He said the CO was in such a high concentration and got into the underground airways so quickly they found miners in the lunchroom who still had pieces of sandwiches in their mouths—one breath and they were gone. Mike left about a year later and went to work on the BWIP (Basalt Waste Isolation) project up at Hanford, WA (next to the weapons complexes) where they were proposing to store high level radioactive waste in the basalt formations along the Columbia River. *[The project eventually got shelved when the DOE decided to put their efforts into Yucca Mountain, NV].*

One time while the uranium was still booming (1978 or so), KGGM-TV in Albuquerque was doing a story about the industry and sent a film crew out to the Jackpile. I got to take the tour group around with Manny Fitch who was a PR guy from Anaconda's Bluewater mill and whose brother was at one time the general manager. Fitch's father is who they named Fitch Hall after (now on the Register of Historic Places because it was a WPA project during the Great Depression) at the New Mexico School of Mines (later changed to NM Institute of Mining & Technology in the 1950's). The TV crew interviewed me and it was aired on TV that week. I wish I could have gotten a copy of that broadcast but in those days no one had VHS or playback units anyway.

One of my co-workers (Archie?? Formerly from the Park City, UT operation) once said: "They don't call Anaconda 'The Snake' for nothing".

In the P-10 underground mine, they told a story of some big strong kid they had just hired as an underground laborer. He didn't know anything about mining or miners. They took him down a track drift and there was a miner who was driving 60 penny spikes into the rail ties with a 16 lb. double-jack (sledgehammer). One of the miners asked the kid: "Do you think you could do it with one blow?" The kid was pretty cocky and said "sure". The miner asked him: "Do you think you could do it blindfolded?" "Yeah", he replied, "I could even do it blindfolded". So they put a blindfold on him and a miner said he would hold the kid's lunch can. After they put the blindfold on him and by feeling they showed him where the spike was going to be started into the tie. Just as the kid rears back to strike the spike, they put his lunch can next to it and he proceeds to absolutely destroy his lunch bucket (and lunch) with one blow of the hammer.

Around Christmas time (maybe 1978), several of the miners & mechanics apparently started drinking underground and things soon deteriorated. At the Mine Safety and Health Administration (MSHA) hearing afterward, General Manager Bob Lynn said: "It was your basic riot". Lots of drunken behavior and a couple of the foreman who were supposed to be keeping order got tied up by their crews, a traditional initiation rite for new miners. I think a few people may have gotten fired but the union was able to protect some of the "perpetrators".

The mining operation was interesting. The open pit began in the early 1950's when Anaconda hired Isabel Construction to do the first stripping over in the east Jackpile Area where the original repair shops were located. They also mined the Woodrow Pipe, which was a high-grade (although very small) breccia pipe (with a variety of mineral occurrences) not unlike the Orphan Mine located in the Grand Canyon. Early on (back in the '50's), they had brought in an Alpine miner (rotating cutter heads) to explore and test mine some of the deposits. [*We actually uncovered some of those openings during the reclamation project in the 1990's*]. The ore occurred in the Jackpile Sandstone and was overlain by the Dakota formation, Mancos shale, and Tres Hermanos sandstones, the upper formations present depending on the erosion of the overburden. Underneath the Jackpile was the Brushy Basin formation and there was no ore

there. The mineralization was coffinite and other silicates and oxides of uranium. Once in a while they would find petrified wood with uranium all over it but they were essentially not able to mill them in the Bluewater circuit since the carbon wouldn't easily break down. *(I found a nice piece of uraniferous petrified wood and donated it to the Tech Mineral Museum. It was on display for a while but has since been put into storage, according to Bob Eveleth, the State Mine Engineer. He said at one time the museum caught a bunch of criticism about having radioactive materials on display and potentially harming people).*

The bulk of the ore occurred in lenses or roll fronts and were typically quite small. As such, grade control became problematic and much attention given to minimizing the dilution. The overburden was all drilled and shot since it was pretty tough but the Jackpile was ripped with bulldozers in about two-foot lifts to break the ore to where it could be handled but at the same time not mixed with too much waste. Once the ore was loaded by front end loaders into 25-ton and 50-ton Euclid trucks, the drivers went to an A-frame scanning structure which measure the radiation given off by the load of ore. The higher the radiation, the higher the ore grade. From there the truck was dispatched to an ore stockpile of designated grade or sent to the waste dump. From the stockpiles the ore could then be blended into a consistent mill feed.

Most of the ore went to the Bluewater mill 50 miles west via rail on the Santa Fe mainline. Cars would be brought in by Santa Fe Railroad up the spur from Quirk (near Old Laguna). The trucks would load out from the various stockpiles and haul it to the crusher where it was broken to about 12" or smaller and then on to a conveyor belt and dumped into the waiting hopper car which held around 100 tons. There was a radiometric scanner on the conveyor belt so the ore grade of each car could be calculated and included on the shipping manifest. Once a car was full, a man on the car would release the brake and the loaded car would go by gravity and hitch up to the downhill car ahead of it. A couple of trains a day would go out at full mine production. The underground was a room and pillar with a combination of track haulage and LHD (load-haul-dump) equipment. The pillars were developed and extracted with slushers, pulling the material to ore shoots and dropping it down to the haulage ways. Then it was trammed to a

crusher and it rode up a 3,000 foot long conveyor where it dumped the ore at the adit portal where it was scanned and sent to a stockpile for eventual shipping. One of my first jobs was doing the ore shipments from the underground to the L-Bar Mill for toll milling since the Bluewater Mill had not yet been expanded. (The late) Ed Maurer, Dick Haddenham (a metallurgical engineer from Wyoming), and Dudley McDaniel were the Sohio people I first met. The L-Bar needed ore to keep their mill going since their own mine was still in development and not generating much ore—more on that later.

There was a guy named Nick Olivas from Mora, NM who had a few dump trucks and he was hired to haul the Jackpile ore over to the L-Bar mill. Typically they would get back on SR-279 and go up through Bibo and past Seboyeta and then east to the mill site. But there was a bridge over one of the arroyos east of Seboyeta that had some structural problems and the NM State Highway Department said the dump trucks couldn't use it anymore until it got fixed. So the trucks had to take a "back road" which was dirt and crossed the Rio Moquino at a low-water point and then went past the village of Moquino. (There were stories that Penitentes would practice some of their rituals during Lent around the Moquino church which probably dates back to the early 1800's). To cross the river, the trucks had to negotiate a pretty rocky and steep dugway going down to the creek bottom and then climb back out. The road could get rough and we would send graders over there when we could to smooth the driving surface. One day one of the truck drivers lost it and dumped a load right into the creek. Everyone started scrambling around and sent equipment over there to get it cleaned up. Earl Arlin later said that could have been a real PR disaster if everyone knew about a load of uranium ore getting dumped into a river (although it was dry a good part of the year).

The Jackpile open pit expanded tremendously in this time. Every twenty-four hours, about 200,000 tons of overburden and ore were being handled. James Hamilton Construction Company was hired to do contract stripping and he had a large & new fleet of equipment from Jack Rust's Caterpillar dealership in Albuquerque. In fact, one of the first D-10 bulldozers got its test runs at Jackpile and over at the St. Anthony Mine to the north of us. Hamilton's engineer,

Dick Garay (and also a company plane pilot) every month had to check to volume they moved so they could be paid. I had taken over that responsibility when Cortez departed to work the Cotter Mine in Wyoming. My survey and calculations showed a significant discrepancy in what the contractor claimed and what our survey showed. It hadn't been a problem before so I wasn't so sure the previous engineering people had just sort of ignored it and paid the contractor what he claimed. In any case, both Erwin Green and Dick checked our work and verified our calculations. Erwin backed us up and we found that the discrepancy had to do with the truck count the contractor kept.

When working in the massive and blocky Mancos shale, you might only get one boulder into the truck with half the available bed volume be unused. However, every truck load was counted by the contractor as a full load. Every month after we calculated the volumes, Dick would check his survey and it always came in within a few percent of ours. The work involved a lot of mine expansion design and the Bluewater Mill had recently been expanded to handle about 6,000 tons/day. Older brother Craig Olsen worked in the mill with Ted Beck, Bob Frantz, Chuck Corwin, and a metallurgist from NM Tech named Mike Drozd (spelling?).

