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Western Mining in the Twentieth Century Series  
Knoxville/McLaughlin Mine

Patrick Purtell

MAINTENANCE AND MANAGEMENT AT THE McLAUGHLIN MINE, 1985 TO 1997

With Introductions by  
Duane A. Smith  
and  
John Turney

Interviews conducted by  
Eleanor Swent  
in 1996 and 1997

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Mechanical engineer

*MAINTENANCE AND MANAGEMENT AT THE MCLAUGHLIN MINE, 1985 TO 1997*, 1999, xv, 145pp.

Education, Oklahoma and New Mexico, and military service; early employment as a mechanical engineer; Homestake Mining Co. from 1978: plant engineer, Grants, NM; maintenance supervisor, Creede, CO; maintenance engineer to manager, McLaughlin Mine, Lower Lake, CA; discusses combatting bacterial corrosion, managing titanium risk, maintaining continuous autoclave system, converting a processing plant, mine reclamation, management strategies for shutting down operations while maintaining morale and safety.

Introduction by John Turney, General Manager, Engineering and Development, Homestake Gold of Australia.

Interviewed in 1996 and 1997 by Eleanor Swent for the Western Mining in the Twentieth Century series. The Regional Oral History Office, The Bancroft Library, University of California, Berkeley.



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1993-1999

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Corporations and Organizations

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One Shot Mining Company

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Christine W. S. Byrd, in memory of Langan W. Swent  
Kenneth S. Canfield  
Rosemary and Harry Conger  
Douglas W. and Margaret P. Fuerstenau  
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## INTRODUCTION TO KNOXVILLE/McLAUGHLIN PROJECT by Duane A. Smith

Imagine, if you would, what it would be like to have a series of interviews from people of all walks of life from a nineteenth century mining town and district--for example, a Fiddletown, California; a Silver City, Idaho; or a Caribou, Colorado. Would it not be exciting to "hear" first hand the stories of miners, store owners, lawyers, teachers, and a variety of other folks that make up the mining West?

Such a series of interviews would be the perfect answer to the Roman statesman, orator, and philosopher, Marcus Tullius Cicero, who observed more than 2,000 years ago: "History is the witness that testifies to the passing of time; it illuminates reality, vitalizes memory, provides guidance in daily life, and brings us tidings of antiquity." Imagine, then, what the Knoxville/McLaughlin oral history project is going to mean to future generations.

The Knoxville, California, mining district has a long mining history. It started in the 1860s with mercury mining and continued into the 1990s with Homestake Mining Company's McLaughlin gold mine. Under the guidance of Eleanor Swent, and as part of the Regional Oral History Office's Western Mining in the Twentieth Century series, a comprehensive oral history project of this mining district was launched in 1993. These fascinating and significant volumes are the finished projects.

While obviously impossible to go back beyond the turn of the century, interviews were conducted with miners, ranchers, journalists, teachers, and merchants who were in the district before the arrival of Homestake. The words of these people provide an exciting look at a district in transition and decline. Then came Homestake and their world changed.

Some gold mines had been operated here in the nineteenth and twentieth centuries, but they were nothing like what occurred when a major mining company became interested. Homestake's geologists found enough gold to warrant development. The concept would be an open pit mine and mill that would impact Napa, Lake, and Yolo Counties in northern California for a generation and provide for the future.

Five and one-half years went into planning for the McLaughlin gold mine, including 327 approvals needed for the mine's development. Not only were some mining ideas new and ground breaking, but the operation was sitting in one of the most environmentally aware states in the country. Homestake spent over \$283 million in start-up costs, before mining commenced in March 1985. The first year's production of 83,836 ounces of gold showed that the planning and work had been worthwhile from a dollars-and-cents aspect. Homestake was proud of its operation.

"The McLaughlin mine is the site of the first successful commercial application of the autoclave processing technology for extracting gold from ores. The operation began production in 1985 and is a showcase for environmental responsibility."

Homestake would continue to mine the pit into 1996 when mining ceased, except for processing previously stockpiled lower-grade ore to be worked for approximately another eight years, "using a conventional direct cyanide leach process." Reclamation, which has been conducted simultaneously with mining, would also continue into the next century. As Homestake's annual report in 1995 stated, "Reclamation of mine waste dumps is scheduled for completion in the latter part of 1996 with the final placement of top soil and hydroseeding. The planting of oak trees and other indigenous vegetation will continue seasonally until the area is completely reclaimed."

All this makes the oral history project that much more exciting; it was conducted while the district still operated and memories were fresh and riveted on a host of topics and concerns. This multi-volume series covers almost every conceivable aspect and impact--it is a monument to a refreshing, innovative way of approaching mining history.

These volumes provide a case study of twentieth century mining, environmental issues, and regional concerns, the successes, failures, tensions, and developments that go to make up a 1980s and 1990s mining operation and the people involved from all walks of life. They are a gold mine of primary documentation and personal memories of an era that is passing into history. A perusal of the table of contents will give the reader an idea, but the interviews need to be "assayed" carefully to grasp the whole story of what went on at the McLaughlin mine and why its impact was so significant. This is a "high grade" effort all the way.

Cicero would be proud. These volumes do illuminate reality, vitalize memory, and provide guidance in daily life. Without question, they testify to the passing of time and will eventually bring "us the tidings of antiquity."

Duane A. Smith  
Professor of History and  
Southwest Studies

September 1997  
Fort Lewis College  
Durango, Colorado

## INTRODUCTION by John Turney

I first met Pat Purtell when he arrived at McLaughlin to begin the task of commissioning the McLaughlin Process Plant. I have purposefully called it a process plant because some of the first conversations I had with Pat were related to our backgrounds in complex process facilities, in both the metallurgical and petrochemical industries. The facilities we had both worked at were always called process plants and not mills. It was interesting that over the years we both referred to McLaughlin as a process plant and not a mill, as is the traditional label.

Pat had come out of the petrochemical industry where he had worked for Union Carbide in Houston, Texas. It was here that he learned the importance of examining process problems from the unit operation approach. I was a chemical engineer so this type of thought pattern was familiar to me as well. This common area of understanding then became the beginning of a working and personal relationship that has now existed for fifteen years.

During those initial commissioning days at McLaughlin we all lived in rental houses in the Lake County area. These houses were rented by the company to provide accommodation to the commissioning team. Pat and I shared a house, and as a result had many conversations about our families and the technical issues we were both dealing with. During this time I learned of Pat's hamburger flipping ability. He was a champion hamburger flipper with McDonalds in his younger days, and still to this day takes pride in preparing a hamburger! I also learned of his love of things mechanical and his desire to be building things, both small and large. His rocking horse projects are just as well known to those close to him as his achievements in solving the nozzle problems on autoclaves.

Pat's involvement at McLaughlin has covered all the major changes and developments since those initial commissioning days. Pat is an engineer who really enjoys being an engineer; he just eats and sleeps with the problems until they are solved. In fact, as McLaughlin evolved and settled down to a steady-slate operation, Pat became a little restless. He had been involved in slurry viscosity, pumping issues, water balance issues, expanded plant, autoclave nozzle and liner systems evolution, titanium walls, in fact all the projects that were critical to the eventual success of the operation.

He was able to apply the engineering thought pattern he loved so much to these problems with an enthusiasm that kept everybody hard at it. It was that enthusiasm and rigour in his thinking that I enjoyed so much, in fact, it was the same enthusiasm he brought to his rocking horse projects, or maybe it was the other way around. When the time

came to do something else and move into an operating role, Pat wasn't sure, he didn't want to leave his engineering, but I am glad I was one of those who influenced him to head in this direction. He has made the transition and is now making a very different but important contribution to McLaughlin.

The nickname "Two Stack Pat" was the beginning of this transition, because initially he never seemed to have more than two autoclaves on line at any one time. But by the time the refractory ore was exhausted and the autoclaves were shut down their performance and availability was as good, if not better, than many of the newer more modern autoclave installations that were constructed around the world following McLaughlin's pioneering start.

Pat can be proud of his contribution to that achievement, and I am glad to have him as both a work associate and a friend.

John Turney  
General Manager, Engineering and  
Development  
Homestake Gold of Australia

April 1999  
Perth, Western Australia

## PROJECT HISTORY--Knoxville District/McLaughlin Mine Oral History Project

The development of the McLaughlin gold mine in the Knoxville District of Napa, Lake, and Yolo Counties in California in the last quarter of the twentieth century was a historically significant event. The mines of the district had been major producers of mercury since 1861. In 1888 an official report by G. F. Becker on the quicksilver deposits mentioned the presence of free gold which could be obtained by panning. It took almost a century before this knowledge could be acted upon when Homestake Mining Company signed an agreement with James William Wilder, owner of the Manhattan Mine, in 1978.

Advisors to the oral history series on Western Mining in the Twentieth Century<sup>1</sup> who were also Homestake directors, Professor Douglas Fuerstenau, principal faculty advisor, Clifford Heimbucher, and John Kiely, all urged the Knoxville/McLaughlin oral history project, as did advisor Sylvia McLaughlin, widow of the Homestake chairman for whom the mine was named. It was decided it should be a community oral history, in contrast to the previous volumes in the series which documented individual careers.

The five historically important aspects are: the history of the Knoxville mercury mining district, with its periodic booms and busts; the effects of a large industrial development and influx of technically trained workers in an economically depressed rural area; the efforts to obtain permits to develop a mine near a center of environmental activism; the continuous pressure oxidation system which was pioneered at the McLaughlin processing plant; the reclamation of the mine site. The life of the McLaughlin mine was projected to be about twenty years, and most of the key players were available for interviews. It is a nearly unique opportunity to document the discovery, development, and closing down of a mine while it is happening.

The history of the Knoxville District begins in 1861 with the incorporation of the Redington quicksilver mine, also known as the XLCR or Knoxville mine, then employing as many as 300 men. The town of Knoxville had thirty or more buildings, including a store, hotel, postoffice, Wells Fargo office, school, and cemetery. In 1872 the state legislature transferred prosperous Knoxville Township from Lake County to Napa County, although it is separated from the Napa Valley by mountain escarpments. Lake County was compensated with a one-time payment of \$3500.

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<sup>1</sup> Information on the Western Mining in the Twentieth Century oral history series appears in the Appendix, page 135.

In 1869 Knox and Osborne opened the Manhattan Mine on the same lode as the Redington. The Oat Hill or Napa Consolidated Mine was opened in 1872. A report on the metallurgy of quicksilver issued by the Department of the Interior in 1925 says, "In 1874, the Knox continuous shaft-furnace for the treatment of both fine and coarse ores was first used in California." [Bulletin 222, p. 5] The Knox-Osborne design was further augmented by a fine-ore natural-draft furnace developed by mine superintendent Charles Livermore. The district prospered until 1905, for a decade around World War I, and from 1927-1936. Demand for mercury rose during wartime because it was used as a detonator for explosives.

Knoxville was linked by road through Sulphur Canyon with the town of Monticello in fertile Berryessa Valley. Farmers descended from early Scots settlers grew pears, prunes, wheat, and barley and occasionally worked in the mercury mines. After World War II, when California's population was growing rapidly, a dam was built which by 1956 flooded the valley to create Lake Berryessa. It attracted vacationers, and for most of them it was the end of the line. The unpaved road from Lake Berryessa to Knoxville was impassable when rains filled the creek bed. In the other direction, from Knoxville to Clearlake, there was a similar little-used road through Morgan Valley.

Although it is only a few miles from the densely populated San Francisco Bay Area, in 1978 Knoxville township had few telephones, surfaced roads, or bridges. Populated by ranchers, miners, seasonal hunters, and outlaws, it was one of the most economically depressed regions in California, with high unemployment. In 1991, Napa historian Robert McKenzie called it "truly the last frontier of Napa County."

The chronology of the McLaughlin Mine is as follows: in 1961, following publication of a Professional Paper by USGS geologist Ralph J. Roberts, Newmont geologists John S. Livermore and J. Alan Coope found a major deposit of micron-sized gold on the Carlin trend in Nevada. It was economic to mine because of technological advances in explosives and earth-moving equipment, and development of new methods such as heap-leaching for recovery of gold from ore. This led other mining companies to search for similar deposits of "invisible" gold.

In 1969, the National Environmental Protection Act was passed, followed in 1970 by the California Environmental Quality Act.

In the 1970s, "Bill" Wilder, principal of the One Shot Mining Company, was reclaiming batteries for Mallory Company in the furnaces at the Manhattan mercury mine. Environmental concerns had made mercury mining unprofitable, so Wilder was crushing the beautiful colored rock on his property and selling it as decorative stone. An assay from several years before had showed gold was there, but at that time mercury at \$75 a flask was more valuable than gold at \$35 an ounce, the official

price from January 1934, when the United States went off the gold standard, until 15 March 1968.

In August 1971, President Richard Nixon terminated the convertibility of the dollar into gold, and the price climbed to \$800 an ounce in 1980. In 1977, Homestake Mining Company underwent a restructuring and embarked on a program to find a world-class gold mine. Their search revealed geology reports in their files from the 1920s which encouraged exploration at hot springs near the Knoxville mercury mining district of northern California. In 1978 Donald Gustafson, Homestake geologist, visited the Manhattan Mine at the place where Napa, Yolo, and Lake Counties meet. A drilling program revealed an epithermal gold deposit which at this juncture remains unique; no extension or replica has been found in the Great Valley geologic sequence or the Coast Range thrust which were exposed at McLaughlin.

Mining companies are familiar with developing mines in remote and rugged locations, with the attendant logistical problems. In this case, there was the further challenge of obtaining permits to develop a mine in the jurisdiction of three counties, regional and state water quality districts, three regional air quality districts, various state agencies, and the Bureau of Land Management. It took more than five years and cost millions of dollars to secure the 327 required permits which made a stack of paper more than eight feet high. In addition, the ore itself was finely disseminated, fairly low grade, and as it turned out, highly refractory. Traditional methods of beneficiation were ruled out by environmental concerns, so Homestake metallurgists developed a high pressure oxidation system, incorporating technology from South Africa, Germany, Canada, and Finland, which has now been widely copied.

The eventual design was for a mine pit with adjacent crushing plant and a five-mile pipeline to conduct slurry to a zero-discharge processing plant using a variety of technologies, including autoclaves. Reclamation in the mine and on dumps began almost immediately, and at the end of the mine's life, it will be a part of the Nature Reserve system of the University of California, for research by scholars at both the Berkeley and Davis campuses.

In 1991, the Regional Oral History Office began to explore possibilities for funding the Knoxville/McLaughlin oral history. A four-year project was outlined to include about thirty-five interviews averaging three hours each, for a total cost of \$100,000, resulting in a set of volumes covering the mercury mining, the gold mining, and the resulting changes in the surrounding community. The Hearst Foundation granted \$20,000 to document the gold mine, and the Mining and Metallurgical Society of America gave \$6,000 to document the earlier mercury mining. Homestake and Chemical Lime Company each donated \$2,000, which enabled interviewing to begin in March, 1993.

The best laid plans, however, can be changed by circumstances beyond control. One of the first names on the list of interviewees was John Ransone, Homestake's construction project director. He sent helpful background documents in preparation for a scheduled interview; however, before it could be held he died of lung cancer. The project manager for the construction company, Klaus Thiel, in the meantime had been assigned to work in Brisbane, Australia, so he could not be interviewed. Several of the other Homestake people had scattered: James Anderson to Denver, Jack Thompson and John Turney to British Columbia, David Crouch to Salt Lake City, Donald Gustafson to jobs in Namibia and Kazakhstan, Joseph Strapko to Maine. William Humphrey and Richard Stoehr both underwent major surgery. Nevertheless, interviews were conducted with these and others involved in the development and operation of the mine.

Although similar difficulties occurred on the list of community leaders, by 1996 interviews had been conducted with a county supervisor from each of the three counties involved, Napa County planners, the Lake County school superintendent, community historians and pioneers, merchants, and ranchers. Some of the most vocal opponents of the mine were also interviewed.

There is a perception that the former mercury miners are all dead, killed by mercury poisoning. In fact, Dean Enderlin, a geologist at the McLaughlin Mine and also a Napa County native and historian, helped to locate some who were remarkably healthy, and who were interviewed. Elmer Enderlin in his eighties spends summers working at his tungsten prospect in Idaho and winters in Lower Lake. Anthony Cerar, also in his eighties, at the time of interviewing still actively maintained several historic mercury mines, including La Joya and Corona. William Kritikos, operator of the Oat Hill Mine, was nearly seventy-three when he died following a stroke, but was in good health at the time of his interview. Ed McGinnis, who worked around the Reed Mine as a boy, is still active in his seventies. Bill Wilder, who owned the Manhattan Mine, is a relative youngster in his seventies and in good health in Upper Lake.

The project comprises forty-three interviews in all. Two of the interviews were completed as separate volumes in 1996: William A. Humphrey, Mining Operations and Engineering Executive for Anaconda, Newmont, Homestake, 1950-1995, and James William Wilder, Owner of One Shot Mining Company and Manhattan Mercury Mine, 1965-1981. They are bound individually. Subsequent oral histories in the project will be bound into volumes containing more than one interview, arranged in alphabetical order. Supplementary documents are included as appropriate; Volume I contains general information. It is expected that researchers will refer to the entire set for a comprehensive account of the McLaughlin Mine. The oral history of Langan Swent, Working for Safety and Health in Underground Mines: San Luis and Homestake Mining

Companies, 1946-1988, completed in 1995, not part of the project, also contains relevant information.

We are grateful to all of the interviewees for their participation. There are many others who have helped also. Homestake Mining Company has supported the project not only with funds, but also in lending the Regional Oral History Office a computer and printer, and making available for research the archival video tapes and files of newspaper clippings and news releases, as well as the environmental studies, the environmental impact report, and the environmental impact statement. Early on, a day tour of the property and box lunch were provided for a van load of ROHO staff, interested students, and faculty from the University of California at Berkeley. The conference room at the mine and the San Francisco offices at 650 California Street have been used for interviewing.

James Jensen made available his extensive files on mercury mining and processing and mercury poisoning. Anthony Cerar led a vigorous hike around the Knoxville mine site, identifying foundations of long-gone buildings and workings. John Livermore conducted a tour by jeep of the Knoxville district, and suggested the importance of the Morgan North papers at The Bancroft Library. Staff members gave help at the Napa Register, the Napa Museum, the Sharpsteen Museum in Calistoga, and the Lake County Museums in Lower Lake and Lakeport. Professor Duane Smith, mining historian at Ft. Lewis College, Durango, Colorado, wrote an introduction for the volumes of multiple interviews. Professor Greg Wheeler of Sacramento State University has given valuable advice, and staff members of the California Division of Mines and Geology Les Youngs, Ron Churchill, and Kathleen Twomey have provided photos and graphs.