Lots of the ARCO management must have been really high on the future of uranium and a sort of "Boom Town" mentality seemed to be taking over. The oil companies, flush with their "obscene profits" related to the so-called Arab oil shocks of the 70's, were buying up minerals companies left and right. Anaconda shareholders were probably fortunate ARCO (which cashed in on the North Slope oil boom) bought them out. All ARCO got for their trouble was a lot of expensive environmental liabilities at all their operations. Anyway, somehow people got so excited about the price of uranium that they lost track of basic economics: when the price gets high, people everywhere want to produce it; when supply goes up, price falls. But the management even had the geologists do some ore reserve estimates with \$100/lb. uranium, which historically peaked at around \$50/lb (in 1979 dollars). Erwin Green always kept it in perspective. The Jackpile was supplying uranium at well below the market price because they had signed some long term contracts several years before and had to meet those commitments.

ARCO was in a hurry to fill those contracts and then hope to cash in on the higher prices they thought would prevail. They even once bought uranium at a price higher than their production cost to quickly meet a contractual commitment. By the time the contracts were filled, the price was beginning to fall—Murphy’s Law was alive and well! Lots of people think Three Mile Island did the market in but that was only a small factor. Actually, the costs of nuke plants were going up so fast that there hadn’t been a new plant order since before Three Mile Island even happened. Once the plant orders began to decline and even be cancelled, all of a sudden there was lots of uranium to be had. The anticipated high prices prompted lots of exploration and production all over the world, notably from the high grade deposits in Canada and Australia against which the US producers really couldn’t compete.

We were trying to come up with some additional ore recovery techniques. Anaconda hired some consultants from Pincock, Allen, and Holt out of Tucson and a guy named Bob Butler worked with us. Erwin Green wasn’t too impressed with them and said all they did was check our arithmetic. Given the spotty nature of the ore bodies, we were looking at some more selective techniques. Gerry Frankovich got Caterpillar to bring out their new track hoe which was the largest they made at the time. He showed me a little bit about operating it but I was still pretty jerky with it. The idea was to dig out the really high grade pockets which tended to be quite small. The problem was the Jackpile sandstone was pretty hard and the backhoe really wouldn’t dig it and was pretty hard on the machine. I heard that John Deere had a machine and some guy named Joe took me up to Bokum’s mill construction (near Marquez, NM) and I got to climb on the John Deere track hoe which they were using to dig some trenches around the planned tailings impoundment. Trying to be a bit more selective on the ore grade was a good idea at the time but we really didn’t have a practical method.

Speaking of consultants, I learned three “definitions” of them from different colleagues while I worked in the minerals business:

1. *A consultant is someone who comes in and looks at your wristwatch and tells you what time it is.*

2. *A consultant is anyone with a briefcase more than 100 miles from home.*
3. *A consultant is a man who knows a hundred different ways to make love but doesn't know any women.*

At the bottom of the Jackpile, just before you got to the Brushy Basin formation (which didn't contain any uranium), there might be some pockets of ore which seemed to be tied up in some clay rolls. Turns out the clay didn't mill real well. The dozer operators would cut these really steep trenches to get the last of the ore. Once a D-9 dozer got stuck in the bottom of one of those trenches. To get him out, two other D-9's pulling on a cable tried to assist. On the first attempt, the cable (a 1-inch diameter wire rope) broke in two and the cable whipped around and cut a slice through the side of a parked pickup, just like a can opener. Had someone been in it, they would have been cut in half. The second attempt was more successful and they got the dozer out. Before an area was finally abandoned as "mined out", the geologists would drill some test holes to make sure nothing was left. It got kind of ridiculous after a while, drilling on 25-foot centers and well into the Brushy Basin where there wasn't any uranium anyway. When asked by management what was going on, Earl Arlin claimed: "Ernie Wiley (the head geologist) is making Swiss cheese out of the pit bottom!"

Brother Craig Olsen took a job with Anaconda and moved to the company housing at the Bluewater millsite after a stint with Kennecott at Hurley, NM. They got tired of the housing and ended up buying a house on the north end of First Street in Grants. Dave Olsen also lived in Grants for a while off Jackson Street in a small apartment when he was working for Harrison Western sinking the large shafts for Gulf Oil above the village of San Mateo. The shafts were about 3300 feet deep and the rock temperature exceeded 130 degrees. There was about 4000 gallons per minute of water to have to get rid of and the humidity was such the miners could only work an abbreviated shift. They had to chill the intake air to try to cool down the workings to some tolerable level. The ore body, I was told, had a couple of hundred million pounds of U_3O_8 , making it world class. But the mining costs were very high and the project finally folded in the 80's when the last operator (some Japanese company) finally gave up. It was rumored that Gulf

had spent a half billion dollars on that project drilling and development, part of the motivation being they were trying to corner the uranium market much like the Hunt's tried to do with silver in the late 1970's. Gulf got into some antitrust problems but the industry collapsed anyway so I guess it is all moot—they got their just reward.

The boom was hard to figure out and, like most mineral booms in history, this one went bust, too. But during the heyday, a lot was happening. The St. Anthony mine over the hill from the Jackpile was being operated by United Nuclear. They would send some ore to the L-Bar Mill but they were even trucking ore all the way to their mill at Churchrock (northeast of Gallup, NM) which must have been close to 100 miles one way. I guess if the price is right, people will do anything.

The Mt. Taylor mine was going to be Gulf's big foray into the uranium business. Dave Olsen (with Harrison Western) worked on the two shafts that were sunk along with a pretty elaborate dewatering system. They had to treat the water with barium sulfate to get the uranium out of it before it could be diverted for use. But the mining costs were going to be high associated with lots of hot water and having to hoist the stuff so far—really energy intensive. A mill was planned but never built and I'm not sure if it even got permitted through the old New Mexico Environmental Improvement Division (as proxy for the Nuclear Regulatory Commission). [The mine never reached its full design production before the uranium business crashed. Gulf sold it off and ate an incredible amount of money. Some Japanese outfit tried it for a while and I think the ore got trucked to the Homestake Mill (which probably was the last one to operate) and some may have gone to Kerr-McGee's mill at Ambrosia Lake. Eventually the pumps got pulled and it flooded, for all practical purposes completely abandoned since not much of the development work would be usable in the future, if the market ever returned.

While my new house was under construction (spring, 1978), the Atomic Workers union representing all of Anaconda's hourly workers went on strike. It was amazing because the uranium price was already falling and a lot of people used to think nuclear power went down the

tubes because of the Three Mile Island (TMI) fiasco. [Actually, nuclear power plant cancellations were already well underway before TMI when it was seen how costly they were going to be]. Had the strike gone on a long time (which some of the folks from Butte, Montana had seen last as long as nine months in the copper mines), we salaried folks would probably have been laid off and that worried me because of the house we had just committed to buy. But the strike was over in about three weeks.

Foreman Max Waconda, PR person Mary O'Neill, and I got sent to Denver to take a course in "Transactional Analysis". It was one of the trendy topics for organizations in those days. The course was held downtown in the Anaconda/ARCO tower and it was quite a setup. They even had a mineral collection on display up on the executive floors. The minerals came from Anaconda's operations all over the world and they looked to be of museum quality. We met some other Anaconda people from Tucson and Great Falls. MT.

Jackpile Engineering Manager Erwin Green, PE was born and bred in Butte, MT and worked in the mines (maybe the Kelly and the Leonard) at night while he went to Montana Tech during the day to work on his mining engineering degree. He told me an old story about a couple of miners working in the Kelly Mine which was the old underground operation. Apparently these two miners were screwing around and went back in some old drift that had been abandoned for years. At the back of the drift they found a keg. They removed the bung and sniffed it and it was full of alcohol. So they each took a swig and every so often when they got tired of working, they would go back to that drift and take a snort. This went on for a few weeks and eventually the keg went dry. They were turning the keg around and noticed something rattling around inside it. They opened it up and found a woman's head inside! Erwin said they were so shook up they swore off drinking for a week.

The overhead truck scanners for ore sorting at the Jackpile were a clever way of doing ore control. They could automatically grade and sort the ore and kept the inventories fairly current, although there was always the problem of calibration between the chemical assays of the ore

grades and reading the radiometric scanners would provide. Another problem was more apparent: if the load in the dump truck was piled too high, the muck pile might catch the scanner and the A-frame on which it was mounted. More than once did a truck driver send one of those assemblies off the back of the dump truck and onto a waste or protore dump.

I was made the Chief Engineer for Open Pit Operations around 1980, sort of by default, I guess, when Chambers and Tobe Leigh hung it up. But by that time, the handwriting was on the wall for the future of the mine. I did some design work and in those days before AUTOCAD and all the computer technology, it was pretty much done by hand. The most sophisticated piece of electronic gear we had was an HP-97 electronic calculator but it was programmable which was kind of neat. We also had a state-of-the-art digitizing machine which was used to digitize the hand-drawn plans so they could be put into some sort of computer program Z. Earl Arlin had worked on. I was never quite sure that computer program did anything of value.

Anaconda was trying all sorts of things to improve recoveries and make more out of the short-lived uranium boom. They had a research group from Tucson, AZ and Stan Low and Manny Quinones were technicians who worked on mineral processing technologies. They had also done some things in Cananea, Mexico, the site of a large copper producing complex. One gizmo the guys were working on was a way to sort of “hand pick” really high grade pieces of ore that might otherwise get dumped into the waste pile because they were so mixed up with waste, the radiation/grade scanner wouldn’t pick them up. So what they did was rig up a small portable conveyor belt with a scanner. As the rock traveled up the belt and past the scanner, if it was a high grade piece of ore a blast of compressed air would blow it off and it would fall into a place where it could be recovered. The waste material would travel off the end of the conveyor which would be situated over a mined out area that would need backfilling anyway. It was a good idea but didn’t work all that well.

Another technique that was tried was some hydraulic mining of small, high grade ore bodies that wouldn’t be justified due to the high stripping expense. They brought in some really high

pressure pumps (up to 25,000 psi as I recall) that were used for rock fracturing in the oil and gas business. The idea was to drill down to the ore bodies and with a high pressure nozzle, cut the rock away with high pressure, mix it with water and pump out the uranium bearing slurry. Another good idea but it didn't go much past the experimental stage.

Years earlier (and the company didn't talk about it much), they had tried some in-situ leaching of some small, high grade ore bodies using sulfuric acid. It didn't work either and the idea of dumping a bunch of acid into the ground turned out to be a bad one so it was abandoned fairly quickly). The company also hired a guy named Dr. Ben Seegmiller who was a rock mechanics expert to look at the pit stability situations. He was from Salt Lake City and was interesting to talk to and developed some reports about whether or not the Gavilan Mesa (east side of the Jackpile Pit) would ever fall down—I don't think it ever did. Most of the area was pretty stable and the geology wasn't too complicated.

The Mine Safety and Health Administration (MSHA) had closed off a surface mining area because of some stability concerns, mostly because of the blocky, loose shale in the overburden. MSHA made the company put up a berm to catch any loose material and it was called, appropriately enough, the "MSHA berm". It delayed some ore production for several months that didn't make the Anaconda management too happy.

The 1980's began with still working for ARCO at the Jackpile Mine. But it was becoming pretty clear things were heading down hill. Erwin Green said he thought the mine would close in 1981 and I thought, well, it's time to get out. The company had been advertising for some positions at Carr Fork UT (underground copper) and Tonopah, NV (molybdenum) but Erwin said those things didn't look like they had much future. Turns out he was right. Ted Beck, the mill guy, went to work for United Nuclear. T.J. McNeil, an equipment pusher, went to work for Gulf up on Mount Taylor. Ernie Lucero (an assistant to the general manager and had responsibility for the mine) ended up leaving and taking a job with Conoco up by Crownpoint, NM. They were planning some deep mines in the Westwater Canyon formation which was

down a couple of thousand feet in that area, using some large diameter boring machines for the shaft instead of “conventional” drill/blast sinking methods. (Eventually some companies looked at doing some in-situ solution mining and were still trying to get them permitted even into the 21st century but I don’t know if it ever happened—lots of resistance from some of the Navajo Nation in the area, especially after what happened at the Church Rock tailings pile and health problems among miners going back into the 1950’s and 1960’s).

CHAPTER 2

I had noticed an advertisement recently for a Surface Mine Planning Engineer over at Sohio’s L-Bar Uranium operation. I applied, got an interview, and found out they had plans to expand the underground workings and open up some shallower deposits to surface methods. Craig Olsen was already working there in the Metallurgical Department. I got hired and started in August, 1980, working for a guy named Jerry Oliver, who was the Chief Engineer. I got involved in the mine planning and was supposed to begin design work on the shallower deposits. It sounded like Sohio was interested in becoming a long term player in the uranium game.

Other people in the L-Bar operation included Naik Naiknimbalkar who was a geologist but working as a production superintendent because the previous one had gotten tramped. He had worked at Ambrosia Lake for Homestake Mining Company for several years. Erwin Kopp was the Area V Superintendent and Zeke Medina was his counterpart in Area II. Conrad Parrish was an engineer & Berk Hotchkiss ran the surveying. Jerry Oliver was the chief engineer (a geologist, really) who had worked for EXXON at the Highland Mine in Wyoming; Les Hatcher and Marty Sanchez did the drafting, George Rowley was a Projects Engineer, Bernice Marquez (secretary), Gretchen Cady, Ron Boyd, and Rick Altenberg were geologists, Andrew Greenberg was a prober, Bob Wells was a miner and later ran the backfill operation (the infamous Radmark setup).

Other people at the mine included: Roger Denhomme (French Canadian foreman or “shifter” as they were called; Zeke used to call him “Roger, don’t you know me?”;), Albino Jaramillo (also a “shifter”; he’d lost a brother in mine accident at Ambrosia Lake), Earl Zinn who took care of some surface maintenance, Jim Butterfield (a shifter who got busted back to a raise miner and then he tramped out to somewhere else; he was my guide during my initial interview and Zeke Medina chewed on this poor guy right in front of me during the interview tour); Louis St. Martin (mechanic, a French-Canadian like Roger; they had this habit, since they were French-Canucks, of never using “s’s” when they were speaking in plurals; they would say “I have to move a bunch of slusher today” or “They are a bunch of *&^%#\$ moron”. I guess it’s a quirk of the French language), Gene Sedillo (electrician who got killed a couple of years later in a car wreck), Earl Zinn (surface foreman), Al Eden (miner), Dinah Alercon (secretary), Red Mares (ventilation engineer), Ed Maurer ran the mill with Melvin Heath and Craig Olsen was the metallurgical superintendent; Dorothy Stover was in charge of personnel.

Steve Kuhn (I commuted with him for a while) had been a police officer in Albuquerque (his father was one time fire chief in Albuquerque) but then went out to be a miner’s helper to make more money and ended up doing safety; I would accompany him underground to learn the ropes and working areas; he later married Gretchen Cady and Joyce & I went to their wedding and they were nice folks to visit with) and Rudy Siegmann worked the safety department run by a guy named Mike O’Day. Sam Shaw III was the Vice President and General Manager and Carol Paffen was the Purchasing Manager. Sam Rice was a maintenance guy. Dean Sares and Jim Bazemore worked in the Environmental monitoring and permitting area. The lab had Bob Crook who was a chemist and he was called “Crooked Bob.” George Deutman was hired from Ranchers Exploration as the General Manager but only lasted a few months before he “tramped out”. Zeke and Erwin were scared to death of him and he was really putting the heat on to get production up at the mine. Zeke Medina grew up in Gilman, Colorado and had worked in the old zinc mines before coming to Ambrosia Lake. Zeke had good miner’s skills and his sense of humor was really infectious. He could do impersonations that were really right on, like Nixon

claiming he wasn't a crook. One time Zeke was doing an impersonation of George Deutman that gave us all hernias it was so funny but it stopped pretty quickly when George walked up behind Zeke and Zeke didn't know it.

The operation had many difficulties. Production levels from the mine had never met original design expectations. Early development in the Brushy Basin formation was such a fiasco it had to be redone at significant cost and time delay. The Brushy Basin, when exposed to water, starts to swell and move continuously, causing problems with keeping the development and haulage drifts open and made ground control a continuing activity. Sohio's partners (Reserve Oil & Mineral) were doing pretty well until the "Squeeze" occurred when some over mining & ground control problems caused a slow collapse of a productive ore zone with some better grade ore. In the hopes of getting the best ore quickly and easily, a lot of ground was opened up on orders of the previous management. The mine had to develop new areas but that takes time and there is not as much ore to feed the mill in the meantime. The L-Bar mill was treating some ore from the St. Anthony (an open pit operated by United Nuclear) and from the underground operations at Jackpile. So cash flow was a problem.

Area V was just developing with LHD (load-haul-dump) trackless machinery. Area II had both LHD and track haulage from a couple of levels. One time two miners got fired for fighting because one miner accused the other of stealing a piece of apple pie out of his lunch can. It was thereafter referred to as the "Apple Pie War".