The tapes of all the interviews are available for study at The Bancroft Library. The completed volumes will be available at The Bancroft Library and in the Special Collections at UCLA.

Eleanor Swent, Project Director  
Knoxville District/McLaughlin Mine  
Oral History Project

February 1998  
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University of California, Berkeley



**Knoxville District/McLaughlin Mine Oral History Project**

William Humphrey, *Mining Operations and Engineering Executive for Anaconda, Newmont, Homestake, 1950 to 1995, 1996*

Patrick Purtell, *Maintenance and Management at the McLaughlin Mine, 1985 to 1997, 1999*

William Wilder, *Owner of One Shot Mining Company: Manhattan Mercury Mine, 1965-1981, 1996*

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume I, 1998*

Anderson, James, "Homestake Vice President-Exploration"

Baker, Will, "Citizen Activist, Yolo County"

Birdsey, Norman, "Metallurgical Technician, McLaughlin Process Plant"

Bledsoe, Brice, "Director, Solano Irrigation District"

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume II, 1998*

Cerar, Anthony, "Mercury Miner, 1935-1995"

Ceteras, John, "Organic Farmer, Yolo County"

Conger, Harry, "President, Chairman, and CEO, Homestake Mining Company, 1977 to 1994"

Corley, John Jay, "Chairman, Napa County Planning Commission, 1981 to 1985"

Cornelison, William, "Superintendent of Schools, Lake County" (Includes an interview with John A. Drummond, Lake County Schools Attorney)

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume III, 1998*

Crouch, David, "Homestake Corporate Manager-Environmental Affairs"

Enderlin, Elmer, "Miner in Fifty-Eight Mines"

Fuller, Claire, "Fuller's Superette Market, Lower Lake"

Goldstein, Dennis, "Homestake Corporate Lawyer"

Guinivere, Rex, "Homestake Vice President-Engineering"

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume IV, 1998*

Gustafson, Donald, "Homestake Exploration Geologist, 1975-1990"

Hanchett, Bonny Jean, "Owner and Editor, Clearlake Observer, 1955-1986"

Hickey, James, "Director of Conservation, Development, and Planning for Napa County, 1970 to 1990"

Jago, Irene, "The Jagos of Jago Bay, Clear Lake"

Jonas, James, "Lake County Fuel Distributor"

Koontz, Dolora, "Environmental Engineer, McLaughlin Mine, 1988-1995"

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1997, Volume V, 1998*

Kritikos, William, "Operator, Oat Hill Mine"  
Landman, John, "Rancher, Morgan Valley"  
Lyons, Roberta, "Journalist and Environmentalist"  
Madsen, Roger, "Homestake Mechanical Engineer"  
Magoon, Beverly, "Merchant and Craft Instructor, Lower Lake"  
McGinnis, Edward, "Worker at the Reed Mine"

Knoxville/McLaughlin Interviews in Process:

Ingle, Hugh, Jr., "Mining Engineer, 1948-1998"  
Krauss, Raymond, "Environmental Manager, McLaughlin Mine"  
McKenzie, Robert, "Photographer and Local Historian, Napa County"  
Moskowite, Harold, "County Supervisor, Napa County"  
Onstad, Marion, "Morgan Valley Rancher, Homestake Secretary"  
Parker, Ronald, "General Manager, McLaughlin Mine, 1988-1994"  
Stoehr, Richard, "Homestake Vice President and Director"  
Strapko, Joseph, "Homestake Field Geologist"  
Thompson, Jack, "General Manager, McLaughlin Mine, 1981-1988"  
Thompson, Twyla, "County Supervisor, Yolo County"  
Tindell, Avery, "Capay Valley Environmentalist"  
Turney, John, "McLaughlin Metallurgist: Pioneering Autoclaving for Gold"  
Underwood, Della, "Knoxville Rancher, McLaughlin Mine Surveyor"  
Wilcox, Walter, "County Supervisor, Lake County"

## INTERVIEW HISTORY--Patrick Purtell

Patrick Purtell, a mechanical engineer, became resident manager of the McLaughlin Mine in 1994, and so was responsible for the shut-down phase and continuing reclamation and conversion to a nature reserve. In his oral history he discusses in detail how his previous experience fed into making critical judgments. A shut-down is one of a manager's most difficult challenges: not only to handle the logistics and economics, but to make wrenching personnel decisions on layoffs. In Pat Purtell's case, he also had, as he says, both a shut-down and a startup (another major crisis for management) because when the mine was shut down, the process plant was converted to a different system and continued to operate. It is greatly to his credit that on his watch Homestake's superior safety record was maintained and no suit was ever filed over layoffs.

The letter of invitation to participate in the oral history series was sent to Purtell in February 1996 and two interviews were held at the mine site on Morgan Valley Road, about twelve miles east of Lower Lake, California. The first was on 31 May 1996, in the manager's office in the administration building adjacent to the processing plant; at that time, the mine was still operating. When I checked in at the entrance gate to the property, I was issued a hard hat and safety glasses and had to sign a lengthy release form. Then when I drove up the hill to the "admin" office, there was a receptionist to greet me in the small lobby before I went down the hall to an attractively decorated corner office. The second interview, on 24 October 1997, was conducted five miles further down the road in a well-worn metal industrial building, the former truck shop, adjacent to the grinding area and the now closed-down mine. There was no landscaping or entrance area, no hard hat or safety glasses required, no receptionist. These were the outward visible signs of a changed enterprise. Pat himself has acquired grey hair during his years at the McLaughlin Mine, but has lost none of his rugged handsomeness nor his relaxed and friendly manner.

Pat Purtell's oral history recalls his Jesuit schooling, which was followed by a sobering and maturing tour of duty with the infantry in Vietnam. After graduating from the University of New Mexico as a mechanical engineer, he worked in Texas in a chemical plant and had a bad experience with poor management and difficult labor unions. This prepared him to accept later on the awkward position as acting manager of the McLaughlin Mine before he was given full responsibility as manager.

From 1968 to 1974 he was plant engineer involved in closing down Homestake's Ambrosia Lake uranium mining enterprise near Grants, New Mexico. Then for a short time he participated in the closing of Homestake's Bulldog Mine in Creede, Colorado. All of this experience

gave him valuable insight into good as well as bad ways to handle both mechanical maintenance and personnel relations.

Purtell's view of the McLaughlin Mine enterprise is determined by his training as a mechanical engineer with chemical plant experience. He was not overawed by the let-down valves which occupied so much of other people's attention, because he considered it just one more mechanical problem to solve.

A mechanical engineer pumps stuff and things turn and you fix them, and that's all there is to it. No big deal. High pressures, high temperatures--people around here, you could feel this fear; I had trouble relating to that. The oxygen plant was just a terrifying thing to have in their backyard over there for these guys because, oh, my gosh, what is it going to do? We had oxygen plants in the chemical plant I worked at: lots of pipes, pipe racks, pressure vessels. I've inspected them before. No big deal. So I didn't have this real overwhelming awe when I walked in.

As for the revolutionary continuous autoclave system and let-down valves, he says:

Once you had it done and it has been proven, great! Now monitor it, which we did. As you went through, you find out, well, this valve gets 8,000 hours worth of life on it. Fine! Change it out in 7500, then. No big deal. It wasn't a great mystery. So you look at what your problem is, like you do with anything else. You're going to have a problem somewhere along the line you have to solve. They're concerned, "Oh, my gosh, it's hot mud. It's got acid in it." Yes, there's concern. You respect it. You have to respect it. But don't be afraid of it; all you had to do was respect it, take care of it, watch it, and it's okay. No big deal.

He empathizes with the employees during the shut-down:

...a morale problem in a lot of ways when, right during the period of time that we were looking at the shutdown coming up, the employees, especially in the process end, that were going to stay didn't really know what their jobs were going to be at that time. We couldn't

really tell them until we got everything well organized. So we had a lot of people that knew they weren't going to have a job, and the other people that were going to stay didn't know what their job was going to be.

So it was a period of turmoil, and it's hard to keep people focused on safety and working well and everything else. That was a real concern that we had going into this. And to end up with--there are some minor injuries, I'm sure, but people weren't paying attention, thinking about something else. And we only had the six lost-time injuries; two true lost-time injuries during that period was pretty remarkable. It's done really well. We've been proud of that one. That's still holding up. We just had MSHA in here just the other day, and he was bragging about what a great operation it was again. It seems that every inspector comes in here decides that this is one of the better ones he's ever been in. That's a good source of pride, too.

The tapes of the interview were transcribed in the Regional Oral History Office, lightly edited, and sent to Patrick Purtell for review. He made a few minor changes of diction and factual details and returned the transcript promptly. The manuscript was corrected and indexed at our office. The tapes are deposited in The Bancroft Library and are available for study.

The Patrick Purtell interview is one of more than forty interviews which were conducted by the Regional Oral History Office from 1993-1998 in order to document the development of the McLaughlin gold mine in the Knoxville District of Lake, Napa, and Yolo Counties, California, from 1978-1998, as part of the ongoing oral history series devoted to Western Mining in the Twentieth Century. The Regional Oral History Office was established in 1954 to record the lives of persons who have contributed significantly to the history of California and the West. The office is a division of The Bancroft Library and is under the direction of Willa K. Baum.

Eleanor Swent  
Project Director, Research Interviewer/Editor

Regional Oral History Office  
The Bancroft Library  
University of California, Berkeley  
February 1999

Regional Oral History Office  
Room 486 The Bancroft Library

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Berkeley, California 94720

BIOGRAPHICAL INFORMATION

(Please write clearly. Use black ink.)

Your full name PATRICK JOSEPH PURTELL

Date of birth AUGUST 4, 1948 Birthplace MILWAUKEE WISC.

Father's full name EUGENE PATRICK PURTELL

Occupation DENTIST Birthplace MILW. WISC.

Mother's full name MARGARET ROSE PURTELL

Occupation \_\_\_\_\_ Birthplace MILW. WISC.

Your spouse SHARON LEE (BARACK) PURTELL

Occupation DENTAL HYGIENIST Birthplace CHICAGO ILL.

Your children CRISTINA, ERIC, THOMAS, JUSTIN

Where did you grow up? ALBUQUERQUE N. MEX.

Present community KEESVILLE CA.

Education BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING  
FROM THE UNIVERSITY OF NEW MEXICO

Occupation(s) GENERAL MANAGER OF MCLAUGHLIN MINE

Areas of expertise CONSTRUCTION, OPERATION AND MAINTENANCE  
OF ORE PROCESSING FACILITIES

Other interests or activities BOATING, GOLF

Organizations in which you are active AIME, CMA

## INTERVIEW WITH PATRICK PURTELL

## I TRAINING AS A MECHANICAL ENGINEER

[Interview 1: May 31, 1996] ##<sup>1</sup>

Early Years and Education

Swent: To start off, Pat, please just tell where and when you were born.

Purtell: I was born on August 4, 1948, in Milwaukee, Wisconsin. Left when I was about three years old. Moved to Albuquerque, New Mexico. He [my father] had a sister down there, and they liked the dry climate and the weather, and they needed a dentist, so he moved down there. Started a practice up right away. In my family, I'm the second oldest of eight kids. There were five boys altogether, three girls. All of us basically lived and grew up in Albuquerque. I spent the first three years, first, second, and third year of high school going to Shawnee, Oklahoma. Boarding school. My parents sent me off over there. So much to say, "You're being too good. Go over here and learn how to live life," I guess, in some respect. I think that was the reason. But I enjoyed it.

St. Gregory's High School, Shawnee, Oklahoma

Swent: Why Shawnee, Oklahoma?

Purtell: It was a boarding school, a Catholic boarding school, that they knew about, and they thought, "Hey, that sounds pretty good. We'll send him over there." So that's where I went.

Swent: What was it like?

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<sup>1</sup>## This symbol indicates that a tape or tape segment has begun or ended. A guide to the tapes follows the transcript.

Purtell: It was different. It was flat land. Albuquerque's got the big mountains and everything, and here's flat land. Rained a lot, lots of lightning. That's the biggest impressions I had. The winds, prairie grass, prairie grass fires. We were the largest group of bodies in the area, so every time there was big grass fires they'd call us out and load us in trucks and take us off to put out grass fires. Those are some of the memories of the place.

Swent: Was it just a boys' school?

Purtell: Yes, just a boys' school. Probably maybe three hundred boys in the school altogether.

Swent: What was the name of the school?

Purtell: St. Gregory's High School. Shawnee, Oklahoma. Jesuit brothers ran it. There's a monastery.

Swent: What did you feel about the Jesuit education system?

Purtell: It wasn't bad. It was good. I mean, I learned a lot.

Swent: What did you study?

Purtell: I was doing pre-college entrance, typical-type thing. Higher level algebra. Everything was all gone through at the time. Latin. I was almost fluent in Latin in three years, but I couldn't speak a word of it now if you had me. If I had to speak it, I couldn't do it. But just about fluent in Latin. That was the one thing I remember [chuckles] coming out of there.

Left there my junior year. It closed down, so there was no going back for the senior year.

Swent: I'm curious. For your pre-engineering training, did they have laboratory education?

Purtell: It was pretty typical of a lot of schools. We had chemistry and a chemistry lab, and biology and a biology lab. Well, I didn't go senior year. I think they had a little physics lab they worked on; it was pretty small. They couldn't get really large. But I went the next year back in Albuquerque, I went to a high school there. They had a physics group there, and I took physics, and we had all sorts of experimental equipment and stuff. So it was a pretty thorough education out of high school.

Swent: I had the impression that the Jesuits are very strict on keen thinking.

Purtell: Well, there's that. And discipline [laughs]. Real good discipline. Yes, everyone had their board. That's how they kept all these guys in line. Some of the students that got sent to that school--

Swent: What do you mean?

Purtell: Swats, you know? Paddle them. In those days, that was allowed to do. So they kept you in line that way. We had students that either had the option to go to this boarding school or go to some kind of juvenile delinquent hall. They could either go to this school or go to there. Sometimes they would give them that option to do, and so they sent them there, so they had some rowdies at the school, too, to top it off. That's how they kept them in line. They used the board liberally.

Study halls. A typical day would be up early, go eat breakfast, go to school, hour lunch, you had a couple of hours after school in the afternoon for either sports or whatever you want to do, activities. They had rec rooms here and there to play in. And had an Olympic-size pool. You could go swimming if you wanted to.

Evenings: dinner, and then you had an hour and a half to two hours in a supervised study hall, so this big long room of desks with people doing nothing but studying. So you talked and made noise, your name was down. And in the study hall you got swats. As I said, if you didn't behave yourselves. So very regimented study periods for those periods of time. And by the time study hall was over, you're ready to go to bed, and that was it. You're off to bed.

Weekends: activities on the grounds. They owned a lot of acreage, so we wandered around. Summer: in the warmer months, you could go swimming in the ponds they had around there, with the cattle and stuff. But a lot of activities kept us going. Go into Shawnee, into the town, itself, and go see the movie. Hitch-hiked. Did a lot of hitch-hiking at that time. That was the thing. You could still do that then, too, without any trouble. That's how we got around.

Swent: When was this?

Purtell: About '62 to '64 I think it was. I graduated from high school in 1966, so that was my first three years. It was about in that range of time in Oklahoma.

Swent: What do you think was your parents' motivation in sending you there?

Purtell: They just thought you've got to go out--I was too good of a kid, I guess. "Go to school." This is what I heard from my sisters, their explanation of it. "We sent him off to school to learn how to do things." How to be a boy, I guess. That type of a thing. And really I don't know that I ever looked on it as that. It was just, well, they're sending me off to this boarding school, so great. This is fun.

Swent: Was there pressure to enter the priesthood?

Purtell: Always. My father is a very devout Catholic, and there was a lot of pressure along the lines. The school, itself, there wasn't much at all. You didn't get a whole lot of it. There was discussion off and on, but there was never as much pressure as I got at home. My father's dream was always to have one son become a priest and one daughter become a nun. And it never happened [chuckles]. So that didn't work out there.

But from that school in Shawnee, when it closed down I went to the Catholic high school in Albuquerque, St. Pius X, which was a rude awakening for me, because now it was a coeducational school. I had been kind of insulated from all these girls running around at the time, so now I'm in a school that's coeducational. That was a different experience in itself. Senior year. And it was pretty intense study. They were pretty thorough on it. Dominicans, I think, was the order that ran that school. They had their own strictness, their own way, too. Was a lot different than the other kids, other high schools would see. Most of my brothers and sisters went to the same school.

Actually, my education has always been in Catholic schools, ever since I was in pre-school, all the way through. It's always Catholic education. So that was usually pretty strict, especially in those days.

Swent: Were you an athlete?

Purtell: Not much. I played some basketball when I was in St. Gregory's. When I got to Pius, it was out of my league at that time, and trying to get onto the team after, just coming in for that last year, was--I didn't do that then. So mostly basic on studies. About the middle of that year I ended up with aseptic meningitis that really screwed me up. I missed about a month of school, right in the middle of the year, right after Christmas, just before mid-term exams.

Swent: How do you get that?

Purtell: A complication of a viral infection I had. I had some kind of a virus or flu or a reaction to flu, and it's an inflammation of the brain lining, but it's not done by bacteria or even virus, I guess. It's just an inflammation. It's as bad as spinal meningitis, same type thing. So that put me out for at least a month, I think. I was out of school in the middle of it all. So had to catch back up. I was doing all the upper-level courses to get into college, so--physics and stuff.

Swent: That was a very traumatic experience.

Purtell: Well, it made it tough. It got to a point when I got back, I could do nothing but catch up and study, study, study to catch up. But I came out of school with better than a 3-point average, which you can be proud of that. But had to work hard that last year. That was a tough year because of missing the month in the middle of the year. And then had to go back and take mid-term exams that I had missed previous to that. I had to go take those again, then catch back up again. That was a challenge in itself, getting through there.

But graduated from there and, of course, my parents then expected everybody was going to go to college. My older sister was in nursing school for about a year and dropped out, and I was expected now to go to college, so I got out and went to the University of New Mexico for a year.

Swent: Let's get this date again. You graduated from St. Pius in--

Purtell: In 1966.

Swent: That was a rough time for young men.