Environmental technician Dean Sares walked into the underground lunchroom one day only to find the survey crew nailing miner's lunch boxes to the table. When the miners were in a hurry to catch the cage to the surface, they would grab the lunch box as they ran by and would pull the handle right off. Miner's sense of humor is somewhat difficult to explain.

Once they gave a miner's intelligence test: they gave a miner three ball bearings and put him in a closed room. In checking on him an hour later, he had lost one, broke another, and took the other one home in his lunch bucket.

The underground environment was challenging from an operation view. The geology wasn't particularly complicated, mostly just sediments which were pretty easy to identify and structurally hadn't been altered much. But after the pillars got pulled, the remaining open stopes or "ballrooms" were dangerous. In fact, it was against Federal law to enter an open stope in the uranium mines. When it became necessary to repair or relocate slusher cables, they had to be connected to a "stope gun" (a .45-70 caliber) and the cables had to be shot from one safe location to where it could be retrieved without going into the open stope. A poor miner got killed at the JJ#1 Mine when he got slabbed by a chunk of sandstone when he went into an open stope. (That happened before I hired on but I remember hearing about it while at Jackpile).

Once in a while you would see mice underground in the JJ #1 mine. Bob Wells related this story about how the mice got there and swears it's true but "The Big Guy" had a charming way of embellishing his stories. He was from California and had become a schoolteacher after having played college football at Pacific University as a linebacker. He was missing a finger which he was accused of losing himself to get out of the military draft but he said it happened while riding a bull and he got thrown and the finger got smashed against a fence when he landed. But he loved mining and underground construction and had worked on the Henderson Tunnel in Colorado and other places. Back to the mice. Apparently some not-too-bright miner complained that his wife was not very nice to him. Bob gave his some advice (just jokingly, he claims) that he should haul off and smack her when she gets that way. The next day Bob asked the guy how things were after that and he reportedly said: "Well, she didn't like that very much." As the story goes, a couple of days later the mine superintendent's office gets a frantic call to get a message to the miner (who was working underground) not to eat his lunch because there was rat poison in his sandwich. So from then on that miner took a mouse to work with him and if the mouse didn't die after eating a bite of the sandwich, it was figured to be OK for the miner to eat

what was left. The mouse eventually got away and set up for a life underground. We also had mice in the main mine office next to the headframe. Erwin Kopp taught me a mice catching technique that really worked. Take a five gallon plastic bucket and three foot long piece of lath or wood. Place the lath against the bucket like it's a ramp (which is what it is). Then put some bacon or cheese or some other bait in the bottom of the bucket for bait. The mouse will run up the ramp and jump down into the bucket to get the food but the bucket is too deep for it to jump back out. Then you just dump the bucket over the john and flush the mouse away. Believe me, it really works.

Because the sandstone formation wasn't particularly strong, there was a large amount of artificial support that was needed. Extensive use of stulls around the open stopes (more to monitor ground failure than actually hold anything up) and crib sets with 8 X 8 timbers were sometimes used. The bulk of the support in the drifts was with split set roof bolts which actually serve the same purpose that a wood screw serves: puts the material in compression so it won't fall in. There must have been thousands of split sets in the J. J. #1 mine and I can't imagine how many must have been used in the district. In addition, the sandstone tended to spall off when it got dry and the small pieces could not only be a nuisance but potentially dangerous. To counteract this, they would put chain link fencing against the rock face before they installed the bolts. Once a truck driver delivering a whole semi-truck load of chain link told the warehouse guy: "Gee, I'd sure like to know what you're fencing down there."

Engineer's surveying tapes, for those who don't know, were measured in feet but instead of graduated into inches, they were graduated in tenths of a foot. This made computations much simpler since you were just working with decimals instead of a lot of messy fractions. The underground miners were typically paid their bonus (contract) relative to the footage they produced for drifting, raising, etc. One bunch of miners was heard to be grumbling about how they were getting screwed on their bonuses because management was using a tape that had only ten inches to the foot instead of twelve!

Bob Wells told me he was working on a job and this old miner walked up to him and said: “Bob, I’m going to have to write home for some more money—this job is lasting longer than I thought!”

All through the fall of 1980, I developed a Life-of-Mine Plan which depicted the next 10-15 years of production from the underground and eventual opening of some open pits. I got sent over to Gallup to look at the Church Rock mine operation which was purportedly up for sale and Sohio wanted to check it out. I spent a couple of days there gathering information about reserves and production and made a trip underground at the NE Church Rock mine. I accompanied a geologist named Mike and when he came upon a miner that he knew, the miner looked at me and asked: “And who in the *&^% are you?” I didn’t have much of an answer. He was supposedly a topnotch miner but he was working in an area with less exposure to radon gas since his maximum annual allowable amount had nearly been exceeded in only nine months.

When I came back I spent some time at Sohio’s accounting office (Tom O’Grady headed that up) at Central and San Mateo in Albuquerque putting together my report. Frank Abshier, a Sohio geologist, came down from Denver to help out. He loved going to Powdrells’ barbecue on Central for lunch. We also chartered a plane to go over to Gallup (oil companies had money to burn in those days) so we could meet with the United Nuclear people (someone named Vince Tonc and some others). The final analysis showed that United Nuclear wanted too much for the place and Sohio let it go. They decided to look for other deposits. The main mine shaft had almost been compromised by mining too close to it to get quick & easy tonnage to feed their mill. Coupled with the tailings dam breach they had, the company wasn’t looked at as one of New Mexico’s corporate icons. The St. Anthony underground mine (also in the Jackpile formation) had been worked during the 1950’s when AMAX had the property. When United Nuclear took it over, they sunk a bigger production shaft. The joke was that the bore hole they followed was really crooked and the resulting shaft alignment was like a corkscrew. It was said when you got on the cage at the surface, you were facing east but when you got off at the haulage level underground, you were facing west! United Nuclear walked away from the St.

Anthony property without any reclamation since there were no legal requirements to do anything when they had it. *(As far as I know, nothing was ever done and all the old pits and waste piles are still just sitting there and are visible on Google Earth).*

The JJ #1 Mine was gambling a lot of its future on a backfill system to recover more of the pillars and the area that had caved in due to over mining. It was called the Radmark system and basically it was a big fan that blew sand and cement in between the remaining pillars. Then the miners could pull the pillars since the backfill material was supposed to hold up the back (roof). Jerry Oliver said it had worked up at the Exxon Highland Mine in Wyoming and they hired a guy named Hank Day to run it. Hank had been a miner and soon after he showed up, he was diagnosed with lung cancer. He had been a heavy smoker and had worked in the poorly ventilated mines back in the sixties. He died a few months later and Bob Wells took over the Radmark project. They were able to put backfill into the mine but never got to the point where they mined out the pillars between the backfilled sections. Most people were pretty skeptical about how it would really work given the sandstone around the area wasn't particularly strong. (Zeke Medina was especially glad when the mine closed because he didn't want to be responsible for mining in between the backfilled areas).

The L-Bar mill was still going to have problems getting enough ore feed to operate in its most efficient manner until the open pit production came on stream. Because of the mill efficiency problems, alternate schedules like two weeks running/two weeks off were tried as ways to save money. All this time, the price of uranium was dropping as more and more utilities cancelled their plans for nuclear power plants and dumped their uranium stocks and supply contracts and general economy was slipping into recession. By early spring, it was becoming pretty clear that the L-Bar's days were numbered. Several people would talk about going over to Ticaboo, Utah (near Lake Powell) where a company was planning a uranium mining/milling operation but it never took off either. Craig Olsen took a job with Morrison-Knudsen and moved up to Idaho. Naik went back to work in the exploration office of Homestake Mining in Albuquerque. Conrad Parrish transferred to Cleveland to be an in-house engineering consultant on the synthetic fuels

projects that Sohio was investigating. In June, 1981, Sam Shaw III stood in front of the entire group and announced the mine was being shut down, mothballed really, to be maintained with minimal cost and be on standby till the uranium price recovered. A bunch of us went to Bibo and had big lunches and drinks (on the company of, course). Bob Wells came over that night and we had some pizza to celebrate.

All the mining operations began to close one-by-one and Grants, NM felt the brunt of it. In the late 70's, there was a boom typical of other historical mining districts (like Cripple Creek, Colorado and the Yukon) and all the trappings that go with it: expensive & limited housing, lagging infrastructure and school development, high prices for basic services, high wages, lots of job & other business opportunities, expensive food, etc. Grants experienced all that but in a few short years, it was seeing hundreds of people leaving and there weren't a lot of places for people with the mining & mineral processing skills to go. Trailer parks were abandoned as were houses, school enrollment fell, and it's somewhat ironic the formation of Cibola County (carved out from the western end of Valencia County) was going to count on the uranium extraction taxes and economic engine to carry the new county forward. Some people hung on and tried to find what they could to be employed. (Over the next few years, the Lee Ranch coal mine opened NW of Grants to supply fuel to the generating station at Prewitt, NM. Somewhat ironic that the coal resource got the nod for development while another energy resource right next door essentially died—I guess that's how economics works sometimes. That coal mine opened up a few jobs as eventually did the new prison and establishment of a new highway department maintenance group at Milan, NM. But it was never to be like it once was).

Sohio offered positions to very few people which was sort of sad since the management always told people how valuable they were. This was my first encounter with managerial lip service about what an asset the people are but it's also the easiest "asset" to dump when things get tough. Sohio had recently purchased Kennecott (*another example of the folly & failures of petroleum companies buying mining companies, especially when copper was really in the dumpster and Kennecott was losing money at a calculated rate of \$500,000 every twenty-four*

hours) and they sent up some token personnel folks to conduct some placement interviews for positions at Santa Rita, NM. I think one person got placed. The message was: you're pretty much on your own; no one looks out for you but you. But people had to find whatever lifeboat they could on their own.

I was still a semester away from completing my MBA (*just in time for the greatest recession since the 1930's!*) but I was able to stay on since Sohio was in the process of getting its Radioactive Materials License renewed. To run a mill, you had to have this Nuclear Regulatory Commission license (which was overseen by the State of New Mexico Environmental Improvement Division). It made sense that the property and infrastructure were more valuable if the license was in place. I was supposed to provide engineering and maintenance support, Erwin Kopp was the manager, Rudy Siegmann stayed on for safety oversight, (late) Frank Barka for surface equipment and tailings maintenance, miners Ruben Romero, Tony Baca, Alton Young, Jerry Vallejos, Joe Garcia, hoistman Isidro Salazar and electrician Ken Bauer (who left shortly after to start his own business and he was replaced by Jim Hoskins) and Edith Peterson from Cubero, NM who did the administrative support. Florencio Jaramillo later joined up as an electrician and his father Louis did janitorial work. Eddie Marquez was a mechanic and there was another one whose name I don't recall. Dean Sares stayed on to do the remainder of the re-licensing work with me to assist where I could. Eventually, I was supposed to join the Corporate Engineering Group in Cleveland with Jerry Oliver, who was heading up a team to assist on the synfuels projects (oil shale, tar sands in Utah, coal gasification in Wyoming and Texas).

Erwin Kopp was one of a kind. He was from Austria and had been in the Hitler Youth in the 1940's. When he was 15 years old, he got drafted from a seminary and put into the German army and sent to the western front. He got wounded and ended the war in a POW hospital. After he got out of that, he went to Switzerland and joined their army for a few years. Then he and some friends got hired as mercenaries and went to Africa. He said he used to get 20 Swiss francs for every pair of ears he brought in—claimed it was the most honest money he ever made. After that, he migrated to Canada where he found work as a miner in one of the large

hydroelectric tunnels in eastern Quebec. He said he once broke an empty dynamite box over a guy's head because the guy was always late in getting to the cage at the end of the shift; said it was his first management training. He then went up to Timmons, Ontario and worked for McEntyre Mines, producing silver. The mine closed when management decided not to meet the striking miners' demands and he migrated to Grants where he found work in the uranium mines with Kerr-McGee.

Frank Csepregi, an MSHA inspector who checked on the JJ #1 periodically, worked for Erwin at one time and told me that when Erwin was mining, they broke an airline that feeds the drilling equipment. Since they were working under a bonus system, anything was fair game to help you get your tonnage or footage. He had a fellow helping him and he knew another miner was working nearby. Erwin snuck over to the air hose, squeezed it down (which is no small task) while his helper slowly closed the air valve. The other miner probably thought they were just having compressor problems. Erwin disconnected the hose and hustled back to his work place and got back into production. Frank worked for Erwin up at Ambrosia Lake and one time in a track drift, Erwin complained that the ties under the rails were too far apart and might not hold together under load. Since Frank was also under bonus and whatever he saved he got a part of, he explained to Erwin that he was actually improving productivity. Erwin asked: "How can that be?" Frank explained: "Well, since the miners don't like to get their boots dirty, they will jump from tie to tie and get to their working places that much quicker." Erwin was not impressed.

Erwin could chew out people like no one's business. Before I got to know him, I would hear him bellowing at his crews' lack of production, threatening to send them to the Russian front. He would call his miners "a bunch of Neanderthals" or "homo erecti" or say they had just "come down out of the trees". He also made the miners line up their lunch cans in "German regimental order". Some days at the end of the shift, Erwin would come into my office and hand me a banana, saying "you did a good job for me today", just like I was a chimp. He also claimed to own a genuine Picasso but I never saw it for myself.

One thing we tried to avoid was having to go through public hearings as a part of the radioactive materials license renewal process. Public hearings allow any citizen and completely unqualified moron to speak—sort of like “talk radio”. Some pressure was on the State to hold those hearings but, the way the uranium business had died, there just didn’t seem to be a lot of interest anymore. When 8,000 people lost their jobs in the New Mexico uranium industry, the mood wasn’t particularly upbeat about pounding on the companies much. We gave in where we could to the State but they always wanted a little more and it continued to drag.

Part of the environmental monitoring was to collect weather data. The reason was to use the data in a radiation exposure computer simulation called MILDOS which would estimate radiation exposures to the general population from uranium mill stack emissions. The program would supposedly estimate what exposure impact the mill would have up to a fifty mile radius. I had to find out how many people lived within a fifty mile radius of the mill and used the census data from UNM to find out how many folks were in each census district and it was a really tedious task. The computer program was fairly complex and sophisticated for its time and was used as part of the information in the radioactive materials license reapplication. The data was collected on strip charts which had to periodically be changed and dated and sent off for computer input. Once there was a lightning strike next to the weather station (at the NE corner of the tailings area) and the unit wasn’t working. So Electrician Ken Bauer and I went to check it out and we found that the lightning arrestor on the unit had caught the lightning bolt and protected the recording unit, but the power source had tripped off. Being curious about the engineering and technical functioning of the lightning arrestor, I asked Ken how it worked. “Just fine”, he replied. Smart aleck. Then we both laughed.

Another large uranium development was going to be Bokum’s operation near Marquez, NM (where it is said the town limit sign also reads “Keep Out!”) [Marquez, NM was settled by some Cebolletta land grant heirs; I don’t think there is a post office there any longer]. The project started in the late 1970’s with high aspirations and Bokum was in partnership with Long Island

Power & Light which was building a nuclear plant on Long Island, NY. Famous last words for miners pissed off at the L-Bar operations were “I’m trampin’ out to Bokum!” When the uranium market went into the dumpster, the project, of course, was quickly mothballed. I don’t believe the shaft ever bottomed out and it was fairly deep since it was targeting the Westwater formation so it was probably down around 2000 feet or thereabouts.

I think Stearns-Roger was constructing the mill which was supposed to handle a couple of thousand tons/day so it was fairly substantial. The site never got its radioactive materials license from the state, primarily because of the tailings disposal plan they had submitted and as mentioned earlier about the Church Rock spill, the state environmental oversight wasn’t in any mood to take chances on a poor tailings pile location. At any rate, the mill was almost completed but never ran a pound of ore through it and it just sat there; to this day I don’t know if it was ever salvaged out or what happened to it. There was a dirt road from Rio Puerco that you could take to get there or you could go by the L-Bar operation up SR279. Once the work stopped up there, however, no one continued to blade the road and it weathered accordingly. So now Long Island Power was stuck with a useless mill and the parties ended up suing each other. Another problem Long Island had was getting its operating license from the Nuclear Regulatory Commission (NRC). After Three Mile Island, the licensing requirements got more stringent and to a large degree forced a lot of utilities to abandon projects and plans, even some under construction. Long Island Power had to generate an evacuation plan whereby they could move everyone within a ten mile radius (or whatever distance it was) within a matter of a couple of hours. Well, the plant location on Long Island meant that they had to move about five million people in a couple of hours and that would have been impossible. So they couldn’t get an operating license and ended up converting the unfinished plant to burning fuel oil.