Purtell: It was a different time, yes. You get out and there's a period when you wonder about the military, so you're going to go to college, just so you don't get drafted. That was part of the times.

Swent: You were registered?

Purtell: Yes, I was registered. I went to Vietnam. While I was in Vietnam, they drew the first lottery. I ended up being 352 or something like that, so I would never have gotten drafted. But [chuckles] I was already there.

University of New Mexico and Working at McDonald's

Swent: So you graduated in 1966.

Purtell: Right. Graduated in 1966, and then the following fall I went to the University of New Mexico, just general studies. I really didn't know what I wanted to do, so I was just taking some general courses.

Swent: That was a rather new campus at that time, wasn't it?

Purtell: No, it had been around for quite a while. The core of the campus, if you go to it right now, looks very new. But the core is very old. It's been around for a long time. It was a small school.

Swent: But they had had a big expansion.

Purtell: They've been really growing. When I was there, there was probably maybe six or seven thousand students, and that had been a big growth at that point. And now it's up to twenty thousand, I think, are at the school now, so--

Swent: I remember a lot of new buildings in the fifties.

Purtell: Right. It was just on the outside. But the core, itself, was pretty old. It's been around for a long time. I went there for that one year. It was a goof-off time. I partied more than anything else. Really didn't want to go to school. Was one of those who needed a break and didn't want to do it, but I had a good time. I failed most of my courses [laughs].

Swent: Were you living at home?

Purtell: Living at home, yes, at the time, and paying for school myself, so it didn't bother me that I wasn't--

Swent: How did you do that?

Purtell: Just worked at McDonald's, like everybody else, and worked in restaurants. But McDonald's was the biggest one. I started there. It was probably the summer after my high school year. Got a job at McDonald's and worked split shifts and stuff while you're in school and get a couple hours here, a couple hours there. So that was grocery and beer money more than anything else.

Swent: A great American tradition.

Purtell: Oh, yes. Oh, yes. So I did that during that period of time. And once I got suspended academically from college, they just said, "You're not here to study, obviously. You've got a 1.2 grade point average, and it doesn't look very good. So why don't you take a year off and think about it, and come back to us." So I was suspended at that time. So I went to work full-time for McDonald's at that time, and thought, "Well, maybe I can make it through this year without being drafted and get back into the university again." And I think going back to school was more to avoid going to the army than anything else.

Drafted into the Army, 1968, in the Largest Draft Ever

Purtell: Then I got the draft notice. I think it was in September. I went into the service in March of 1968, so I got my draft notice I think it was in February of '68, is when I finally got my draft--because I went through that year of school. Got this draft notice. And it was kind of a relief, you know. Now it was over. Okay. Done. Let's go. Let's do this.

So I went down. I probably could have gotten out because I had a bad knee or anything; I could have found out something, and I went into the service anyway. Said, "What the heck. It's a good two-year break. Let's do it." So I went in there. Drafted out of Albuquerque. Went to Fort Bliss, Texas.

Swent: You joined the army.

Purtell: Drafted into the army. They were drafting into the marines at that time, too. I got lucky. I got drafted into the army, which was fine by me. So I went into the army--

Swent: You were drafted. Although it was before the lottery.

Purtell: Right. They were drafting people. The month, actually, that I was drafted was the largest draft month ever: 355,000 guys were drafted that month. It was a big month for good old President Johnson, yes [chuckles].

Swent: What was the feeling in--it's hard to go back and remember, but, you know, at that time, on the campus or in Albuquerque?

Purtell: The campus. It wasn't a big deal at that time. It had not built up to the level of--the protesting and stuff had--beginning at the time. You saw some demonstrations about the war, but from what I remember, it wasn't really rampant. When I came back from

the military, it was just terrible. I mean, all sorts of demonstrations all the time. The National Guard out and everything else. There were several demonstrations I saw after I got back, going to school at that time. So it was--

Swent: But the spring of '68 it wasn't--

Purtell: It wasn't a real big deal. It was just more than anything else the feeling from the campus was, from the guys anyway, that, you know, hopefully I wasn't going to get drafted, and that was the big thing. And in recollection there wasn't that much in the way of demonstrations or protests or anything at the university there.

Swent: How did your parents feel about it? Do you know?

Purtell: Well, from what I understand, they never really spoke to me that much about it. It was just, "Well, it's good for you. The military will be good for you. But at the same time, just hope you don't get drafted in the infantry and end up going to Vietnam and in the war itself." I had a cousin that was in the marines at that time. Was over in Vietnam. Had gone through three tours over there. And they would see him on his return, thirty-day leave period, and they didn't want for me to go over there at all.

But when I got drafted, I got sent down to Texas. Fort Bliss, Texas. Fort Blisters, is what the guys actually called it. For basic training. Near El Paso. And while I was there, the last week of training I had viral pneumonia [laughs]. So I got sent to the hospital for a week. And I came back and of course the company that I had been training with were all gone. There wasn't anybody left. So they sent me back to this thing, and it was kind of a holding company for a while. And after a while I realized I wasn't getting any orders to go anywhere. So one of the sergeants there called some people up, and I got sent to Anniston, Alabama.

#### Infantry Training in Alabama; Illiterate Co-workers

Purtell: It was infantry training school. The major thing they did was train the infantry. And I thought, "Oh, geez." And I had no idea. I had one sheet of paper. Most other people got packets of paper when they get sent with orders to go somewhere. I showed up at this place, the guys looked at this paper, and said, "We don't know what to do with you." So they put me in a holding

company, and I spent about two months in this holding company. And it was people that were waiting for court trials, for AWOL, and for people that had lost orders. Just a really interesting group of people, anyway, to put it lightly.

They just sent you around, doing odd jobs. We were kind of an odd-jobs group. But after a while, being a training area, they needed machine-gun belts made, so that's what I spent probably a month of my time in the army, was sitting on the bench, putting together machine-gun belts with some hillbillies from Tennessee and some different--really interesting conversations with these different people from around the United States.

Swent: What did you talk about?

Purtell: Well, me, it was just more asking what their life was about. Some of these guys had never been away from their home until they were drafted into the military. They had never been out from the town, little town down the street. They had never been away from that before. And to talk to some of them, what their impressions were and what they had seen, was really interesting. And some of the "wow's" and "oh, my gosh, what happens here?" "I never knew this existed" type thing. But really illiterate. A lot of them were really illiterate. And I tried to get them to--

Swent: They were white?

Purtell: White, yes. And tried to get them to express what they were seeing. I don't think they had words for it. It was difficult to get a real good feeling for it. So I met some interesting people there at that time.

Then for a period I got sent over as a permanent assignment to go fuel helicopters in one of the little areas there that they used for training pilots and stuff, so I did that for a while. Then my father got irritated because I wasn't doing anything, so he called the congressman that we knew in New Mexico and said, "Something has to be done." So the next thing you know [chuckles], I was shipped off. This is it. Off to the infantry.

But instead they sent me to a motor pool, wheeled-vehicle motor pool. And on-the-job training, OJT. Learn how to be a mechanic. So I thought, That's a pretty good break. That wasn't bad at all.

Swent: Who was your congressman at that time?

Purtell: I'm not sure. I'm not sure. Domenici might have been. It might have been Pete Domenici. It might have been in his first term, because my dad knows him. He knows him personally. I think it was Domenici that he talked to because he knew him. I think he went to our church, as a matter of fact. So he called up and got me moved. I was in wheeled-vehicle motor pool, maintaining vehicles for a while. And that was, oh, gosh, I was in the service then at least a year and a half. No, almost a year, I guess, at that time.

And one day this wave of orders came into the company we're in, and there was about six other mechanics in this motor pool who worked with me. Good friends. And of those six, five of them got orders to go to Vietnam. And I looked around. There was one guy and me that was left, and the guy that was there, I didn't really like him that much.

I wasn't about to stick around being a mechanic with all this stuff going on, and there weren't any others coming, to speak of, so I said, This is crazy. I didn't want to stay here. The company commander changed. We spent a lot of time marching in parades, retirement parades for people, and it was, like, I'm spinning my wheels here. I'm not doing anything other than just fixing these stupid trucks. And they weren't really being used that much to fix. But this was ludicrous.

So I got a copy of the orders that were sent all my buddies around, and I just went down the list, and I found a guy from some other place, not even our unit, that wasn't even a U.S. citizen. He was in the army, but he couldn't go to Vietnam. So I took a copy of those orders, went over to the personnel office over there, and said, "Put my name here [knocking on the desk]. I want my name to go here."

So they said, "Well, we can't do that."

So I said, "All right." So I went back, kind of resigned that I wasn't going to go. I was going to spend the rest of my military life in this place with these people.

Pleiku, Vietnam, 1969; "You Grow Up Fast"

Purtell: A week later I got my own personal set of orders to go to Vietnam. So I was off. So they sent me over in the Central Highlands area, north part of the country, in Pleiku, working in a military police company.

Swent: And this was when?

Purtell: It was right after the Tet offensive in '69, I think it was. That would have been the Tet offensive in '68. I was there March--

Swent: Tet was February '68, I think.

Purtell: Right. And I think I was over there March, April of 1969 to March of '70. Yes. I think that's when--I know I got out in March of 1970. I was discharged right from Vietnam.

Swent: How did you get over there?

Purtell: They just flew you over in commercial charter planes.

Swent: Commercial?

Purtell: Yes. Through Tokyo and over the top. Well, actually, we flew to Anchorage, Alaska, I guess, then to Tokyo, and then landed in Saigon. From there they load you in cargo planes, like cargo, and fly you where you needed to go. Sitting on the floor, strapped to the floor. I flew up north then to Pleiku. And then would join your company.

So that was about ten months in-country, there. I came in as a--what was I? Specialist fourth class mechanic. And I was there about four months and was promoted to motor sergeant. It changed my life dramatically, that period of time.

Swent: In what way?

Purtell: Well, when I went over there, I was kind of a drifting--you weren't really grown up, didn't know what you were going to do. And here you suddenly saw death around you and, you know, just different environment that you lived in. And realized that when you go back to where you--the world, it was called--you go back to the world, that things were going to look different. And they did. You get to look at life a whole lot differently. It's hard to put a real handle on what the changes were, but you grew up fast. That's one thing. You grow fast.

Swent: Was there actual fighting right there?

Purtell: Oh, yes. There was a lot of it around the area. I spent most of my time repairing vehicles, but I also was assigned as the wrecker operator for our armored cars. We escorted convoys. And that was the MP's job that we did most of. And if an armored vehicle broke down on the road, I was dispatched with another guy

to go get it and haul it back in and fix it and get it ready for the next day's convoys, because that's the only way they could run is if we had armed escort like that. So there were times like that. I had two of my wreckers blown up during pick-ups. You know, parked alongside the road and got ambushed. So there were some spooky times. Some direct combat that was no fun. But you survived it mostly. I did, thank goodness.

So a lot of different instances and episodes and kind of living under constant tension all the time that something was going to happen. Shell you where you're living, where you're sleeping at night. Your base camps were shelled. So there's a lot of different episodes there that definitely made a change in myself. I was coming back a different person altogether. A lot of guys, I understand, came back fully a wreck. But I didn't. I took it as, Hey, this was okay. I learned something. And used that to my benefit.

#### A Clinical Attitude Aided Survival

Swent: Do you have any idea why you came through it better than others?

Purtell: Don't know. Maybe just the outlook that I went in with.

Swent: It sounds as if you had a good, strong family.

Purtell: Well, it helps, yes. But it was none of this--personally looking at some of the episodes and how they affected me. Some guys would say they saw a blown-up body on the side of the road or something like that, and that affected them a lot differently. I looked at it as a clinical-type thing. That's how I ended up surviving, I think, a lot of those deals, where you saw--. These towns that we were in: we would drive through a town and there would be bodies stacked up, like a fire fight the night before or a battle the night before. There would be bodies just stacked up in the town square.

And they would stay there for about three days. And the next day you would go back, and maybe half of them are gone, and the next day maybe another half are gone again, and then the third day they just pile them into the trucks, just load them up in the back of trucks and take them off and bury them. They were Viet Cong or the ones that disappeared were actually people from the area that had been recruited by the V.C. Or something like that, so the families were claiming bodies, basically. That's what happened at nights.

So you would see a lot of carnage, you might say, a lot of times. And if you didn't look at it clinically, you could go crazy. You could do that. And you really wondered what kind of madness you were in. And it turned out a survival-type thing: I hope I survive this thing, I can make it through here. And you did [chuckles]. A lot of us did. They said 58,000 got killed over there, but there was three or four million that went over. A lot of people came back from that. So I don't know, it's just a frame of mind, I think, more than anything else.

Swent: Your physical health?

Purtell: I don't think anything was bothering me. I went through areas that had been defoliated, Agent Orange had been used on, and that was the big deal, and I don't believe I had any ill effects from it at all.

Swent: What about the drugs?

Purtell: Well, like everybody else, you had your beer. We had a nightclub. We were an MP company, so we had our own little nightclub there and drank a lot of beer. I stayed away from drugs. Most of the people I was with, I think, stayed away from it a lot. They didn't mess with it. You saw a lot of usage of it, though, a lot of people that--. One of the biggest fears I had: we were in this big base camp and we knew that the companies that were guarding us on the perimeters out there, most of them, the stories you hear, were guys that were just doped up there and waiting. There were times when, Yeah, he's supposed to be guarding me, but he's too drugged up, probably, to do that. And you wondered how safe you really were in cases like that. There were episodes of guys just shooting off rifles on the perimeters for no reason, and seeing things and stuff, so obviously they were hallucinating [laughs]. But that was the biggest fear I think I had, was the drug part of it, was that these guys were out there either drunk or drugged up and weren't doing their job, and their job was to protect me on the inside. That was probably one of the most--I won't say agonizing problem--but a problem that was there. What I felt was fear.

Out on the road, I felt in some cases, actually, more comfortable, when you're in a convoy with a bunch of people. At times I felt more comfortable out there. Even though we did lose two vehicles.

Swent: Pleiku was a big, major base.

Purtell: The base was big, yes. They had the air force in, and then our army base, 4th Army. It was the headquarters there. So the army

base was a fairly good size. I don't think I ever actually made it to the air force base. From a distance I saw there was a lot of--had to be a lot of--big runways and stuff, a lot of jets taking off and coming in and going out. So I guess when I came in and went out, that's about the only time I was there.

Swent: It wasn't a little isolated outpost.

Purtell: No, no. The town was I would say a reasonable size town for Vietnam. It wasn't anything like Saigon at all, though, with all the cars and vehicles and stuff all over the place. It wasn't like that at all. It was a still a rural atmosphere. But it was different.

Swent: Would you like to go back?

Purtell: No. Don't really have any draw. No draw to go back at all.

Swent: A lot of people are going back now.

Purtell: Yes. I just don't really have a draw to go do that. It would be totally different, anyway. After I left, was shipped out, they were in the process of starting to take our base camp down and start moving in, pulling into different areas, I think. These guys I was with were going to head over toward the coast to a larger base camp. So where I was, I don't even think I could find the base camp where I was. It's probably gone now, anyway, after all these years. The town of Pleiku is totally different, I would imagine, too.

But I got around, saw some of the country in some of this convoy stuff. A couple of times. Up north. Standing on top of an armored car and could look into Cambodia, Laos, and while I was in Vietnam, so you see [chuckles] all these--we're up in the Triangle that you're supposed to stay out of. So I got to see some of the stuff. Got over toward the coast on a couple of convoys. Other than that, you survive it. I made it for ten months.

Left there and realized when I came back--see, I came back in March. It gave me time to kind of settle back in again, back to Albuquerque, back to the house. Actually, one of the things that irritated me the most, I think it was, is my parents moved while I was over there. I thought, "Well, I can't go back to the old homestead." That was kind of disappointing. But when I came back, I had a sister living in New Jersey at that time, and I flew from Fort Lewis, Washington, where they discharged you, over there. Stayed a couple of days with her and flew down to another sister living in Georgia, then flew back to Albuquerque.

Stayed with parents at that time. And then waited until the fall semester. I started back in school again.

Swent: That was when?

Purtell: That was in 1970.

Swent: The big incursion into Cambodia was in spring of '70.

Purtell: Yes. It started.

Swent: You were still there then.

Purtell: Yes. I wasn't involved in it at all.

Swent: But were you aware of all of the--

Purtell: Well, we knew it was going on, because the area we were in there were lots of supplies coming in and out; working on, actually, some vehicles that were coming into one of the larger repair facilities in the area. They were getting a lot of stuff worked up to go that way. We knew it was moving over there. And some of the armored divisions, groups that we had--the 4th Army had some armored divisions, too--were moving into that area.

Swent: My recollection is that that was kind of a focal time for the change in public opinion.

Purtell: That's when it really flared, yes. It was a big expansion of the war. We were invading another country now. You're not just fighting for Vietnam; you're fighting somewhere else now.

Swent: When a lot of people became much more convinced that it wasn't a good idea.

Purtell: Right.

Swent: And more outspoken about it.

Purtell: Yes. So it really did get big. It got real big at that time.

#### Return to UNM and Mechanical Engineering Studies, 1970

Purtell: So I started back in school. I knew I wanted to go to school. I knew I liked mechanical stuff. I really didn't know what you do to get a college education in mechanical stuff. My mother was

working at the university, in the engineering department, actually, for one of the secretaries there. Then she said, "You know, there's mechanical engineering. That might be something you might want to be interested in."

I said, Well, it's got 'mechanical' in it, so that sounds pretty close. I looked at the curricula a little bit and decided, Just give it a shot. Still had no idea what a mechanical engineer did for a living. I had no idea.

But I went in. Started taking some of the courses. And I think even through my junior year, even my senior year I wasn't sure of what a mechanical engineer really did. What I found out is they do a lot of things, so you really can't say what a mechanical engineer does. They do a lot of different things.

Swent: Did you have any particular teacher, anyone that guided you particularly?

Purtell: Not really. When I was at the university there, there was a kind of a big flux of teachers in and out. They didn't really have--I think in the four years I was there, there was three different department heads for the department. So there wasn't any real steady hand through the whole thing. That's another--you worked your way through it by yourself. There might have been--

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Swent: So you went straight on through, then?

Purtell: Yes. I didn't--

Swent: That would have been three--

Purtell: I took a little bit longer, probably four and a half years, to go through, by the time I got done. Used the G.I. Bill [Serviceman's Readjustment Act of 1944]. Took twelve hours at a time, because I also decided that I was going to support myself as much as I could. Stayed at my parents' house for a while, the first two years; then I moved out, probably my junior year. Junior and senior year I was living away from the house. But McDonald's and G.I. Bill were paying my way. No problem at all. I didn't have any troubles at all then.