Rudy Siegmann was the safety guy and he hailed from Hancock, upper Michigan. His father worked in the old Keewenaw district mining native copper. He told us his father worked in the mines and the native copper was really rich. His dad said they would drill blast holes with auger bits into the native copper and the cuttings would come out as copper corkscrews! Rudy had

good mechanical and welding skills (he said he welded up the man-cage at the main NE Church Rock shaft) along with his safety background. One time we got a call from a guard over at the St. Anthony Mine that one of their guys was hurt. Sohio had an ambulance and Rudy grabbed me and we went over there and found this poor guy lying on the ground with a broken leg and arm. He had been dismantling something and an I-beam fell on him. He was really hurting and Rudy showed me how to install air splints on the broken limbs and then we loaded the guy into the ambulance and took him to the hospital in Grants. I tried to keep the guy lucid since he was in a lot of pain. We got him to the hospital in Grants but the leg break was pretty bad and they were going to have to send him to Albuquerque for surgery. Rudy was a hero, however, and deserved the thanks he got from United Nuclear's people.

Lynn Jacobsen, PhD was the first general manager of the L-Bar operation and once told a good story. He was doing petroleum geology work in the Permian Basin over by Odessa, Texas. One day his boss John came from Sohio corporate headquarters to look at the progress. As they were driving out to the drill rig, a pickup with a Conoco logo passed by. "You know", Lynn said, "those Conoco trucks have air conditioning in them." Lynn was hinting around since his own truck did not have air conditioning and the summers around Odessa can be quite hot. "That's nice", John said. They drove a little further and Lynn passed a pickup truck with a Texaco logo on the door. "Those guys from Texaco have air conditioning in their trucks, too", said Lynn to John. John just nodded and continued to look ahead. A bit further on they passed some guy walking down the road, looking as if he was completely broke and like one of the Joads out of the "Grapes of Wrath". John said to Lynn: "Did you just see that guy we passed walking on the road?" Lynn said yes and asked why. John said: "He used to work for Sohio. He wanted air conditioning in his truck."

The Federal mine inspector Frank Csepregi told us about a fatal accident his agency investigated in Nevada once. Apparently some small outfit was sinking an exploratory shaft and didn't have a cage installed yet so access down the shaft was by means of a series of wooden landings like steps that people hopped on as they went up and down. The foreman used to fire

one person each week—it was his method to “motivate” everyone to work as hard as possible. But for one unlucky person each week, that person got tramped. How Frank got involved was they ended up investigating a fatal “accident”. The foreman fell to the bottom of the shaft and got killed. One of the landing planks had broken when he stepped on it. Further investigation showed the plank had been cut underneath and the thin wood section couldn’t be seen. When the foreman put his weight on it, it snapped and down he went. No one was ever charged as far as I know.

Security on the site was by a contract “rent-a-cop” outfit. They would watch the guard gate and once the mine closed, it must have been a terribly boring job. In the late 1970’s, there was an incident where five drums of “yellowcake” ended up in El Paso where a couple of guys tried to “fence” the stuff. At that time, the U_3O_8 was going for \$40/pound and each drum had about 700 lbs. in it. The drums supposedly came from the L-Bar mill and the perpetrators used a Sohio truck and drove right out the gate with it. But what was really funny was all the mills in the area claimed it was their’s—might as well try for a “freebie” when you can. (About the same time, a bunch of gold had been stolen from the Gold Fields operations up near the ghost town of Dolores, NM in the Ortiz Mountains. There was a small operation there that produced a little gold and as far as I can remember, whoever took it got away clean. And it must have been an inside job, too).

In between the re-licensing help, I assisted the Corporate Engineering group on some of their projects. We looked at a lignite gasification project in east Texas (near Sulphur Springs) that Phillips Petroleum was leading and looking for partners because it was about a \$2 billion investment. However, with the recession of the 80’s and natural gas supplies increasing due to more drilling (when the prices were allowed to rise—duh!), coal gasification technology was no longer economically feasible and the project ended up on the shelf. I think since then a lot of that coal was mined and burned in steam power plants. I also looked at a project near Gillette, Wyoming where a guy was going to take coal and convert it to gasoline. Problem was the coal had to be certain size for the process to be efficient and the fine coal would have to be discarded,

which common sense dictated you really shouldn't do. And with the recession continuing and oil prices falling, the process wasn't economically feasible in the long run. Had OPEC held together and kept prices on the spiral that we saw in the 1970's, perhaps there would have been more incentive to develop these synthetic processes. But that's the way the market works and there was little impetus from the US government to really make inroads into foreign oil dependency and reliance on fossil fuels. And at the time of this writing (ORIGINALLY IN 2003), nothing much has changed. All those projects I worked on are either on the shelf or in boxes in a warehouse somewhere or, just as likely, been through a shredder and recycled.

Even back in the 70's, it was nice to go to lunch over at Bibo. Pauline Michael (Hanosh) ran a small restaurant there and her son Eddie Michael ran a grocery store for a while. (Eddie even had a large old Dart side cab front end loader that Anaconda must have given him for some reason. I never saw it move). Back when the mines were really booming, there was also a tavern a few doors down and a lot of the miners would cash their paychecks there for 1% plus any change in coins. Then many of the miners would proceed to get drunk and fight and whatever. Anyway, the Bibo café got to be quite a local standard where we would take lots of guests, visitors, consultants, government officials and anyone else. [I also ate there occasionally when I was managing the Jackpile Project]. They had a wicked Navajo Taco on the menu along with really good chile cheeseburgers and burritos.

Erwin Kopp was eternally optimistic about the mine reopening someday but I couldn't share in that. It looked like the industry was doomed due to high cost, low demand, and competition from foreign producers all being significant factors. Kennecott's management (Harold Krueger) came to the same conclusion and his strategy was to sell and get out of it all together. I was tasked with developing an updated mining and milling plan and identifying all assets and reserves. There was still some chance someone might be willing to buy the place. A significant hang up, however, was a lawsuit filed by the Cebolletta Land Grant. For some history, the L-Bar Ranch (which Sohio had purchased and on which the uranium and potential petroleum might be situated) was one time part of the Cebolletta Grant, which was established in 1806. It was one of

the last of the Spanish grants since Mexico became independent in 1820. The original Fort Wingate was at Cebolletta and it had a stagecoach station at one time. I was told that the people of the grant decided that, rather than hold the grant in common they would split up the individual parcels they wanted. Once that happened, however, the people became subject to property taxes imposed by the State of New Mexico. The people didn't know that and pretty soon they were in arrears on taxes and completely unaware of that liability. Part of the old Santa Fe Ring noticed these large parcels available for back taxes and began to buy them up.

A 1940 Supreme Court decision upheld the people who got the property for back taxes, acknowledging that the land grant folks may have been taken advantage of, but that still it was ruled legal. But the resentment never died among some. A different land grant commission got their lawyer to file suit against Sohio to get the land back and also recover what they claimed were the obscene profits made on the uranium resources. If they had only seen the accounting records, they would know what a financial loser the operation really had been overall and there was still a significant environmental liability and cost in dealing with the tailings stabilization and eventual reclamation. [Dean Sares and I got interviewed by (the late) John Robb, part of the Rodey law firm Sohio had retained for help on the lawsuit. Robb wrote down everything we told him and the report he put together read like a history book and it was uncanny how he captured everything we told him. He had an amazing intellect].

The land grant had fenced an area that they claimed was theirs through "adverse possession" and Sohio had to respond. Lynn Jacobsen hired a helicopter so he could get some pictures of the fencing work done up on the L-Bar property and I got to ride along. Helicopters are pretty neat although I think it cost something like \$500/hour back in the early 1980's for using it. Erwin and I went to Gallup one afternoon to meet with John Robb since the case was to be heard in McKinley County instead of Cibola, a change of venue sort of thing. When we went into the courthouse, there was a guy standing there by the lobby in a brown pin stripe suit with a polka dot yellow bowtie, sucking on a bottle of Coca Cola. I figured he was some goofy bailiff or helper and thought to myself: "Who is this clown?" When the opposing attorney called him

‘your honor’, I guess I had to put my first impressions aside. The case never went anywhere as far as I know. I don’t remember the judge’s name.

So the L-Bar had been a working ranch in excess of 100,000 acres with a nice ranch house at the eastern base of the Mesa Chivato. Grazing was still occurring on a small scale and there were some sections up on the top of Mesa Chivato that were grazed in the summer months. It was a tough place to ranch since it was typically quite dry and a lot of the area had been overgrazed and never really recovered. We noticed a ranch lessee bringing in a load of cattle one day and I remarked to Frank Barka about what they would find to eat. Barka said: “It’s a new breed of cow. They eat rocks.”