So got through school on the G.I. Bill. I mean, used every bit of it. I got married the summer after my senior year. Of course, then I went another semester after that, so the final semester I was married.

Swent: Had you known Sharon a long time?

Purtell: No. Well, I say no. Yes, I did. Except she was somebody else's girlfriend. When I got back from the service, I looked up some old friends, and this was one of the guys I knew, and Sharon was dating him at that time. So I knew her--let's see. I must have known her four years, I guess, before. But probably wasn't until, I guess, around my junior year that things changed where now she was my girlfriend type thing, so it went from there.

Swent: Was she a student at the university?

Purtell: She was a dental hygiene student. She went to work for my dad as a hygienist, and it was one of the guys she was dating at the time who said, Hey, he's one of the better dentists in town, one of the best to work for, so go work for him. So she went to work for my dad. So it was kind of a nice arrangement [chuckles] in the end. It worked out very well.

But see, we got married in 1973, and Tina, our oldest daughter, oldest child, was born that last semester I was in school.

Then, as soon as I graduated in January--actually, it was December of 1974, from college. And about the only industries that were interviewing at that time were oil and chemical. Oil refineries, chemical. Big ones. Shell, Global. Doing a lot of interviewing. There were some aircraft industries had interviewed at university, but I think I had about five different offers from different--

Swent: The big oil crunch was '73. The crisis.

Purtell: The crisis [chuckles], yes. But I can't remember. I guess it was chemical. The DuPont? And Shell. I interviewed at a refinery and a chemical plant. Union Carbide I interviewed with.

#### A Strange Job Interview at Chino, New Mexico

Purtell: And I interviewed with a mining company in southern New Mexico. Chino. Kennecott was still running it. Then Phelps Dodge bought into it later.

Swent: Phelps Dodge bought it from Kennecott.

Purtell: Yes. Kennecott was running it at that time. I was looking for a job in New Mexico. I wanted to stay in New Mexico. And that was one of the few offers I got out of a company in New Mexico to go to work in. The [chuckles] whole interview process down there was not much to impress anybody by, and then their offer for dollars was lower than anybody else, any of the refineries, by a couple of hundred bucks a month. So really, when I interviewed with them, I would say--

It was funny. I was going out as a maintenance engineer. That's one of the things. Toward the end of my senior year, I realized I wanted to do something, work with equipment, maintenance-type things. Repair, that type of thing. It seemed like that would be interesting. So who does it? Well, maintenance engineers. That's what mechanical engineers do. I said, Okay, that's cool. Let's go look at that.

So there was a project-type engineer, for Chino, and they set you up with all these people to interview you, and a tour, of course, like they normally had. And I interviewed a couple of people, and they took me in, the third person I interviewed-- "This is the guy that will be your direct--this will be your supervisor. And we've given you an hour with this guy at the interview."

I said, Okay. Stepped in the room. And this was a guy, late sixties, and I found out later on he was going to retire in two months. He spent five minutes with me and had no other questions and just told me to go ahead and leave. So, Well, this is really interesting. Who was going to be his replacement? I had no idea.

So they said, "Let's go take your tour." So they toured me into the smelter area, and I went in with this guy, and they tapped one of the furnaces at the bottom. Just plumes of H<sub>2</sub>S came pouring out. Sulfur. Out the bottom of the furnace. And we had no respirators on. Everybody else was on respirator, and we weren't. So this big old plume of gas comes charging out there, and this really takes your breath away. Can't breathe. And that lasted--I don't know if it was an allergic reaction or just a natural reaction, but for about thirty minutes I was just very short of breath. Could not take a full breath. So we just left this tour.

And now they took me in to interview with a couple of more people. And I could hardly talk, because I can't breathe because [chuckles] of the tour. That was kind of strange. But I don't know, a week later the guy calls up with an offer to go to work,

and I said, "I don't think I'll work with you guys down there."  
I wasn't really impressed with the whole situation.

Maintenance Engineer for Union Carbide in Texas City

Purtell: But I did end up going with Union Carbide in Texas City, Texas. It was their chemical and plastics division. It was a pretty big facility, one of the larger facilities where Union Carbide--went to work as a maintenance engineer.

Swent: How much did they pay you?

Purtell: Twelve hundred dollars a month. That was to start.

Swent: Was that good?

Purtell: Yes, that was pretty typical pay. The highest offer I think I might have gotten was fourteen hundred dollars a month, and that was from Shell, the Shell refinery, I think it was. But, again, they weren't really impressive on some of their stuff, and Union Carbide just seemed to be a pretty impressive outfit.

Swent: In what way?

Purtell: I think more than anything else it was the way they treated you on the interview for one thing. They tied you up. If you were interviewing for maintenance engineer, a maintenance engineer was your guide. And, We'll take you through the plant, talk to people, all the interviews you needed to do. And while you were there he was basically your guide for a day or two. I forget how long it was. Very open in what they did, how they did things. And it seemed like there was a good flow of people. The way they discussed things with you was pretty open. So I liked that. So I went to work for them. And found out it was a lot different [chuckles] than it looked like when you interviewed with them.

Learning the Problems of Middle Management

Swent: Oh, really? In what way?

Purtell: Well, it was typical--I guess now that I find it's typical, when you have the maintenance-operations clashes. The plant had been there for years, I think forty-five years when I was there.

That's how long the plant had been there. And there had been some guys there most of the time, and they had their little power structures already built up, in place, and they were a constant struggle to work through. You had to work through, around these guys all the time to get things accomplished, and it made it much more difficult than it needed to be in a lot of ways.

Swent: Could you be a little more specific?

Purtell: Well, for instance, if you had a major shutdown, there's a group over here that was supposed to take care of--maybe inspecting vessels at that time. I actually ended up in that group later on. To get them lined out to do your work, you had to go in and shmooze them, you know, make them feel really great that--we would do them every favor we can to make sure that their job goes right; plan the whole job around them, even though they're basically just a minor part of it. It just made it very difficult to just do a straightforward job. You needed a--and a big shutdown. It would be like shutting this facility down here for four or five days, and work everywhere. Yet these people, you had to make them feel it was the most important group that was going.

Swent: What did they control? Equipment? Or supplies?

Purtell: They were doing inspections, and if they weren't there to do the inspections when you had the vessels open and ready to go, your whole shutdown could go. But that was the same thing for the mechanics. If the mechanics decided they didn't want to do that job today as it was planned out to do, your shutdown falls behind again. So part of my job in some of the units was doing that. Major shutdowns. Planning for that. I was a shop engineer, which spent a lot of time coordinating with the operating units how shop time was going to get used. And then these were one of the shops. It was a safety inspection shop. I ended up working in that group later on. And we changed that. Much more cooperative [chuckles].

But it was that type of a thing. You had to pull all these people together. And here you are, junior engineer, really struggling to figure out what's going on in the world to begin with, and trying to coordinate all of this. It was harder than it needed to be, in the end. I don't know if it ever changed. You looked at the department head above you. Most of them were young, and their whole ambition in life was to make the next step. They didn't care what was going on at this time. So you had no real guidance or direction from above. The department heads could have gotten together and straightened a lot of this

out, but they were too busy looking for their next step in their career.

A really big problem. Twenty-four hundred people worked at this place, so you were a small cog. But it was a lot of these small cogs that got the whole thing working many times. It was the middle management levels that really were a hindrance to a lot of things going on. So I started seeing some of that, and after about three years there I said, I've got to get out of here.

For one thing, Houston, that area, the weather was just obnoxious. The humidity and the temperatures and the roaches and all the other stuff just got to be really bad news. Was a nice area other than that [chuckles]. It was nice to go to Galveston Beach on the weekends and sit and watch the waves come in and out. But it just wasn't enough there to keep us. For me, we had to get out of there. For my own self. I think I was getting to a point, stressed out, that had to make a change or I was going to go ballistic and who knows?

Swent: And by now you had a couple of children.

Purtell: Yes, I had two at that time. And I think Sharon wouldn't have minded staying. She was used to, could handle the weather more than I could. But she wouldn't like the tornados and the thunderstorms and the hurricane warnings and everything else. Roaches, if nothing else, got her, was the roaches.

So I said, "Let's go back." I called a headhunter up, and I said, "I want to go back to the Southwest. Find work in the Southwest." That's all it was.

Swent: Who did you call? Do you remember?

Purtell: I don't remember the name of the outfit. They're out of Albuquerque, but I can't remember what they were, what their name was. But he called. I think I had two interviews. That's all I had. Jobs for mechanical engineers in the Southwest. Was two places.

Swent: When was this?

Purtell: Would have been in '78, early '78, late '77. It had to have been at that time. And one was Green River, Wyoming, with FMC, as a maintenance engineer over there.

Swent: That was uranium?

Purtell: No, it was soda ash. Trona. And I wasn't terribly impressed with the people. For one thing, they were bragging about how they were able to survive the seventy degrees below zero and the seventy-mile-an-hour winds and everything else. Why move from Houston to there? That didn't seem all that good [chuckles].

Then I got an opportunity to interview in Grants, New Mexico. My wife is from Phoenix, and we used to go through Grants from Albuquerque.

Swent: Everybody goes through Grants!

Purtell: And she knew what Grants was all about and really didn't want me to go there to interview. She really didn't want that to happen. But I said, "I've got to get out of here. I want to go back to the Southwest. It's close, between your family and my family, and my family is still in Albuquerque," so I went to interview.

Swent: With Homestake?

Purtell: With Homestake. Gary Boyer was the guy that interviewed me.

Swent: Out in Grants?

Purtell: In Grants, yes. I went there myself. I didn't take my wife at the time. I took a few pictures, you know, of the town, a couple of the stores that were there, and it was all [chuckles] to try and get her to feel that this was a great place to go to.

Swent: It wasn't very photogenic.

Purtell: No, you couldn't do much with it. But they offered a position, and I didn't even hear anything back from FMC at all when I got the offer from Homestake, and I said, I'm taking it.

## II PLANT ENGINEER FOR HOMESTAKE IN GRANTS, NEW MEXICO, 1978

Rebuilding a Lot of Equipment

Swent: What was it for?

Purtell: It was plant engineer, was the title. What they were doing was in the process of rebuilding a lot of equipment, because that was when the uranium was really booming. I think it was at \$54 a pound at that time. And the facilities were in pretty bad shape. Been run down. Been operating since '54, I believe. And hadn't really--the first slump came in. They really didn't spend money on maintenance. A lot of pumps were really shot. A lot of stuff was wrong.

Swent: This is in the mill.

Purtell: In the mill. That's where I ended up working, in the mill. Which is different, because that was almost a mill and a mine, different companies in their own right. But I think I started there in April of 1978. And I had about ten contractors working for me.

Swent: Outside contractors?

Purtell: Outside contractors. The job there was to do the major overhauls or retrofits or whatever we were doing at the time. We did a lot of--I won't say major repairs, but putting things back together, more than the maintenance department could handle. So that's where I started working with these ten guys, doing a lot of that. Rebuilding anything that needed to be rebuilt. If we needed a new pipeline, these guys, they did it. And I engineered it to do it and bought the equipment for them.

Swent: What was the mill doing? Was it carbonate leaching?

Purtell: It was carbonate leaching, yes. Alkaline leach mill. What they had at that time were digesters, so they heated the ore up and then added oxygen.

Swent: How did they heat it?

Purtell: Steam. Steam sparging. And they also used a little pretreatment on the ore, too, at times, from different areas. Kind of convoluted, so I can't get into it [chuckles], but they heated the ore up, bubbled in air underneath it under pressure, and it probably spent maybe an hour in a digester, and it would dissolve the uranium, put it in solution. And from the digester area it went to a filter building, large drum filters. Washed the dissolved uranium out of the ore.

Then from there, the solution was extracted from the drum filter. Went over to precipitation building. And the whole process in there I can't remember, but that's where uranium was precipitated as yellow cake. Then the yellow cake was roasted and drummed. We had a byproduct vanadium, which is a small stream compared to some other operations. We actually threw a lot of the vanadium back to the tailings pond. It just wasn't economical to process. It cost as much to ship it as it cost to produce.

Swent: The yellow cake was shipped.

Purtell: The yellow cake was shipped out in drums.

#### Changing to Modern Air Compressors

Swent: So the equipment that you were maintaining was--

Purtell: Crushers and ball mills. Digesters, which are actually just low-pressure autoclaves [laughs]. That's all they are. And the drum filters. Then you had the ancillary equipment. The compressors. That's one of the things I changed. The compressors they used for plant air, like every other facility does around, for running tools and equipment. But we also had the plant air for the digesters.

All the compressors were old, beat-up piston machines that they just kept repairing and repairing, I think. Each machine was overhauled every six months.

Swent: What brand were some of these things?

Purtell: Some of the compressors were Worthington and Ingersoll-Rand. I actually replaced all those with Sullair screw compressors, the new modern-age compressor that people use. The mining industry for a long time was stuck on nothing but these piston machines. But every other industry has changed over, and I picked that up from Union Carbide, was that you use screw compressors, do the job much more efficiently, and they make good air. You know, it's just low maintenance cost, so I converted all the air systems in Grants over to screw compressors. Worked fine.

Overhauled boilers. That was the other thing. Overhauled the boilers. I'm not sure what the name of those boilers were. The Peterson drum filters were probably the biggest major project I had in the whole place. They all needed to be rebuilt. Corrosion was tearing them up.

Swent: Corrosion from the uranium? From the water?

Purtell: Well, elements, more ions in--it was a combination of corrosion. For one thing, it was warm ore. It was 140 Fahrenheit when it first came into the filters, and I think that--plus all the dissolved uranium and the pH being high, worked on the--so we had--a lot of it was a galvanic type--

Swent: Was it that warm because of--

Purtell: Digesting. Digesting.

Swent: You heated it up to that heat. I see.

#### Redesigning the Peterson Drum Filter for Lower Maintenance

Purtell: Right. And then we used these filters, the Peterson filters. They're all made out of carbon steel, and they were forever having corrosion problems with them. So with Gary Boyer, who was--I think he's a chemical engineer; we decided we needed to know what was going on, and we decided that you just had to go to stainless wherever you could. So the tubs the uranium ore sat in, we put stainless steel liners in them.

And the drums were carbon steel, and you couldn't do much about them, but we had a problem inside of them. A bunch of them, just a maze of tubes where all the vacuum pulled on these drum filters, then pulled the solutions out. Just a maze of tubes, and very difficult to maintain. We had a guy down there, I think he spent most all his time welding up pipe. Just to go

back--we had twenty-one drum filters, and he spent most of his time designing pipe, well, welding up pipe, actually, to keep going into these--

So I redesigned the inside, using rubber tubes and stainless steel pipes and everything else, and that pretty well cut that maintenance out. I would bet you right today, if you looked inside of a Peterson drum filter, you'd probably see my design in there. Mr. Peterson, himself, came down for a tour and marveled at this new design inside of his filter, so I've got their inside somewhere [chuckles]. I don't know for a fact, but I wonder if he didn't take some of that design.

Swent: Where did he come from?

Purtell: I'm not sure where they were out of. I think they may have been in Utah. Salt Lake, I think. The drum filter. They still use them today in different ore processing, so they're still around.

Swent: Now, when they take an idea like that--

Purtell: It wasn't patented.

Swent: No?

Purtell: No. He probably took it back, and if he used it, he patented it. All I know is it worked, and that's all I wanted to do. I wanted to stop the maintenance problems we were having with these filters, and that's what we did.

Swent: Rubber tubing.

Purtell: Rubber tubing and stainless steel pipe so it quit corroding on us. That was a big one.

#### Rebuilding the Double-drum Hammer Mill

Purtell: And rebuilt a crusher. Crusher, itself, was a double-drum hammer mill, which was kind of a different crusher than I had seen anywhere. Always had problems with it.

Swent: Hammer mill. I haven't heard of that before.

Purtell: Yes. Two large, actually, rotating, heavy drums with hammers on them, with bars for these big hammers. A rock drops on it. These are rotating. A rock drops onto the drum, and the hammer

hits it and breaks the rock up. If it doesn't break up small enough, of course, it bounces off, right back in, until it gets hammered out of the mill. So it's pretty violent [laughs].

Swent: And noisy.

Purtell: Yes. Sandstone. It worked pretty good. That's with a sandstone type ore, so it didn't do too badly. But the problem we had was periodically the sledge hammer would drop into it or something like that and just tear it up. So we redid that, rebuilt the crusher. Actually, we just measured it off in our shop, built the crusher, and then we put it all back together that way. That was another interesting time.

Swent: Used the same--

Purtell: Used the same. We just measured it off. Blake Brown, the other engineer over there, who is there right now as a matter of fact. He and I spent several Saturdays out there while the crusher wasn't running, measuring where bolt holes were for liners and all the different dimensions of the mill and drew it up and built it in our own shop, because they wouldn't let me buy a new one, so we just built one out of plates and parts we could buy anywhere. That was one of the fun things we did.

Swent: Was the ore dry or wet?

Purtell: It was dry. We had to install a dust collector, too, on the crusher. That was a pretty major project. Putting a lot of duct work in there because of the problems with uranium dust in the crusher.

#### Protecting the Health of Mill Workers

Swent: What precautions were there for radiation?

Purtell: We really didn't have any problem with radiation there. In the precipitation building, where the yellow cake actually was precipitated, that was a concentrated area, they had the little badges on there, and I don't think anybody ever had a problem with radiation. The problem we were concerned about is heavy metals. It was just like working in a lead plant. You could get heavy metal poisoning. You could get heavy metal poisoning from inhaling the dust and eating it. It would be just like eating lead or inhaling lead dust.

So in the precipitation building, if you were working in a dusty area, and it was mostly wet process, it wasn't too bad. But near the roaster it would get dry and you would have to wear respirators to make sure you didn't breathe the dust in. Once a month you dropped a little sample of urine off at the gate post. It would be checked to make sure you're not getting poisoned. And if you ended up having too much uranium in your system, then if you worked in the precipitation circuit then you were assigned elsewhere until your levels came down in your system.

But I've never had any problem with that. I don't think anybody did at the time, that I know of. Every once in a while you'd have someone--some of my contractors who worked on a job in the roaster, itself, disassembling part of it, and they weren't really good at wearing their respirators. They both showed up with higher levels of uranium in their blood or in their urine. But it's just like lead. It dissipates in the system. Stay away from it, it goes out. So I mean, there's no lasting effects from it.

Swent: Were you given any sort of training or orientation in all of this?

Purtell: Oh, yes.

Swent: When you first hired on?

Purtell: Yes. Didn't have--not quite so much as you do here. MSHA [Mine Safety and Health Administration] training was more informal at that time. You had to do it. You had to have so many hours of MSHA training. And you had your monthly safety meetings that they normally had for MSHA regulations. And more than anything else, I think when I started working on it was explained--Gary Boyer was good about it. You know, "You're going to go in here, and here's the safety problems you have to worry about."

Or when you're designing something, you need to design it so if it contains dust or--you started picking things up like that along the way, if nothing else. You know, solutions were salty, and make sure you didn't ingest any of the solutions in the mill and that type of thing. Just the typical, standard stuff that you have a person that would work there at the time.

When I came here, it was a little bit different.

The Mining Industry's Impressive Level of Safety Awareness

Swent: Let's talk about that. Did it come from the top down, then?

Purtell: Oh, yes. Safety is a big issue. I was actually really impressed. Leaving the chemical business and coming into the mining industry. The difference in levels of safety awareness. In chemical, Union Carbide, there was this terrible fear of OSHA [Occupational Safety and Health Administration]. OSHA had never, never even inspected this place. But there was this terrible fear of it, and I spent very much a part of my hours in the workday making sure that things were OSHA-compliant. But OSHA never showed up. But you never heard this push on personal safety and wearing your safety equipment. You had to wear safety glasses, of course, like most places. But that was the biggest push you ever saw.

When you get in the mining industry then, it's much higher awareness on safety. I think it was the most--mining, especially underground mining, which is known to be a much more hazardous job, basically, so I think that awareness was brought there, anyway. But even in the milling side of it, you see the awareness of safety that went on all the time. The discussions on safety were impressive.

And then to find out this group called MSHA. The federal group actually came in and inspected the place every quarter. Blew me away, after being in the chemical business. And say, Oh, my gosh, a federal inspection! How are we going to survive this? It's no big deal. You know, you're compliant. You do what you need to do to stay in compliance with the regulations. So I could see MSHA actually had a bigger influence in mining than OSHA had in the outside world, in terms of safety. So that was a big step, coming in there to see the difference in that, and how you had to look at different things.

Swent: And you thought it was because of MSHA.

Purtell: Oh, yes, yes. Like in every other industry, you're required to train people to a certain level; so many hours a month you had to be trained. So you met the requirements. But the company--I don't think they took it as a burden. They said, Okay, we have to do this. Let's do it. And we did it right.

Swent: Do you think they would have done it without MSHA?

Purtell: To a point, I think. Yes, you had to. I couldn't really say. It would be speculation in the end. You know, who was there in

the beginning to say how you do this? But the awareness was there. It was much higher in mining. So most everything we did, you designed something, installed something in the plant, you always had to make sure it met MSHA requirements. You're aware of it all the time, consciously aware of safety. The work order system was set up, as in every mill. If there's a safety issue or item that needs to be looked at, you put a work order in, and it was the first one that got worked on. You worked on it first. That was impressive. And they maintained that, pushed on that all the time.

And then the pride in a safety record. That was the other thing. They always had this pride--and you could see it in all Homestake operations. Safety, safety, safety. You take pride in that.

Let's see what else at Grants?

Swent: Where did you live in Grants?

Purtell: Lived in one of the newer subdivisions just outside of town. First moved there, lived in a company rental house for about, probably, six months, and then moved into the new house out of town.

Swent: Out of town?

Purtell: No, it was just newer, to the east of Grants, east of town.

Swent: Out towards Lobo Canyon?

Purtell: Right. It was newer homes built up in there, in a subdivision.

Swent: You had children.

Purtell: Right. We had two kids at that time. Another one was born there, so we had three.

Swent: Born there?

Purtell: In the hospital at Grants. We've never--even here, our fourth child was born in Lower Lake, California, not in St. Helena, not in Ukiah, not in Santa Rosa. It was born in Lake County. We didn't do that.

Swent: Sharon, I gather, didn't enjoy Grants very much.

Purtell: No, not a whole lot. To her that was kind of a bad time. I'm not really sure why. It was--the surroundings she didn't like,

the shopping and all that thing. You had to go to Albuquerque to do anything major, whether it was bothersome or not. I mean, we do it now and it's no big deal. In Creede, we even had to drive further. So I don't know if that was it or not. Just the surroundings and the type of people that were there. The town wasn't real impressive. When you'd drive around, you just didn't feel real pride in the town because it was a mess [chuckles] in a lot of places.

Swent: It was declining by then, I guess, wasn't it?

Purtell: In the end, we started looking around. A lot of people moving out. We bought a house for \$50,000 and we were able to sell it for \$45,000, six and a half years later. That was kind of--of course, the company helped us make up the difference. We walked out with \$50,000, so we didn't get hurt on it.

Swent: How long were you there?

Purtell: About six and a half years.

Swent: That's a long time.

Purtell: Yes. And let's see. We moved there in 1978, April '78, and we left in August of '84. Yes, we moved to Creede in August '84.

##

Swent: We were just talking about Grants. At that time, you were rebuilding the equipment. Uranium was still booming.

Purtell: Right. For almost the whole time I was there. The last year and a half I was there was when it started to drop off, fade off, anyway. It was running strong. It was one of the frustrating parts of the job. We just got the mill in pretty good shape, ready for the long run, and uranium prices started dropping, Three Mile Island happened, so there was really--

Swent: What was the effect of Three Mile Island on you?

Purtell: It changed the perception other people had of uranium, if nothing else. This "terrible" stuff that we were mining out there. Then the contracts we had with different utilities suddenly were coming into question. Why were you running the reactors, anyway? And so there were a lot of different questions I just picked up from the background because, again, I spent more time in the mill than anywhere else. Just hearing what was going on in the back rooms, you might say. That is, what's the effect going to be?

What's it going to be? Well, what it in effect did, it pretty well knocked the uranium industry out of business.

And then I think it was during that time, too, was when Westinghouse were accused of their cartel, I think. I believe, actually, that they were convicted of it. And they ended up trying to control uranium prices by stockpiling uranium, yellow cake. So they came and flooded the market with it, so uranium prices dropped rapidly during that period of time.

The Slump in Uranium Markets Affects the Grants Operations:  
Summer Shutdowns

Purtell: I don't know exactly the year we had a summer shutdown. We'd never had [one] before. I think it lasted a month. Everyone was pretty well laid off. Some of the maintenance people were kept to do some repair work. I stayed on and directed some of that maintenance work and did some of the construction stuff, too, at the same time. We started back up again, and we were running full bore. We weren't slowing down production. We were still running around three thousand tons a day, I think, ran through that mill at that time.

As it started getting into the next summer, you could tell--that's when contracts were starting to come due, and prices were dropping, and renegotiating contracts. A lot of that was going on at that time. You could see that things weren't going real well. And that summer we had a three-month shutdown. Maine Yankee was a contract we had. It was one of the major contracts. Six hundred thousand pounds of yellow cake, I think. They were paying the higher contract rates, \$54 and \$60 dollars a pound. Market was down to \$30 or less. The utility commission for Maine Yankee said, "You can't keep paying those prices, so you have to do something." So they renegotiated the contract altogether, down to the lower levels. At the same time, then, they didn't pick up the large amounts because there was other--I think, at that time, Canada started bringing on uranium, too, at cheaper levels. More yellow cake was becoming available on the markets, so you saw things market-wise were really changing during that time, really fast. That would have been the summer of 1984. We had a three-month shutdown. Something we'd never had before, other than we had this one-month shutdown, but this was three months. And you could see the handwriting was on the wall.

Swent: Were you paid?

Purtell: Oh, we were paid. I was still kept. Salaried people were maintained. We ran the ion exchange plant out at the mine, which was water treatment. They're always pumping water at the mine still to keep the mine open, so that water was just sent through an ion exchange plant. I spent a big part of that summer working out there, almost as a mechanic and welder and everything, repairing stuff at the ion exchange plant. And in the mill itself, getting it ready for when the hourly employees came back. The construction jobs were ready to go after, so I learned how to weld and cut with cutting torches and learned some new skills during that period of time.

Swent: But the mine was closed.

Purtell: The mine was down, too. Everything was down.

Swent: What happened to the people?

Purtell: They were put on layoff. In essence, they were just strictly laid off and went on unemployment.

Swent: Did they leave town?

Purtell: Most of them came back. I was surprised that they actually got that many people back. When they started coming back--that's part of--I left in August. They were just starting to call people back at that time, when I left to go to Creede. But it was kind of there. It was on the wall. You know, the place wasn't going to run for very much longer, and the position they had then said this was going to transition up into Creede was from here. Things were winding down. But it sounded like they were going to run off and on.

#### A Lot of Work Designing Special Water Systems

Purtell: We had a lot of water systems on the outside, trying to take care of the outer perimeter waters for--I want to say the Superfund, where we had damaged an aquifer, according to the government, and we were pumping wells and injecting water. That had just started, too. Right toward the end we were doing a lot of that during the summer.

One of the last projects I did was work up a water system for the subdivisions around the tailings area. Had water supplied from Milan into these subdivisions. Ended up having to go out to an independent engineering firm because I wasn't

qualified to do it, and they designed the same facility I did, but [laughs] it ended up they had to add a fire system, too, I guess. Since the water was going out there, we had to put in fire mains to go with it.

Swent: Who decided that you weren't qualified?

Purtell: The state. They were just saying that this wasn't designed by a qualified engineer, so we need a third party, certified engineer, to do this. So we had to go out to an engineering firm, and they redesigned the whole system. But it was pretty much what I had designed. There was nothing much different.

So we had that in. And we installed the water system, and I believe we paid the first ten years of water for anybody in the subdivision. Redrilled a few new wells for them that they could water their gardens with. That was probably the biggest push that was going on, especially--and on the environmental front at Grants--while I was there, was the underground water, the aquifer. Aquifers in the area around the mill site, itself.

#### Cleaning Up the Superfund Site

Swent: Why was it declared a Superfund site?

Purtell: Some high values of selenium were showing up in the water by some of the samples that were being taken around the area. From what I understand, there is a place--I guess it would have been to the north of the mine, some ways. I want to say twenty-five or thirty miles. Called Poison Canyon. The reason it was called Poison Canyon was the livestock would drink water out of there, and they'd get sick. It was high in selenium, natural selenium, up in this area. That was where the ground water was being affected by the selenium. If you measure it on one side of our tailings pond, where the water was coming in, you had a selenium value that was high. It was much lower on the other side of the tailings pond, where the subdivisions were. So we were actually precipitating selenium out in the ground water with some of the solutions that were coming out of our tailings pond. But we were required to fix it. In the end, we did it fine. We had a plume that was coming out from our tailings solution, leaking through our tailings pond, out in the ground water, in the ground area. So we were required to clean it up. While I left, I would say at least thirty different ground wells around the tailings site, pumping water out, trying to bring the plume back in again. Since I left, they added injections and evaporator ponds and a

lot of things at the mill, itself, to finish it. Now it's in its final state of closure, so they still will be pumping water into the ground and pumping it out of the ground for a long time.

Swent: The closure procedure had not begun when you were there.

Purtell: No. They ran the mill periodically off and on after I left. I don't know if it was just contract requirements or they had some ores to run here and there. I left in August, and I know they were up and running again--

Swent: The mines.

Purtell: The mines. And the mill was up and running again later that year. In September, I think, they started back up again. And then I went to Creede at that time.



## III MAINTENANCE SUPERVISOR, BULLDOG MINE, CREEDE, COLORADO, 1984

Instilling Professionalism in the Management

Swent: Why did you go to Creede?

Purtell: They had a job. What I found out later on is that they wanted me to go up there and the term they put it in was "instill some professionalism in the group" [laughs]. I don't know. I heard that later on, later years, why I was actually sent there. They sent me up as the maintenance supervisor for the mill. This is a 300-ton-per-day milling facility that didn't really have very many people there at all. When I first got there, I accepted the job because it looked like it would be interesting to get into. Different type of thing. Flotation instead of this carbonate leach.

Swent: This was silver.

Purtell: Yes, base metal with lead-zinc-silver float con[centrate] is what they made. Concentrate. So it was different. And the area was really nice. I liked the mountains, living up there. It was a pretty area. Took my wife up there, and she couldn't understand why in the hell I wanted to move her from Grants to this place up here that only had six hundred people living in this town, which is terrible. First night was all tears and "leave me alone"s. And then the next day I went and said, "I'll go up and interview anyway. We just won't move. So I'll go up and interview." My wife was escorted around town by one of the wives of the guys up in the plant up there. And when I came down, she said, "Why don't I just go home and get the kids?" Because she's not leaving town. She fell in love with it [chuckles].

Swent: Who took her around?

Purtell: Judy Bohling, I think her name was.

Swent: She must have been a good guide.

Purtell: Her husband Rich was the mill superintendent.

Swent: So he's the one who interviewed you.

Purtell: Yes, and just took me around the different places up there. So it worked out well. So, okay, accepted the job--

Swent: You liked it, too?

Purtell: Yes. To me it was going to be a different challenge in its own right, be interesting to work at. I had been there, let's see, a couple of months, and I thought it was interesting because I had two mechanics and two electricians that were my direct reports. That was it. I had been working with ten, fifteen, twenty, thirty contractors at different times at Grants. So this was kind of a step back. But then I realized, too, that a lot hadn't been done.

The mill was built I'm not sure what year it was. The guy that built it came from Lead. He was a carpenter. And he ended up being the construction manager when they built the place. Then he ended up operating it. And to him if all the equipment turned, the mill was operating properly.

When I got there, Rich Bohling had been there about six years already when I got there, and he said--he first came in and asked, when he took over as mill super, "Where are your metallurgical records, so I know what you've been processing, your recoveries and everything else?" What records? Because no one had been keeping them. It was just if the mill turned and silver was coming out, they were happy as they could be. They had assayers, and they knew that they were going on, but they were getting about 65 percent of recovery, I understand, in the process.

So Rich organized them and got it up to about 85 percent recovery, which is pretty typical for a facility like that, for what they're running. And got that organized. But then--he came in--there was a lot of what this first mill super would consider was high-tech stuff. Like control valves on water systems so you never ran out of water. And automatic rake lifters so that the rakes on the thickener, if they got stuck would automatically lift and you wouldn't have any problems. Just simple things. Magnets on crusher belts so you didn't get metal in your cone crushers and tear crushers up. To him it was high-tech stuff and didn't need to be done.

So when I showed up there was always stuff just laying around that was bought but never installed because he just wouldn't do it. He just wouldn't install it. And at the time, too, one of their cone crushers and their crusher--I think it had to be a Symons cone crusher with serial number 9 on it, I think. Had to be built in nineteen-aught-one, maybe. It was just an old, old crusher. And it was falling apart. So we replaced that. That was one of the first things we did. We replaced the crusher. And then went from there, trying to fix things in this milling thing.

After about two months, got called into the general manager's office and said that I was going to be in charge of all maintenance.

Swent: Who was that?

Purtell: Tom Robertson. And that he wanted me also to take over underground, all the mine maintenance, too. That was something I wasn't really prepared for. I never really spent much time underground at all, period. So that was going to be a new challenge. And it was a real challenge the way the place was set up. Management was really loose, how it was structured. The general manager tried to run everything. He would direct mechanics underground, anywhere he would direct them, and so your work was difficult. You gave this guy an order to go do this job an hour ago and you go back to him and, Why are you doing this?

"Well, the general manager told me he wanted this job done." So it made it kind of difficult to manage. In the end, after I heard this in retrospect, years later, that the reason I was sent there was this professionalism, was for this reason. To try and tighten things up and get things to run.

The warehouse system they had there was really--there was a warehouse, but it wasn't a warehouse. All the milling parts were underneath the floor, in the flotation mill because the warehouse didn't want to carry them. It was really an oddball setup. I didn't get to spend--my total time in Creede was about ten months. In that ten-month period, the last six of those, probably, were spent traveling between McLaughlin and Creede. Well, they wanted me to come out here as a startup engineer, help in the startup.

Swent: You said '84.

Purtell: August '84 is when I went to Creede, and I hired on full-time here in May of 1985, I believe.

Swent: Their first pour was March, I think.

Purtell: March, right. So I was still temporary at that time. I was still considered startup. But I worked--in Creede, itself, the whole situation was--a different mine to work at. Even Grants. Grants had a pretty good level of professionalism. The mine was twenty miles away, and it was almost like another company in a lot of respects. But everything was run pretty tight. John Parker was the guy that was the manager at that time, and he had a good handle on stuff. Gary Boyer was running the mill and really a top-notch, professional-type feeling to work for the place.

#### A Poorly-Managed Shutdown

Purtell: Went to Creede, and it was just a totally different--here was a 300-ton-a-day mill that had a general manager, an assistant general manager, a mine manager, a mill manager, mill superintendent, a maintenance superintendent (which was me) on the mine side. And then you had, you know, a couple of guys underneath the mine guy. It was a huge group of people trying to run this mine. I never could understand it. That was part of the problem [chuckles] with it. It was hard to understand why you had all these people. We could have done away with probably half of the management and still run the place, and you probably would have made some money at the place, too, at the end.

But it never got--and January was when we got called in and said the place was going to get shut down. "Get ready for it." So I was out here at the time. A date was picked, and we were going to work toward that date and try and shut it down. Well, it leaked out, and Tom got really irritated about it, and he said, "To hell with it. I'm shutting it down today." So I was out here, and my guys got laid off [chuckles] back there in Creede. I would have liked to have been there, at least to thank them, give them their card, you know, send them on their way.

In the meantime, we had worked it out on the mill side that as this day worked up, we were going to slow down crushing, so we didn't have full bins and everything else. Just be able to finish the mill. You know, have all the mill stuff done and cleaned out, ready to go for shutdown. We ended up with a fine-ore bin that was almost full. It was wet ore. And in Creede it gets cold in January, and the stuff froze in the bins. They were doing the Equity exploration, which was up by the Continental Divide, about eight miles out of Creede. It was supposed to be

the next mine to help everything, the whole place go, but it didn't pan out at all.

Swent: Is Equity the name of the mine?