We had a bad cave in on one of the major haulage drifts out in Area V. Erwin got all excited and was ready to pull out all the stops to fix it. I went underground with Erwin and Rudy. Aside, Rudy and I thought fixing it was sort of dangerous and maybe not worth the effort right now since the mine was in a “care & maintenance” mode anyway and it could have waited. I suggested to Erwin that we leave it but he was insistent that his responsibility compelled him to do so. Erwin was fiercely loyal and could not understand why anyone would question what he felt he needed to do. I got on the horn to Jerry Oliver in Cleveland and laid it out for him. He agreed that clearing the blockage wouldn’t interfere with the current “stand by” mode and even made a trip out himself to meet with Erwin. Erwin relented since someone from the corporate office told him the same thing I did. But no matter since we kept from putting some people in harm’s way when it really wasn’t worth it. We would periodically check the mine conditions, looking for ventilation problems, ground control issues, and the like. Erwin, Rudy, and I even once donned the self-contained breathing apparatus so we could go into the old “squeeze” area and check the ground conditions. The radon levels were really high so we had to carry our own air tanks to legally go in there.

There were some piles of rocks at the heads of some of the arroyos between the mill site and Seboyeta. I was told they were placed there as head cutting erosion control measures by folks in

the Civilian Conservation Corps back during the Great Depression. The CCC had a camp at one time up in the woods above Seboyeta. Anyway, the stone arrangements resembled graves and the story was that they really were burial sites for miners who didn't meet Erwin Kopp's productivity expectations.

The radioactive materials license was eventually granted around 1983, the first such relicensing of a mill in New Mexico. It was hoped that would make a difference in putting the property up for sale. Early in 1984 some companies (Homestake and Rancher's Exploration, in particular) visited the site as possible suitors but it never panned out.

Efforts were made to try and make something economically out of what was left of the operation. We took a trip up to Kerr-McGee's mill at Ambrosia Lake, NM to observe what they were doing with the mine water and recovering a little uranium since they had to keep dewatering anyway, which was the same situation we were in. They had an Ion Exchange (IX) column and Lynn Jacobsen and I were doing some research on how we may at least be able to cover the holding costs in the hope of better times somewhere in the future. The IX column technology looked like it had some promise and we further investigated it by taking some ore samples to a research metallurgist at NM Tech to see if he could give us some ideas on what we could expect for mineral recoveries. (Lynn also had the idea that we could enhance the reaction by adding oxygen or even something to lower the pH a bit but we got nervous that the State Environment Improvement Division may not think that was a good idea; anytime you look at altering the chemistry underground without a good way of controlling it was something they probably would not permit).

Kennecott (having been purchased by Sohio) had a silver mine going in northern Mexico and VP Harold Krueger decided to send some of the equipment from the JJ #1 mine down there. That made the fate for the L-Bar Operation pretty much sealed, in my view, even though I had always felt it never would re-open anyway, much to Erwin Kopp's chagrin. We had to steam clean the equipment (mostly Wagner loaders and some slushing equipment) and check them for radiation contamination because of the environmental restrictions. Then a truck came and picked

up the stuff and drove it across the border at Eagle Pass, TX and it went somewhere into Mexico. I never did hear what happened after that.

The tailings pile was getting to be a different problem. It was stable and there was not any new water going into it which could affect the phreatic surface and put more hydraulic head on the contamination plume. But it was drying out and more of it was exposed to the winds which can be especially vicious in the spring time. We asked Tom Carlson, the Kennecott manager, for funds to spray a stability binder on the exposed tailings so they wouldn't blow around. Our monitoring data indicated the stuff was getting outside the fenced area and the NM Environmental Improvement Division wasn't going to be too pleased with that which could have involved fines or even losing the radioactive materials license which was about the only value left attached to the operation; I wasn't interested in being held personally responsible since I was designated as the Radiation Safety Officer and responsible for technical compliance. I told him how much we needed but he cut the request in half. I protested and explained that doing half of it was like doing none of it since the still-exposed areas would still be vulnerable. He said: "Well, that's all I'm going to give you so **just do the best you can**". We did what we could but it ended up just like I predicted (*I found out years later that when the site was finally reclaimed they had to pick up a lot of contaminated soil east of the tailings impoundment, exactly where we knew the windborne tailings would end up—I told you so*). I left Sohio in April, 1985 (Paul Pierce took my place) to work in the Albuquerque water system operation. The remaining staff were laid off about a year later and the mine site was cleaned up and the tailings pile reclaimed and put on an environmental monitoring program.

[See the US Department of Energy *2011 Annual Site Inspection and Monitoring Report for the Uranium Mill Tailings Radiation Act Title II Disposal Sites*. That report documents the closure/reclamation of the Bluewater and Sohio L-Bar tailings piles and give an historical and technical summary].

CHAPTER 3

Fast forward four years:

About July, 1989, I had heard back from the Pueblo of Laguna about the Jackpile Reclamation Project manager job. So I decided to pursue it and was called in for an interview. It was like no other interview I had ever had. It was in front of the entire tribal council and officers and you had to stand up each time someone fired a question. I was offered the position and the actual hiring was by the full Council vote (it wasn't unanimous), even though I would be reporting to the tribal governor (Delfino Begay at that time). I negotiated an employment contract with Del Begay and (late) Lester K. Taylor (the pueblo's legal counsel) and started work on August 15, 1989 which was also a Laguna feast day and I didn't have to go to work.

The work began by finalizing the design and cost estimates from Jacobs Engineering. Effort continued with finalizing the schedules with the Laguna Construction Company and getting delivery of the heavy equipment and all the support gear. Late in 1989 they began moving material by backfilling the North Paguate Pit. Neal Kasper (president & general manager of the Laguna Construction Company at the time) and I were watching the work and I said: "It's really nice to see dirt moving again". He smiled and shook my hand. I appreciated that because of all the hassles people had gone through on this project for so many years and it was finally becoming a reality. Actually, the construction activity spanned a shorter time than did the document preparation, public hearings, negotiations with ARCO for the settlement money, the tribe getting approval from the Bureau of Indian Affairs (BIA) to do the work themselves, formation of the company, and all the rest.

Roger Baer was the Bureau of Indian Affairs (BIA) front man for a lot of the preparatory detailed work. He helped with the Record of Decision getting finalized (the specific criteria set for the project to meet, based on the Environmental Impact Study led by the BIA with the Bureau

of Land Management as technical advisers), getting the company formed, and hiring Jacobs Engineering to do the engineering design and cost.

The 1990's opened with the Jackpile Project getting up to pretty good speed. Production and progress seemed to exceed expectations and it was good to be on the side of something that was successful instead of something dysfunctional. Buddy Goff was handling operations and R.B. Witt was taking care of the shop. Both were very capable men and I learned a lot of things from these two (at times) curmudgeons.

The revised revegetation specifications were done by Dr. Ed Kelley (who had done his doctoral research at the Jackpile back in the 70's while at the University of New Mexico and also had headed up the State's oversight of the Federal Office of Surface Mining reclamation compliance. Ed said one time he sent some paperwork to the Federal Office of Surface Mining for a mining permit but it was returned to him, saying the permit application report lacked a study on the fish in the Chaco River. When Ed explained the Chaco River wasn't really a perennial stream anymore and had no fish in it, the reviewer didn't believe him. He insisted if the map said it was a river, then a river it must be. Ed finally convinced him). Dr. Kelley was helped by Sterling Grogan who spent a lot of time managing reclamation at the Navajo Mine west of Farmington, NM. Sterling had to deal with the Federal regulators coming to inspect the work at Navajo and one time the Fed was really difficult to deal with. Sterling made a really good case for explaining why something wasn't done the way the Fed wanted it, saying that all it took was to exercise a little judgment regarding the intent of the regulation. The Fed said: "I'm not paid to exercise judgment"). The final slope engineering work got done by Weston Engineering (after we closed out Jacobs Engineering) and Landmark Reclamation provided Jim Harrison as the Construction Project Manager who the BIA wanted as additional oversight. The whole concept was overkill and eventually we got the BIA to relent and allowed me to assume those oversight duties (which I was doing anyway). Wil Lente, the Laguna interpreter and also a supervisor for the construction company explained the additional oversight this way: "I (the BIA) want a new TV set but you (Laguna Pueblo) are going to pay for it."