Purtell: Right. It was an exploration project that never came to fruition. So we knew the shutdown was coming. But they decided they wanted to use the mill as a full-scale sample plant, so they brought down rounds of ore to sample from Equity. We would just run them through the mill. That was going to be the plan after everything was shut down. So we had to dig this bin out that was frozen. Frozen ore. We spent days doing that. Meantime, I started doing the shuttle again. I worked for three weeks in California and traveled back and worked for a week in Creede and then do the routine again. I did that for six months.

Swent: You drove to Denver from Creede?

Purtell: Drove to Albuquerque. Left my car at my parents' house, and they took me to the airport [laughs].

Swent: Oh, was that the easiest way to get out here from there?

Purtell: It was a four-and-a-half-hour drive to Denver, and a five-hour drive to Albuquerque. So it was a shuttle. Part of it was we had moved into the house in Creede.

#### Building a Really Nice House

Swent: Yes, I want to talk about the house.

Purtell: What the company did was a plus. They had a lot of lots. One lot was left. We moved into it, and the housing was really tough because these people from Texas and Kansas were coming and would just write a check for \$150,000 for a house. So housing was very high.

Swent: Where exactly is Creede?

Purtell: South-central Colorado. Up high. It's 9,000 feet altitude. But there weren't any homes at that time to get into, so we lived in a company trailer, the only thing they had as living quarters. And they said, Okay, we'll let you build a house on the one last lot that Homestake owns, up on what we called Snob Knob. Actually, it was called Amethyst Heights, was the real name for it. So they said, We'll sell you the lot. You can build a

house, and that's part of the thing I did was working at the mill but building my house at the same time through the contractors, as just part of a company project. It was pretty interesting.

So we got the house put together. My wife designed what she wanted in the floor and the whole works, got her floorplan. Had a little basement underneath. Was getting all set up, and they were going to sell it to us with low interest rates, short-term loans, make it so you could afford it, really. It was nice. I'm glad they did that. It was a nice perk, you might say [chuckles], that they offered us.

Swent: Beautiful country.

Purtell: Oh, yes. And it was really nice. My wife, of course, designed the house. It was her house, and we were doing a lot of work on it. The basement was unfinished, and I was finishing that up at night and on weekends. And when I'd come back from here, from McLaughlin, I would work on it, too. So I used to put my truck down in Albuquerque, would go to the super-discount lumber store and load the thing up with lumber and nails and all the other stuff I needed to take back to Creede to work for that next week. I did a lot of that. That was part of the reason to go to Albuquerque and back.

But the house. About a week before the layoff was announced, we were supposed to close on it, and they said, Well, hold off. We've got some more problems with the paperwork. Well, the problem was the mill was shutting down, and they weren't going to sell the house.

Swent: Who said this?

Purtell: This was the manager.

Swent: Tom?

Purtell: Tom, yes. "We won't sell it to you now."

So I said, That's all right. So we'll rent it. Well, until--got to a point here it was in January, and the kids were in school and didn't want to move them out, and I was in the business with the startup anyway, so we decided Sharon and the kids would stay in Creede, and I worked with the managers here and in Creede. One guy paid me for a week's pay, and the other guys paid me for three weeks up here. So that's how I got paid, back and forth. That was a nice arrangement. It paid for my plane fare until June, and that was it. Then it was time the family moves out and we're done. So the family moved out here in

June. I had been here already since January at that time. That was one of the nicer parts of the thing, was having that house.

When they shut it down, as I understand it, all the houses had been sold up there. Properties were sold up on the top, and the only thing left at the mill--there is nothing at the mill. Beautiful job of reclamation. Harold Barnes [current director of environmental planning] would appreciate that [laughs]. We went back, might have been two years ago, to see, just to look at the town and go through and say hi to a few friends and drive on the way down to Albuquerque. We went up to the mill, and you couldn't tell there had been anything there. If there had not been an administration building there, except my references, I would never have known there was a mine there. You could not see it. The portals. There's no place where the buildings were. Nothing showed at all. I was just dumbfounded that that was so well hidden that even I hadn't seen it. So many years, and it was gone. Nothing there. So it was really very interesting to see that.

Swent: So what happened to your house then?

Purtell: It sold to somebody in town.

Swent: Homestake kept it.

Purtell: They kept them, and then sold. Some houses, I guess, in the early days they had already bought and were renting to some of the employees. And they sold those. Others were like mine. They either sold them to the employee and then bought it back when the employee was laid off, but they ended up selling everything to people in the town, itself, I guess. Even though there was a slump in housing at that time, I understand mine sold for \$45,000 and it was \$85,000 to build it. So it was a loss to the company, I guess, in some way; but it's off the books and they're no longer responsible for it.

Swent: You would have liked to have had the chance to buy.

Purtell: Oh, yes. It was a nice house.

Swent: And you weren't even offered the chance to buy it?

Purtell: No, not till after basically all the houses were sold and there was some property left. "Oh, well, you'd be interested," is what I got.

"Yes, I'd be interested in some of that. The house?"

"No. That's gone already. That's already sold." It would have been nice.

Swent: Yes. That's too bad.

Purtell: You can't think of everything.

Swent: No, but it sounds as if it wasn't very well handled.

Purtell: From there--

**IV MAINTENANCE ENGINEER TO MANAGER, MCLAUGHLIN MINE, 1985 TO 1997**

**Maintenance Engineer, McLaughlin Mine, 1985**

Swent: So what were you doing out here? How did you know about this?

Purtell: Well, Gary Boyer had been transferred from Grants to the corporate office, working for Bill Humphrey. And just prior to startup here, later stages of construction, they needed startup, and Gary was assigned out here by Bill to I don't know if it was to totally oversee from corporate level or what, but Gary brought in metallurgists and me from around the company to try and come in and help during startup time to get things up and running. Where we could help. Bring some outside people in.

So I was here in January, when they shut Creede down, and started just doing small--more than anything else, just overseeing the final stages of construction in different places and watching the things were going on. Never really had an office. It was just out-and-about type thing. That went on till March or April, when they realized that I wasn't going back to Creede. I think Gary convinced them that they needed me here, that I was supposed to be hired on, so I hired on here. Was offered a job as a maintenance engineer in the maintenance department, and I took it.

**Startup: A Definable Start, and a Fuzzy End**

Swent: Startup is a term that I keep hearing. I guess I don't quite understand. Is this a definable period? Or is it sort of fuzzy?

Purtell: Well, there's a definable start, and usually a fuzzy end. You don't really know when startup actually ends.

- Swent: But you know when it begins.
- Purtell: Yes. Startup here, I think, was January 10th. The first ton of ore was dumped in the crusher.
- Swent: Okay, that's when--
- Purtell: So they started it. But there's a period before that where a lot of the process, the piping and some of the equipment is wet-run, wet-tested. They pump water through them to make sure there's no leaks in the pipes, that all the pumps are turning in the right direction, that all the equipment will rotate like it's supposed to. All that is pretty well-defined before you put the product in, and that's part of the startup process.
- Swent: There's a period when you've got Davy [engineering construction company] (in this case) that's in charge.
- Purtell: Right. That was a cloudy area. Who was actually in charge at that time.
- Swent: Yes.
- Purtell: There was supposed to be a hand-over period, where it was signed over to Homestake, and then Davy people were still in charge of the mechanical--it was mechanically complete when all the test work was done. All this pumping of water, no leaks in the pipes, everything turned in the right direction, when you pushed this button the right piece of equipment started. All that was done.
- Swent: But who is pushing the button? Davy or Homestake?
- Purtell: No, this would be Davy people at that time.
- Swent: They're still pushing the buttons.
- Purtell: They'll push a button and say, "Okay, that works. Everything is flowing right. Okay, so now it's time. We'll start running ore through the system." Now it's Homestake people. Mechanically complete. They sign it over and hand it to somebody. "Now it's your place to run." And they did this piecemeal. As they completed areas and tested them, it was handed over. So the crusher was done, so, okay, Homestake people dumped stuff in the crusher. Homestake operators now are going to run the crusher. Once they finally got a crushed pile, all right, now we start bringing it to the grinding circuit. So you start running product through the system now. So once you're doing this, it is mechanically turned over and Homestake people are operating it, but there's still a requirement--

Swent: If something goes wrong, whose fault is it?

Purtell: Well, that's where you come back on it. Was the design faulty? Now is it operating properly, as designed, with the ore in the system? If the chutes or the belts aren't delivering the ore fast enough, as design criteria said it would, then Davy, then, it's their responsibility still. It's like a guarantee. Come back and make it right. What has to be changed in the design to make it right.

Well, part of the job, say, for me would be that--is Davy looking at this the right way? You've been out in the business before. Now, if you need a belt to supply more ore, what do you do? Run it faster? Do you open the chutes up? Where's the catches? That's what you need to look for. So that's part of what the job we had here was. The same thing as--

Swent: And you were here during that fuzzy--

Purtell: Yes. Once the startup--the startup period goes on in this place I'd say it was almost a year. It was considered startup. Once you get up to design tonnages, and by the time that year was up, Davy wasn't here any more. It was Homestake people that were making it work. The design as Davy installed it in most cases was correct. They did a good job, I'd say. They did a real good job, meeting what they said would be done. And a good base to work off of to improve and move things on.

We found parts up here--there were kind of some unknowns. Viscosities of ores. I don't think anybody thoroughly studied that before startup. We found out you can't pump it through a pipe because it's too viscous, and were not sure why, but in the meantime you have to get by that somehow, so you put temporary pipe in. We did a lot of different things, and that's part of the startup processes. You get it moving, it's supposedly running now, you're supposed to be making money at it, and it's supposed to be putting product out at the end, and you need to get it going. So there's where we went through the system. That's where the startup process just continues on, continues on.

We did that, I'd say, for at least a year. We had meetings about once a week. What are the bottlenecks in the plant? Especially when Homestake took over. I have to put this in. Homestake engineers took over. Where are the bottlenecks? And okay, how do we run this place? We need to make 3,000 tons a day. John Turney said that right off the bat. He said, "Okay. We need goals. Quit looking at these stupid papers with thousands of jobs that have to be done. How do we make this place to run 3,000 tons a day?"

So you started over there. Said, "Okay. Can we get through precipitation here? Can we get through CIP [carbon-in-pulp]? We've got problems over here. We've got some problems here if we get the tonnages up too high. The viscosity looks like it will be a problem. So what do we need to do?"

"Dilution. That will help."

"Well, the pipelines are too small, or the pumps are too small."

"Change the pumps. Make them bigger so we can pump more water, get the dilution down."

"Okay, looks like we might be able to get this through CIP." Now, how do we get it to CIP? You keep going through all the steps back and back and back.

And in the meantime, then, we had equipment that maybe wasn't fit for the design it was in. We had stuff that would start breaking. Had to change that equipment as you go. So you keep going on. Keeping everything running behind it, but at the same time taking out all of the little bottlenecks that were building up. And we call it in a lot of places, it's "debottlenecking." You just start going through one step at a time until you get the whole place running as smooth as it will go. And everything will supply the solutions you want, the ore you want, in the right places, and that's the whole gamut of startup.

So the end of it is real fuzzy. Okay, we're at 3,000 tons a day today. We did. That was the goal. We got it. But, gosh, the next day we're only at 2,800 tons a day because there's another problem over here that we didn't look at. So you bring that in. So finally you're running continuously now. Now startup might be over because every day you can run 3,000 tons a day through the plant. So you're no longer in startup phase. You're in operating mode. Even though it's the same guys. You're just doing a different thing.

#### Plant Engineer

Purtell: Then we started having--after that point, here in McLaughlin, went from a maintenance engineer to a plant engineer, which was like project work, and all I did was move to a different office

and had a different boss. So, you know [chuckles], that was the move.

Swent: So you were under John Turney at first?

Purtell: At first I was under Al Querry as a maintenance engineer. And then I was a plant engineer under Fred Turner. And then Fred left, and I was the only plant engineer there for a while. I took over--

Swent: So you were supervising only this--

Purtell: I had the TIC, the construction, The Industrial Company, TIC.

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Swent: But they were TIC employees.

Purtell: Right.

Swent: Still.

Purtell: Still. Just contracted to Homestake Mining Company now. So they weren't contracted to Davy; they were to us now. So that was a change. I had about twenty, twenty-two people, with TIC that were doing projects for me. We would identify a project that needed to be done with John Turney, and Roy Smith was involved in it. Where do we need to work now? I'd buy the parts, we'd put it in, and keep on going. That was a continuous thing. Through that first year. Very intense. A lot of stuff going on.

And it continued, I mean, for at least the first two years, if not more. It was just a continuous thing. Once we got it running, then we found pumps that couldn't handle the corrosive atmospheres and were falling apart. So what do you do now? You buy a pump that will handle it. So you buy that pump and you install it, and you keep right on moving. It was a continuous thing for those two years.

### Controlling the Water Balance

Purtell: One of the things we identified early on was a water balance problem. Every mine I've been at had a water balance problem. This one was a bad one. I came from Grants. We would actually write [reprimand] someone if we saw them using a hose, cleaning something up with fresh water on the floor, because it went to

our tailings pond, and if it didn't evaporate we'd shut down, if it got too much water in it. So it was very critical that you didn't use any fresh water in the system. With Creede, similar type thing. You had water balance problems. You watch it.

I came out here, and I was appalled. Fresh water hoses just running on the floor. All the pumps had gland water and stuff with fresh water just pouring all over the place, going everywhere.

Swent: The pumps had what?

Purtell: Gland water they call it. It's part of the sealing system on a pump. You run water into it to seal it. It was all fresh water. So the tailings pond was just filling up enormously. Davis Creek was going down, and the tailings pond was coming up. And no one seemed to care.

Swent: And you had to have a zero discharge.

Purtell: Right. You can't discharge it. It's got to evaporate. And no one seemed to care. No one was concerned until it got to a point, and John Turney--where he picked up and really started pushing it. Then Roy Smith and I probably spent I want to say the third year here doing nothing but water projects. Installing pumps in the cooling pond, trying to get recycled water back to grinding, lots of things, all over the plant. Modifying pipelines so there's no longer fresh water; it was what we call mill water, recycled water, would go to pumps instead. A lot of time spent doing that. A lot of money. I think I spent close to a million and a half dollars, just on water projects alone to get the water balance back under control.

One of the things that Davy didn't do that was bad was this water balance. They didn't take into account the five- and ten-gallon-a-minute flows here and there. When you add them all together, it's a huge, huge flow of water. So that was part of it. So we started converting all these different flows and different types of waters, to convince them we could treat recycled water, reclaim water, tailings pond water, with cyanide in it, through the CCD circuit, counter-current decantation. It's acid. Acid water. But it had so much iron in it that as soon as the cyanide hit the water, it would tie up as an iron cyanide and was inert then. Never went to hydrogen cyanide. So we could take tailings water and throw that in there, and it would be opening up a loop of water so we could send water down to grinding. So that's what we ended up doing. So I had to install a twelve-inch pipeline from the process area to the

grinding circuit. Never had done that before; never ran an overland pipe before. So that was a fun project.

While we were doing that, we had our first slurry line failure. That was about the right time.

#### A Bacillus Causes a Slurry Line Failure

Swent: That was coming up from the mine?

Purtell: Right. Slurry being pumped up from the grinding area to process.

Swent: That's a five-mile--

Purtell: Five-mile line. It was buried. I started noticing--

Swent: It's buried all the way?

Purtell: It's buried all the way, yes. A lot of the work I was doing around the pre-ox area, different areas of the plant, I started noticing pipe corrosion showing.

Swent: Pre-ox. That's before the--

Purtell: Pre-oxidation, before autoclaving. Started noticing pipe corrosion in areas that you shouldn't have seen it, or pipe was just thinning up, and it wasn't due to erosion. I was concerned. I started seeing it at grinding, too. I mentioned it at one managers' meeting, like nine o'clock in the morning. I had just come from a pre-ox area and realized that we have a problem that we're going to have to address somewhere along the line. At two o'clock that afternoon we got a call on the radio that there was slurry blowing up in the air about two miles from grinding. Shut the pipeline down coming up here and dug it up, and they had a hole corroded in it. So we cut out a piece of the pipe, and the whole bottom of the pipe, as far as you could see, had spots, pits, corroded in it from the ferro-thyobacillus, I think that's what it is.

Swent: Oh, dear.

Purtell: I don't know if I could spell it [laughs]. It's the bacteria that they use that will actually digest iron. Likes to eat iron. They also are using it in bio-oxidation now in different places. But it will also eat pipelines. I should have caught onto that.

Bacteria That Eat Holes in Stainless Steel Tanks

Purtell: Early on, I think we hadn't been running eighteen months and noticed some holes in our milk-of-lime tanks, and you shouldn't see those. Milk of lime has a pH of 14, which is high, real alkaline. Didn't support much life at all. It's hot, because the water, the slaking action, makes it kind of warm. We mixed it with reclaim water, which means there is some cyanide in the water, too.

But somehow this bacteria would create a little carbuncle on the steel wall of the tank, and then there's an anaerobic bacteria that somehow survives in that atmosphere, under the carbuncle, and it starts digesting sulfates that's in the water that we mix it with. There's a sulfate in the water. And it converts the sulfate to a sulfite. S-u-l-f-i-t-e. And the sulfite is very corrosive to steel, so it just drills holes in the tank. And leaks all over the tank. About six months later, that was a crisis thing. We had to start coating that tank because you have to have milk of lime or you can't run the thing, neutralization purposes.

So about the time we were getting that under control, someone says, "You know, there looks like a leak in one of the CIP tanks, carbon-in-pulp tanks. So I went over there and looked at that and said, We better drain it and look. And sure enough, the same thing was going on in the carbon-in-pulp tanks. And these tanks have free cyanide in there up to 100-150 parts per million. Poison. The bacteria was doing the same thing in these tanks. Eating them. I found out it's a natural occurring bacteria in the soil, the slurry. Somehow it survives all this in the water and everything else and gets into the tanks. Everything that was steel was starting to become corroded.

Swent: Just thrives on the cyanide?

Purtell: No, it thrives on the steel [laughs]. It thrives in cyanide, yes, but it eats the steel. So everything, it turns out, most everything we had that was steel had to be coated. All of our tanks, we had to start draining them and painting them different coatings and stuff. That was an ongoing thing that lasted for a long, long time.

Swent: What did you finally discover you could coat it with?

Purtell: Depending on the tank. Most of it was epoxies of different kinds. You almost had to look at each application. With a high pH, like the milk of lime, you had to have a certain coating that

would handle that type of immersion service, with the high pH and the lime of the chemical. The slurry tanks the same way. You had to figure out something that would resist any corrosion there. So we started going all over. I bet you we spent at least a million dollars just coating tanks in the years after startup.

So we got both our slurry lines in. Let's see. At that point, we put in a sulfide slurry line. We replaced it on the ground. It was on the surface this time. Instead of burying it, we placed it on the surface with the recycle water line. Both those two lines went back to grinding on surface. I'm thinking about timing. That had to have been in 1987.

Swent: Fairly soon after.

Purtell: Yes, '87, '88. In 1988 was when we did the expansion.

Putting in the Second Circuit: "The Most Fun I've Had"

Swent: That's when they put in the second circuit?

Purtell: Yes, the second grinding circuit and the second CIP circuit and added a boiler. That was my project. That was probably the most fun I've had in some ways. Kind of someone gave me \$25 million and said, Go put it in a circuit for us. So it was interesting. It was a lot of fun. I was the project manager on that. Using Davy as the engineer, and TIC did most of the construction. That started in 1988.

Spring of 1988 we started construction and finished it in-- let's see--January of 1989 we also installed a new crusher, a whole new crusher. We had a jaw crusher. This is a gyratory crusher, because we were going to be running twice as much ore. We needed a bigger crusher. So that was also installed. The last thing to be done was the crusher. It started up in January 1989, and the project was completed about two months ahead of schedule, and it was \$19,000 over budget. That wasn't too bad.

Swent: No. That's very good.

Purtell: It was a fast track. Everything was just fast, fast, fast. And started up. Our own people then started it. We didn't even have Davy or anybody help us on startup. Our own guys experienced at it. We just did it. So it came up and ran right away. Hardly any problems whatsoever with it.

But then, a few years later, we had another slurry line failure. It was the other side this time. The new slurry line [chuckles] failed. So we now have two slurry lines above ground. We figured every five years you could economically replace a slurry line. It's about \$500,000 apiece, but you could economically do that. So we were going to do that, but three years after we installed the first new one, it blew another hole in it. Opened it up [snapping his fingers]. Corrosion again. Rampant. So here it is, three years down the line. We went through this--the first time we put the line back in, we thought about rubber-lining it, doing a lot of different options on what to do with the line. They said, "Just put a new one in every five years." That was the final solution. This line failed in three years. You can't do that any more. So what do you do now?

#### Slip-lining the Pipes Solves the Corrosion Problem at Last

Purtell: In the meantime, they would slip-line these pipes with a real thin polyethylene plastic pipe. You can slide it in the pipe. It expands to the pipe diameter and seals off the product so it won't corrode. So all our pipelines now have that. Twelve-inch pipeline. Two eight-inch pipelines have it, all the way to grinding, five miles each. We've done it everywhere we can to stop corrosion. That will be the end of the line. It will last till the end of the mine, I think. That's been one of the bigger challenges.

I haven't even got to autoclaving yet, but in the early, first few years, probably up through 1988 into '89, I really didn't do much with the autoclaves at all. There were all sorts of people concentrating on autoclaves. I thought, "Okay, they've got that under control. I've got all this other stuff." The corrosive slurry stuff was a problem. Grinding, we had problems, trying to get chutes to work. A lot of different things. So I was all over the place but autoclaving through that time. And then I did the expansion project. And after expansion, it was kind of a slack time then. Stepped back in and realized, "Okay, where do I need to look now?" There's still a lot of stuff to do. I kept busy.

Mill Operations Superintendent, 1990: A Whole New Thing

Purtell: And then it was early 1990 I was made acting mill operations superintendent. John Turney went to Australia. Phil Walker, who was the operations superintendent, moved to mill manager, and I was stuck in as the acting operations superintendent. Never had been in operations before. Always was doing maintenance-type work. So this was a whole new thing.

Swent: What was the difference?

Purtell: Well, you're in charge of making sure that the tonnages are run and the gold comes out in the bar. Otherwise, all it was was maintenance, where you're fixing it and keeping it running. And you've got a whole different group of people now. I had no contractors. They're all Homestake operators, and foremen and general foremen are now reporting to me. Just different line of work, actually, altogether. It was just "Here. Here's your job."

I did that for about four months. And this was another interesting period of time. Just before I got pushed in that position, I started realizing that, Boy, the autoclaves. They seem to have a lot of troubles up there. Maybe I better start looking closer. And just started picking up on some of the problems, with pipe wears and pipe corrosion, other problems up there that was going on. Suddenly now, I got a couple of good ideas in my mind about using some ceramics and a few things. But it was directing them, how to get it done. I was looking at how do you do that.

Comparing Different Kinds of Management

Swent: I was just going to ask--I'm interrupting you a bit, but as plant engineer, did you have the authority to say, "I need \$25 million to do this?" Or did you have to go through somebody else?

Purtell: No, that was always done elsewhere. That project was done. Jack Thompson had initiated that one. But other projects, I needed \$1 million to do a pump and pipe system to grind and put in water. You identify the problem, you justify it, you present it to the management, and they ask for the money. If you've justified yourself, there should be no problems. And that worked very well.

Swent: Did you find that this worked okay?

Purtell: Yes.

Swent: I'm going back to your experience down in Texas City.

Purtell: This worked very well.

Swent: Did you have to jolly somebody along to get what you needed?

Purtell: You can almost get a sidetrack, kind of a side light on this thing. Three different properties. Take Union Carbide. That was a fright to work through it all. Grants was a fresh relief. It was easy. It was a small organization, pretty tight-knit, wasn't difficult to get stuff done, worked as a good team, really felt comfortable working in the environment, your supervisors listened to you and worked with you. So this was a real change from Union Carbide.

Went to Creede and it was, like, "Oh, what did I get back into here?" There was no real support, no real direction--this or that way--from anybody, anywhere, any time. You were isolated in the middle, you might say, in a small group. We did that very well. Tom Robertson never looked at the mill. The only time they went to the mill was when Al Winters was there and he wanted to walk through it, and that was it. So you had no real direction to speak of. You did all that yourself. So you're kind of drifting, and this is kind of funny.

But then came out here to McLaughlin. The first year was a tough one in terms of getting things done. I think it was partly because everything was so new. New people, didn't know each other well enough, teams hadn't been developed, how to do things was complicated and convoluted, and it was really hard for the first year to do a lot of stuff. You just had to take initiative to get anything done and do it. And most people would listen to you and work with you pretty well.

#### Metallurgist John Turney Grabs Hold and Sets Direction

Purtell: And then John Turney, when he really grabbed into it and said, "We need to set direction," did it. That's when things really started happening at that time. John grabbed a hold of it. He was the chief metallurgist at the time, and he just took the bull by the horns. Some of this is kind of tied together. And "We're going to go for it. We're going to make this place work. That's

how we're going to do this." So we just charged ahead. And yes, in some respects it was kind of tough for some people because they didn't like what we were doing and how we were doing it, but we were just "this needs to be done, has to be done." We showed it had to be done, got the money justified--

Swent: Which group of people didn't like what you were doing?

Purtell: Operations. Some of the maintenance people. Some of the operators didn't think--they had their own ideas. You know, "What are you doing? We're going to do our thing. You do your thing." And found out you can't do that in a plant like this. You have to have a concerted effort, kind of core direction. So we worked in any system, any changes that had to be made had to go through--it was a group discussion. And what it ended up in the end doing, this jelled a unit of people that worked as a tremendous team within the organization. There was a few people that didn't like to fit in the team-type atmosphere that much or had trouble with it, but we just went past them or through them [chuckles] or whatever it took. We got things done.

A Tremendous Organization Team Linking Mine, Mill, Operations, Maintenance

Purtell: That filtering mechanism, coming back in again, made it a really interesting environment to work in. People, anybody, was expected, actually, not just encouraged but expected to speak up. "This is what we're looking at doing. This is how we want to do it. Do you see any problems with it? If you see them, speak up now because this is where we're going." And some did speak up, and they were listened to. It was really an interesting environment that developed after that first year.

Swent: Did you have actual formal meetings?

Purtell: Not always, no. It turned out many times it was just, Hey, we need to get together. So you would sit down and call a couple of people up into an office, and you would sit down and discuss something. The larger, overall stuff that needed to be done was looked at much more formally like that. We would have a sit-down meeting. Maybe ten or fifteen people. To discuss an issue around the autoclaves or an issue around the piping system or operating system. So you would have the operators there, you would have the maintenance people there, you had the engineers there. Everybody sat down. We discussed, This is what we're going to do. It turned out to be a really good environment to

work in, where you felt that you were really putting stuff out, really being fulfilled, and actually doing something, really quality stuff all the time.

Swent: You were pretty close to the head office. Did that have any effect?

Purtell: [chuckles], It's too close to the head office. There's too many visitors, too many [laughs]. That's part of it. But it's okay now. You get used to it. But it was different, knowing that you were this close because you knew you were going to get a visit by anybody at any time. Not so at a lot of the other outside mines. At least you knew when the boss was coming, so it was different.

But the environment here is probably one of the better ones, with Homestake, to work in, to get things accomplished. When this team spirit developed--in the early days, of course, like every other mine, the mine and mill always clashed. The mine says, "I've got ore. I don't care what it is, but it's yours. Take it." The [mill] guy says, "I can't process that." They say, "Tough. It's yours to process." You know, just this battle went on all the time.

Early days, there was some of that going on. You could tell the infighting that--got down to a point where you realize, you can't run this place. An autoclave plant can't be run that way. We have to have some kind of control over what comes into the system or you're not going to run it right. A lot of resistance. Built up in the early stages to make this commitment to each other. But they did eventually start to jell, and now--there was nothing. I was just a plant engineer. Or even the mill operations superintendent at the time. To go down and sit down with the mine guys and talk about what's going on or get in the truck and drive around the mine, trying to figure out what they're doing. Have them come up and say, "What's this circuit doing?" And walk through the circuit and figure out what's happening there. Real nice environment to work in, where people were back and forth. Both sides. There was none of this conflict that you saw in other mines.

Swent: What was the organization at that point? Was it divided by mill versus mine? Or was it operations versus maintenance--because there was a change.

Purtell: At that time, it was operations.

Swent: One person was in charge of operations?

Purtell: No. It was mill and mine at that time, early on. It was mill and mine. Then it was, let me think. When Mike Attaway left. Then they split it operations-maintenance. That was a battle time. But it was interesting. The battle was done up here, at the top. Wasn't done in the middle. The middle guys just didn't really pay that much attention to what was going on. We still did what we had to do.

Swent: Did your thing.

Purtell: Yes. It was the management that had some problems up in the top end. And we worked around that. That was one of the things that was done. We knew what we had to do to get things going.

Swent: There are always pros and cons for both these.

Purtell: Sure, sure. And I don't know which one is better. I don't know which one is better one way or the other. I think either side works just as well. It depends on the people that are in them and how they're running them. In my mind, it's how you influence them, how you work them. We went back to the mine-mill after Joe Young left. I think it was after Jack left. Joe Young left, Jack left. Ron [Parker] was general manager. We went back to the mine-mill. But we were talking at that time it was John Turney and Dave Hyatt.

Swent: He was the mine--

Purtell: Mine manager. And real discussion. We had meetings with the metallurgists, and the geologists met every Tuesday to talk about the types of ore that would be coming to the autoclaves for the next week. They actually said, "Okay. Are we too much sulfur? Not enough sulfur? What are we going to do? We have this problem. Can you deal with this?" It was a real good flow back and forth. And that made it really comfortable to work in the environment. Because you picked up a lot of--I mean, that's where I learned a lot about the mining. For instance, I probably would have not learned in another atmosphere somewhere along the line, so--

#### The Style of the Plant Manager

Swent: There's also something else that I've gotten kind of interested in: the architecture of the plant and particularly your office.

Purtell: You have to ask Jack about that. [laughs]

Swent: Open doors?

Purtell: Oh, in those terms. Yes.

Swent: That kind of thing?

Purtell: Oh, yes.

Swent: I mean, you've got your manager out here in a separate little place where he can't see what's going on?

Purtell: That's the manager that's sitting in there. Jack spent a lot of time there. Ron, especially in the latter time, when he was doing more of the corporate-type stuff, spent a lot of time in there. I'm a different manager. I don't do that. I spend more time, probably, out at the mine and in the mill, walking around, talking to people and seeing what's going on. If not more out there than I do in my office. It's just how you deal with it. I have people dropping in all the time. While I'm here, if they want to talk to me, they come in and talk to me. It's no big deal. It just depends on how you deal with it. Some's good, some's bad.

Swent: It's closer to the mill, obviously.

Purtell: Right.

Swent: And five miles from the mine.

Purtell: Yes. I'm process oriented, but what I knew I needed to do was learn mining. And I had this short window of time, when I got to be the general manager, to learn it. I started to learn it, and then when I was the mill manager position--. Having spent all the time out there, I knew every pipe and valve down there and the whole place out there. I knew it pretty well. I had run it, I had been operations superintendent. Now I'm the mill manager. I know the people that I have running the place out there don't need to be watched that much at all, just kind of a coordination here and there. So maybe it's time for me to go learn something. So when I could I would go spend at least a couple of hours a week talking with mine guys.

Swent: This was when you were still--

Purtell: When I was still mill manager.

Swent: So you went from plant--

Purtell: I can actually go through it. I came in as a startup engineer, was a maintenance engineer, went to plant engineer, went to chief plant engineer, we brought in another mechanical engineer, mill operations superintendent, mill manager, and then general manager.

Swent: That's where I sidetracked you, was when you got mill operations superintendent.

Purtell: Right. So as we were talking, the first one--

Swent: That was a big jump.

Purtell: That was a jump for me because, as I said, I'd never been in operations to speak of before.

Swent: That is a big change of outlook, I guess.

Purtell: Yes. How you look at things. So it was at the same time I realized to make the place really run well and effectively, the autoclaves had to do better than they were doing. We were having some troubles off and on with them all the time.

#### Autoclaves Don't Frighten Someone from the Chemical Business

Swent: Well, this was a revolutionary thing.

Purtell: Oh, yes. Totally different. For me, it wasn't--. Interesting; back to the side light again. Coming from the chemical business into the mining industry, all I had to do was convince Gary Boyer that just because I was a chemical guy, worked in chemistry, doesn't mean I can't work in a mine. A mechanical engineer pumps stuff over here, and they pump stuff over here. We don't care what's being pumped. It's just pumped. And things turn. And you fix them, and you do this, that, and the other. That's all there is to it. No big deal. I convinced him that okay, maybe this guy can work in the mining. So I came into mining. In those days, how can you go across trades like that, industries like that? You can't do that. Well, I did.

And then I came up here, and I looked at this place, and this was a chemical plant. Didn't bother me a bit. You know, high pressures, high temperatures. So, I've got those in chemical plants. Seen that before. Done it. Been there. That whole thing. But people around here, you could feel this fear. It was like this mysterious place they're putting together over

here. I had trouble relating to that. The oxygen plant was just a terrifying thing to have in their backyard over there for these guys because, oh, my gosh, what is it going to do? We had oxygen plants in the chemical plant I worked at that ran remotely. Nobody. Not even an operator around them. Days on end. And here there's this big fear of all this here. It was a different thought when I came into it. When I came, it wasn't a big deal. Lots of pipes, pipe racks. I've seen those before. Pressure vessels. Done that. I've inspected them before. No big deal. So I didn't have this real overwhelming awe when I walked in.

Swent: I've heard so much about the let-down valves.

Purtell: [chuckles] Yes. The whole system. Autoclave all the way. Was a big--

Swent: Doing the continuous autoclaving.

Purtell: Yes, continuous autoclaving. It was getting past that step. How do you do that? Once you had it done and it has been proven, great! Now monitor it, which we did. As you went through, you find out, well, this valve gets 8,000 hours worth of life on it. Fine! Change it out in 7,500, then. No big deal. It wasn't a great mystery.

Swent: This is the maintenance engineer speaking.

Purtell: Yes, that's part of it. So you look at what your problem is, like you do with anything else. You're going to have a problem somewhere along the line you have to solve. They're concerned, "Oh, my gosh, it's hot mud. It's got acid in it. What the heck are we going to do here and there?" Yes, there's concern. You respect it. You have to respect it. But don't be afraid of it. You realize you have a problem somewhere there, you've got to deal with it somehow.

If you have a problem, it can be a big problem, like we had a couple of times, when we had a pipe blow open or something like that. That's a big problem. You've got acid slurry going everywhere. Nobody was hurt. I think it worked out well. That was part of it. The safety of the building. But everybody respected it. And after about three or four years, people understood that all you had to do was respect it, take care of it, watch it, and it's okay. No big deal. But it took a lot of time for people to do that.

When I came into mill operations superintendent, I already had a bunch of ideas going in my mind that we could really get-- because we were doing about maybe 88 percent availability. Was

probably the best year we ever had, which was pretty good. But I said, "No, we can do better than that." You look at where am I losing all my time? I came in day after day as the superintendent and I hear the operators say that "Yes, this autoclave was shut down because this pipe blew out and that pipe blew out and this happened, that happened." Who is looking at this stuff? What's going on?

So just took it upon myself to get a couple of engineers over here to start looking at stuff. How about if we ceramic-line this pipe? How about if we do this over here? How about if we do that? And just started getting working and going at it, picking away, while I was up there as even acting [superintendent] because I figured I was going to be able to take it over when I got back to my engineering job [chuckles]. I'll just take it back over and run with it. "We're going to make these 'claves run, by gosh. We're going to make them go."

#### Managing the Risk of Titanium Piping

Purtell: So we got things started, just rolling, that way. We upgraded some of the piping that was alloy 20 pipe--

Swent: Alloy 20?

Purtell: Alloy 20, which is a high-nickel alloy. Upgraded it to titanium, which is what we consider a higher grade alloy.

Swent: Wasn't there a danger with titanium?

Purtell: If you respect it, there's no problem. [chuckles] Okay?

Swent: Okay. All right.

Purtell: You understand the problem. It's there, and you know how to deal with it, so you work with it.

Swent: Because it can be explosive.

Purtell: It can. Above 400 degrees Fahrenheit, in an oxygen atmosphere, it can auto-ignite. Our autoclaves ran at about 398.

Swent: Whooh!