Laguna Industries was formed after the mine closed as a way to generate some jobs. They got hooked up with Raytheon (I believe) to work on some communications equipment fabrication for the Department of Defense. A bunch of the executives came in from Boston to meet with the tribal council and other officials; these executives had probably never been west of the Mississippi River, let alone to Laguna Pueblo. I was told a couple of the tribal councilmen were talking about deer hunting and one of the “three-piece suits” overheard and asked one of the Laguna fellows if they still hunt for their food. The Laguna guy said: “No, most of us just shop at the Safeway over in Grants”.

One afternoon at Laguna there was a lot of excitement. The fire crew got called out to the project site. The old rail trestle was burning and apparently it was quite a site for a short while. What had happened was R. B. Witt had told some guys to cut the rails so they could dismantle it. We had specific requirements that we were not to burn anything that was demolished--it had to be buried in the pits. Well, the cutting torches got the rails so hot that the wooden trestle caught fire. Since it was probably forty years old with lots of creosote, it went up like Roman candle. No one got hurt but some mechanics got chewed out pretty good. Back when the mine was operating, the main road crossed the Rio Moquino on a low-water crossing concrete pad. When the Moquino started running due to a flash flood, the only way to cross was using the train trestle. [*Back when the mine was still operating, I drove my old Toyota Celica over that trestle more than once*]. I walked the whole rail spur one day to check for radioactive contamination so it could be cleaned up if any was found. The condition of the spur wasn't that great but could have been put back into service. I tried coaxing the tribe into marketing that spur into some heavy industrial use but there was never much interest in it. (*I think in the past few years the rails & ties have been removed*).

Progress continued well on the Jackpile Project. I was finally able to convince the BIA (Roger Baer and George Farris, who worked out of Washington, DC) that the Construction Management Contractor was not needed and that a couple of guys from Laguna that I could train could adequately cover what oversight was needed. This step saved about \$1,000,000 over the

forecast life of the project. The Laguna Construction Company maintained a high level of performance. However, as long as we could keep it up, I pushed for maintaining it at as high a level as we could as did the folks directly responsible for the crews' productivity. If it got done early, all the better for the Pueblo of Laguna since it would mean money saved and the problem solved sooner than expected. We were able to share our experiences by participating in some professional paper presentations in Durango, Colorado, Albuquerque, and in Billings, Montana. Periodically we would take the Tribal Council out and they seemed pleased with what they saw. One time, Secretary of the Interior Manuel Lujan came out. We couldn't get to the site because rain had made the road impassable but we made a presentation to him and he was impressed by what the various government, tribal, and company representatives told him and the self-evident results.

The Laguna Construction Company was headed by Neal D. Kasper, R.B. Witt ran equipment maintenance and really knew his stuff. Buddy Goff ran the operators along with Jack Presnell and mining engineer Rudy Lorenzo from Paguate ran the engineering. Anson Carr, who had been a surveyor when the mine was active, ran the survey crew. Atiq Tatari ran accounting and his office supplied us with the pay estimates to be checked and processed. Buddy Goff had worked in the phosphate mines in Florida and knew a lot about equipment, especially draglines. I learned a lot from him and used to go on rounds to check the progress. He'd spent some time in Guyana in a bauxite mine and I think he went back to work in the Caribbean area when he left Laguna Construction. I lost track of most of these folks but they were a pretty capable bunch.

As part of the settlement between ARCO-Anaconda and the Pueblo, some of the money was to be used to compensate the Paguate residents for damage done because of the blasting during the mining days. We did a little trim blasting (as was required in the approved design from BIA/BLM) to the edges of the highwalls and it caused a minor uproar. A guy named Greg Lewis even called the Grants Beacon newspaper and said we were destroying the village so we ended up not doing anymore blasting and the tribe and the BIA (Allen Sedik, PE took Roger Baer's place) went along with it. To get back to the story, there was a geophysicist named Ken King

who had studied the blasting effects at Pagate during the Environmental Assessment phase and the Tribal Council wanted him involved in helping to decide how to distribute the damages fund, i.e., some had suffered more structural damage than others and closeness to the mine site didn't seem to be a significant factor. There were lots of variables (geologic structure, age of the houses, lack of good foundations, and other things) that came into play so it wasn't a really easy answer. We had heard Ken King was doing some work up in Chaco Canyon, investigating some effects of ground motions on the Anasazi ruins and so some of the councilmen wanted to visit with him up there along with Roland Johnson (BIA and a prior tribal governor from Pagate). So we drove up the road through Ambrosia Lake to Hospah and then came up to the turnoff to get over to the south entrance to Chaco. The driver asked: "Which way now?" I gave him directions and got him going and one of the Laguna councilmen in the back seat said: "Well, we're going to where our ancestors came from and we have to ask the white guy how to get there". Everyone laughed. We met with Dr. King and walked around Pueblo Bonito and it was a bitter cold & clear winter day and the wind was howling through there. I had a sense the place is haunted.

ARCO advertised locally for some environmental professionals so I sent in a resume and got called for an interview with Chris Sanchez who was the on-site fellow for the Bluewater tailings cleanup. We had a good visit but it didn't turn in to anything substantial. ARCO ended up with lots of cleanup costs after the buyout of Anaconda. Anyway, the Bluewater tailings pile got covered up with lots of malpais rock for erosion control and the buildings and town site were dismantled. If you didn't know where to look, you could drive past the site today and never know what a huge complex had been there at one time.

The Alpine Mine at the Jackpile had been cut back in the 1950's when Anaconda was doing some of their exploratory and feasibility assessments. Some guy named George (forgot the last name but Erwin Green said he was a topnotch mining man) was in charge of using an alpine miner to see if they could handle the sandstone and also be fairly selective on extracting the ore. I presume the idea was abandoned more so for the fact that the ore tended to be spotty and, it

being close to the surface, they could probably get higher tonnages using bigger equipment and actually uncover more of the resource by surface techniques. During the reclamation project, some of the old alpine working adits were temporarily uncovered when some of the protore piles were being hauled back into the pits. I took some photos of the alpine drifts and you could still see the marks from the cutter heads left in the sandstone—it looked like they had been done the night before. The openings again got covered with the topsoil work but the excavations are probably still intact today and they were mapped in the event someone might want to investigate them in the future.

Project management office took care of pay estimates for the construction company, environmental monitoring, regulatory compliance, monthly reporting to the Governor and all Councilmen, financial tracking, construction inspection/quality assurance, among other items. I reported directly to Governors Delfino Begay, Conrad Lucero, and Harry D. Early at different times through the project and Victor Sarracino and his son Marvin were hired and trained as Technicians along with Lydia Martin providing administrative support. Victor also served as Lt. Governor for a time so if the Governor was out, I reported to Victor at the same time he reported to me—quite an unusual arrangement and I'd never experienced one like it before.

All told, the Jackpile Project came in under baseline budget by around 15% and about 18 months ahead of the baseline schedule after having moved 30,000,000 cubic yards of material and restored 2,700 acres of land.

In mid-1994, it was apparent the Jackpile project was getting done ahead of schedule and there really wasn't a strong need for my continued presence. I had Victor and Marvin Sarracino pretty well trained, the long term monitoring plan and finances had been put into place, and things were just generally winding down. I had started looking for a new job since my employment agreement was due to expire on August 15.

That was the end of my involvement with the Jackpile Reclamation Project (*and the Laguna Mining District*) except for writing up a few final reports.

[APOLOGIES FOR SPELLING OR IF SOME PERSONS WERE NOT MENTIONED; AS I APPROACH SOCIAL SECURITY AGE, SOME OF THE RECOLLECTIONS MAY BE INCOMPLETE AND NO OFFENSE OR SLIGHT INTENDED; CORRECTIONS & UPDATES ALWAYS HELP].

The site met its original requirements of the 1989 Record of Decision but in 2014 was listed on Superfund because of radionuclides showing up in the watercourse downstream from the site so the coda for Jackpile is still pending.

My time in the district spanned (off & on) seventeen years, an estimated 375,000 miles of commuting, seeing massive operations boom, wither, and die and then come back to life for a short period of reclamation. There will always be some controversy about the uranium development in that part of New Mexico (and the Colorado Plateau in general). The history, cultural & economic impact, and environmental legacy of the Cold War and the foray into generating electricity that was going to be “too cheap to meter” will linger for generations to come as will the still unresolved waste disposal problems from nuclear weapons and power plants (*WIPP and Yucca Mountain have their own issues*). QED.