Purtell: The higher you get over it, the worse the potential is. But you realize, as we discovered, and this is what John Turney and a

bunch of us sitting down talking, how do you get around it? We had fires in the autoclaves. The oxygen sparge pipes in the slurry caught on fire and burned up. But we didn't have any that came out. For some reason, ours always stopped. So we said, "Well, why is it doing that?" And we realized that we had a flange inside, a connector, where the two pipes connected from the inside to the outside of the vessel, and it got to that point and the heat just couldn't continue, because this thing would just radiate the heat away. It would stop the fire. You take away the heat, and the fire stops. So that's good. So these pipes of titanium going down to the vessel. How do you stop that fire? Well, let's make it a thicker pipe. It's titanium, but we'll just make it a thicker-wall pipe. So now you have to have a whole lot more heat to get it to auto-ignite.

So now we have thicker pipes inside. The flanges are still there, the connector is still there, and we've never had a fire come out of our autoclave. Since we've done that, one tube I know of that's caught on fire. And the reason for that was an operator--the tube was plugging up with slurry. He shut it off, cut the oxygen flow off, and just opened it up real fast. And that made a rush of oxygen right through this little, tiny hole, and that's the other way you auto-ignite them. You have oxygen go through it so fast, it just heats the pipe up right there and [snapping his fingers] off it goes. So it burned it up.

So we learned some lessons. We said, "Live with it. You know what the limits are. Live within those limits." And we do fine. There hasn't been any troubles to speak of with fires. Other places have had a lot of them; we haven't had anything to speak of. It's been a real hazard to that, so you live with it. You respect it.

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Swent: So you got yourself acquainted with the autoclave, ahead of the time that you really were assigned to it.

Purtell: I was really running out of other projects anyway, and I realized I better start learning this stuff because this is a technique you need to know in the industry to begin with. But then I was being up there and it now affected how, as an operating guy, how this place ran. So there's the other side of it right there. I was charged with running 95,000 tons a month through each one of these autoclaves. Or through the autoclave circuit. And we were having trouble doing that because pipes kept blowing out or this was a problem or we'd have a leak on a flange because a gasket was the wrong material. So I started working at that and trying to make modifications, changes wherever you could. Recovery or

availability did start picking up, just by small changes here and there, some big changes in some places. It would pick up.

A Serious Autoclave Problem: Dissolved Lead Liner

Purtell: The problem [chuckles] I got into, though: there was a very interesting situation when I first started in there. We had troubles--it was about five years into the autoclave life. We knew we were having some brick problems inside. They predicted the bricks would start to need to be changed out probably nearly that time. But we didn't see any really terrible problems in it. I think I was two weeks into the job as acting operating superintendent, just a fill-in guy for two weeks--it actually ended up being four months--but I was two weeks into the job, and one of the operators called me up and said, "An agitator just quit pulling amperage on the motors. It's not drawing the power it's supposed to."

"Well, what's wrong?"

"I don't know. We can't tell. We don't know."

"So something is obviously wrong. We better shut it down, depressurize it, and check the agitator." And that impacts your availability right there, doing that, because you have to shut it down for probably up to twelve to sixteen hours, just to get it down and then back up again if there's nothing really wrong. Cool down and depressurize.

So cooled it down. We picked the agitator up and looked down, and there were no blades left on the agitator. Part of the brick wall had dropped into the agitator and broke all the blades off. Up on top there's a titanium ring inside the nozzle where the agitator fits in, and it was gone. It was down on the floor. And I was looking at bare steel, which you should never see in an autoclave. Bare steel inside the autoclave.

And got inside, and there was brick just all over the place. It was messed up. So we realized we had a problem here and to try to fix it. Our autoclaves are set up where they've got a lead lining. You've got the steel, then the lead, then the brick. The lead had been dissolving. A lot of times during our shutdowns we would see--another reason for long shutdowns was lead would chemically dissolve in the upper section when it would be exposed to the atmosphere, and we seemed to find that the solutions would find the lead and start dissolving it. So we had

to break out the brick, find the lead, attach new lead to it, and bring it back up again to keep the steel protected. That was tedious.

Well, here I saw there was no lead left at all in the nozzle, period. You could look back as far as--you know, it was gone. Don't know how long it had operated that way.

Swent: How big are these autoclaves?

Purtell: The autoclaves are fifty-five feet long and about fifteen feet in diameter. The nozzles we're looking at are probably maybe three feet in diameter on the inside, where the agitator fits, and that's a pretty good-sized nozzle. But the lead was always a problem. "We've got to do something about this. We've got to do something about the lead. Take the lead out." So--big step. All the way up to the corporate office. They couldn't understand anybody who would do that. That was the stupidest thing anybody ever did.

#### "Two-Stack Pat" Puts in Pyroflex Liners

Purtell: We put stuff called pyroflex, p-y-r-o-f-l-e-x. It's made by Koch Engineers. They'd used it in different areas, different applications. Similar type thing, but not exactly this type of environment. Said that's the only way to do it. We decided we had to rip bricks out, put in the lead, rip the lead all the way down to about half, the midline, of the autoclave, and put this pyroflex in. New bricks and everything. Well, that took thirty days for each autoclave to do that in. So I got the nickname of Two Stack Pat. That carried on for a long time because we always had two stacks going. There was no longer three stacks, like we're supposed to have, because I always had an autoclave down, being worked on.

So in the four months I was the acting superintendent, we had no more than--maybe we had one week we had three stacks running, and that was it.

Swent: I'm not clear. Why did you need--why was the lead there?

Purtell: The lead protected the steel from the acid environment, and it kept getting dissolved.

Swent: The bricks, themselves, weren't enough.

Purtell: No. The bricks were actually just thermal protection.

Swent: They're too porous?

Purtell: Lead can handle a certain temperature before it will be damaged, so you put these two layers of brick to insulate the heat from the lead. Then the other problem you have is then some of the mortars used to put the bricks together can't handle the oxygen, so you have a certain mortar in the back that's a strong mortar and then a different mortar on the outside brick environment. So that's part of the stuff we fought and tested and tried all these years we've been operating.

But we put this pyroflex in and started an autoclave up, and that works. We're doing that now. I would put it back in an autoclave again if I built them again. It's easier to do. Our maintenance guys out here could fix it. If they had to repair the pyroflex, they could do it. Really quick and easy to do. Not like a lead burner. You had to call a lead burner in from the Bay Area to come up and repair lead. It got to be--sometimes you couldn't get him, and that was kind of bad news.

So we started using pyroflex, started changing bricks, started using ceramics in the discharge, the let-down systems, ceramic agitator paddles instead of metal ones, which cut the cost tremendously and also adds to the life.

Swent: Had those been available earlier?

Purtell: No. We used to use titanium all the time. A guy from Coors came through and said, "Gee, I don't know. We could probably make some of those for you. We could try it." So we had them make a set of blades for us. We gave him the design, showed him what we wanted, and he went back and made them for us, and we tried them. And we've had them last for 12,000 hours in the autoclave. A long, long time.

#### Advising Other Autoclavers; Consulting Service to the Industry

Swent: Your system here has been copied by a lot of other people.

Purtell: Yes. Well, all our agitator blades are all over Nevada now, where that is done. Early on, we used to get calls all the time from other autoclavers. "We are thinking about doing this. What are you doing? What are you doing in mortars? What are you doing in valves? What are you doing in this?" So we always were

a kind of consulting service to a lot of the industry. I think in the early times, especially when First Mississippi at Getchell got started they were having troubles. And I think in the industry out there, people were saying we were really autoclaving, but not really doing what we said we were doing. We decided, well, we have to get another operating unit going. So John Turney and a couple of people at different times went out and tried to help Getchell get their 'claves up and running reliably by talking about some of the stuff that we had been doing, helping them with different techniques and things. And that probably helped them out.

And then Barrick started going. We had conversations with Barrick, all the time, on what they were planning on doing. They had about four or five different things. They were putting autoclaves in different times, trying. And it all came back to the basics. I have to say, the guys that did the original brick work in here--they were Germans from Didier--used a certain--the brick works the best for us. We know that for certain. We're back almost to the old mortars that they used in the early days because they're the best ones after all the umpteen times we tried different mortars. The ones that worked out the best were the same basic mortars they used early on. Improved, somewhat improved. But basically the same mortars. In Nevada they're using lead-based mortars now that we tried. We still have some in the autoclave, and we would never do it again. We don't need it. That's an environmental problem, so we're into that. Don't want it [chuckles]. So we're basically back to the standard mortars.

That was the biggest push there, was trying to get the 'claves going. We got them up to probably after that four-month period I think we were looking at 90 percent availabilities, when we had got the ceramics going in, new brick going, all the other problems solved, new gasket material for the flanges in the autoclave. So we started getting better and better on our availabilities.

Swent: You got up over 90 percent.

Acting Mill Superintendent: Achieving 93.7 Percent Availability

Purtell: Well, our best time was 93.7 percent one year. I was acting mill superintendent at that time.

Swent: What's the difference between manager and superintendent?

Purtell: The manager had operations superintendent, maintenance superintendent, and chief metallurgist reporting to him. And I was the operating superintendent. Different mindset, different names. At Lead, mill manager would be called mill superintendent, probably. They call them managers here for some reason. That's just a level.

Swent: Some places a manager is higher than a superintendent.

Purtell: Right. The only manager would be the general manager. Nobody else would be a manager.

Swent: But here you have operations manager--

Purtell: We have mill manager and mine manager, and under those managers they have superintendents. Under the superintendents, they have general foremen and then foremen and then your operators. So that's how it's set up.

So I was the operating superintendent at that time, in charge of mill processing. John Turney was in Australia. They had some problems down there with a roaster or whatever they wanted him to look at. So he spent four months down there, and I took this rotation, shuffled through.

When John Turney came back--I think it was September, and then November they had a big brouhaha, round and round change, and I ended up being the full-time operating superintendent. I had three stacks running for a long time [chuckles]. So I got better at it. But that's when we started getting better availabilities all the time, up to higher rates. I was the operating superintendent for maybe a year when John Turney then got assigned to Eskay, and then I was made mill manager at that time.

So the big turmoil. By the time I was mill manager, the biggest part of the challenges of getting it up and running and the trials and tribulations, I guess you might say, of getting reasonable availabilities going and a lot of the big, big problems were out of the way. We had worked through those already, and it was what we called almost a steady state condition.

Swent: A mature organization.

Purtell: Yes. That's a good word to use. We still had a lot of problems with the slurry pumping. That's another problem we had. The Geho pumps down below were starting to give us--they were getting old. They started having problems, major problems. Breaking

crank shafts, valve housings, and diaphragm housings were cracking, and just a lot of problems started showing up that we never anticipated at all. We worked through those without Geho's help, because they weren't much help, haven't been much help [chuckles].

Swent: You say that with some feeling.

Purtell: Yes. We don't talk to them much any more. Most of our parts now we're able to get U.S.-made. High-cost, bad availability, no help when you have problems, to speak of. They ask you what you're going to do. What can we do for you? That type of thing. So we're just doing it ourselves. Redesigned the pump, almost, in its own right.

Swent: This is from Germany?

Purtell: Holland. So those are some of the things. Right now we're in a fairly steady operation. For the next month [laughs].

#### Mill Manager; Putting in the Flotation Plant

Purtell: The next step. Mill manager step was a pretty steady state. It was more or less keep things running, and we put a flotation plant in during that time. That was just kind of stuck in at the side, and putting the concentrate in the autoclaves. Probably the one thing that really settled the autoclaves down to run very stable and very steady was being able to control the concentrate level at 4 percent sulfide in the autoclaves at all times. That was real good. That was a plus. It worked out real well.

Swent: And what made that possible?

Purtell: Put in a flotation plant on the low grade. What happened is we put in this expansion, we ran oxide ores that were stockpiled down there. There was enough for about two and a half years of run. And everybody always said, What are you going to do? We're going to run out of these things. We're going to have this whole grinding circuit down here that's been paid for by running the oxide ores, but now what are you going to do with it? So we did some testing on some of the low-grade ores and found out that if it's been sitting in the stockpile for a while, you can direct-leach it, and recovery is not too bad. Sixty to 65 percent, and that's better than we ever thought it would be, so that's pretty neat.

In the process, [we asked], What if we put a flotation circuit in there and take the concentrate in? Get it to the autoclaves? Because when you can use more in the autoclaves, we won't have to burn the boilers as much because it has to be hot enough to oxidize. So we went through the process and, sure enough, we got \$5.5 million for the flot[ation] plant to go in. It's kind of a side line. Many mills, that's the heart of the operation. It's just a reagent generator for us, on the side.

We take that concentrate, the autoclave settled out very nicely. Operators love it because it's easier to control for them. That's done real well. So now we've got the system. Everything is functioning really great, and we're running out of ore. In no time [chuckles]. So that's kind of frustrating. That's one of the biggest frustrations.

Swent: You have some ore going through one circuit and some going through another.

Purtell: Before, it was the sulfide circuit and the oxide circuit. The oxide was the oxidized cap material that we used, we stockpiled at one time, thinking that if the autoclaves gave us problems, we could use this oxidized ore to help as a cash generator while we were getting the autoclaves straightened out. Never happened. Never used it.

One summer we had a five-day shutdown and ran oxide ore, and that was it. So that's when I think Jack said, "Let's do something with all that ore." He worked it through and got the \$25 million for the expansion to go through. We ran out of oxide ore, and so now what are you going to do? You know, here it is. That's where the crunch came in. And we started looking at ways --at one time we bought pyrite concentrates from the Empire Mine in Grass Valley to help us.

Swent: It caused a sensation as I remember.

Purtell: Actually, an ongoing thing. We always knew that we wanted to shut the boilers down, quit using all the fuel to heat the thing up. If we get 4 percent, it would be great. This is one of the things I think I did as a superintendent. I went in, not an operator again. Kind of the other side. "What was the equipment sized for?"

"It was sized to run so many tons a day at 4 percent sulfide."

"Well, how come we've never run 4 percent sulfide? How come we don't do that? The mine guys are always squawking that they

have to cut the sulfide level down because it's too high for us. Why aren't we running 4 percent?" No one really answered the question. "Well, let's run 4 percent." I didn't realize. I had scared the hell out of a lot operators up there when I did that because the mine started sending us 4 percent. I said, "Let's just try it for a while."

So it ran for about a month at 4 percent, and it was great [chuckles]. They realized how well they could control it. It wasn't all that scary after all, that they could still control it. That's what these things were made to do. So we dropped back a little bit from 4 percent because it was right on the line all the time. But I don't know if I was just being naive or what. "You should be doing it. That's what it's designed for." So we up the levels. We ran closer to 3.8 percent all the time, instead of the 3.0 or 3.1 percent early on. So less boiler fuel is used, and you can put more of the high grades into the system because it has the higher sulfurs in it.

Well, from that test, then, we said, Gee, the sulfide levels, as the high-grade, the sulfide ores, started to be used up, it gets deeper. Sulfide levels dropped down. How do we keep them up? Well, we talked about a flot plant before. Why don't we put them in? So we did. We put a flot plant in. Those concentrates, then, from the flot plant--the autoclave operator had the control of how much went into his tank to feed his autoclaves, so he could maintain 4 percent. And it just hummed right along. So it was kind of an innovation in its own right, but it was kind of just logical thinking. That's all we did. Just think through it logically. How would you solve this problem? And that's where it came from.

Now we're coming up into June, and mining will be done. And we'll be doing nothing but the stockpiled ores.

Swent: Now you are talking about 1996.

Purtell: Yes, '96, 1996. We're moving ahead [chuckles]. I'm now the general manager, but I've been the general manager now for two years.

Swent: You were acting--

Purtell: Let's back up and do that one again.

Swent: Yes, we should. I was going to ask, too, did the acquisition of Corona have any repercussions here?

Purtell: No. There was nothing here. For us, we thought it was exciting. They're doing something. It looks like there might be some other opportunities for everybody. So it was kind of exciting to see the company grow.

Swent: Did you sense any difference?

Purtell: No. Nothing here. Nothing to speak of at all from here.

Swent: Except that then people started being moved up to Canada.

Purtell: I think that was just later on, as it evolved, with Jack moving and then Ron. Peter Steen, when he was president, told Ron several times that he needed to go get some underground experience, and he would put it off. He finally said, "He's told me three times. I guess I better go do it." And he decided, okay, he was going to spend some time at Lead, so he set up the situation where he was gone for six months. Up to Lead, back periodically, here and there. He wanted to try it.

"Do you want to run it?"

"Sure, why not? Let's try it. See what we can do."

#### Acting General Manager; Seen as a Caretaker

Swent: So he asked you.

Purtell: Yes, he asked me if I wanted to try it, so I said, "Okay. Whatever. Let's do this. Another job. Let's see what we can do." So he went to Lead and spent that time up there, and it was a fill-in. It was an acting job. I put Roy Smith in as the mill manager; let him try and be mill manager for a while, and moved a few people around. Let them try jobs, too, while I was trying a job. So kind of moved it around that way.

Then Ron came back sometime in June of 1994 and was here until September 1994, and then that's when all the Canadian shuffle went on. [Homestake acquired Corona Mining Company.] He went to Canada, and I was given the job permanently then, at that time.

Swent: You said a little earlier when we talked about this, you weren't sure it was a good way to do it.

Purtell: Well, I think in this case, when you're acting--I don't want to say you don't take it seriously, but you're not taken seriously by other people.

Swent: Well, you don't have the authority.

Purtell: Right. You feel like you're a caretaker in some respects, and I think that other people reporting to you look at you as a caretaker, also. That, not to worry, that other boss will be back, so not to worry.

Swent: The "real" boss.

Purtell: The "real" boss will be back. So then there was a short hiatus, now. I'm a mill manager again, and now I'm the general manager. So there was that two-month or three-month period in the middle there that I went back to my old job. Now I've got this new job, which is the job permanently now.

I think it was hard for everybody out there to make that adjustment. For a period of time it was very tough to feel like you were the boss, you were the general manager. And I think that was the sense coming back, too. You know, "Is this really happening? He did this before." And it was hard to get past that stuff. I think it would have been just easier--

Swent: How did you--

Purtell: Time [chuckles]. Working with them. Letting them know as things came up that a decision had to be made, and I made it. And then stick to it. A couple of times you do that and make it stick, and they understand it. "Okay, he's the boss now."

Swent: I'm sorry to interrupt you. You started to say it would have been easier--

Purtell: Easier if you just basically move from the job into the job, move from your old job into that job and saying, "Now I am the boss." I think it would have been much easier for everybody to accept, and you wouldn't have this period of time of trying to readjust everybody to this fact. That took a while.

#### Pit Walls Slide and the Mine Changes Dramatically

Purtell: And then it was also a period when the mine changed dramatically. We were mining the North Pit, and about two or three weeks after

Ron went to Lead, we had a pit wall slide in the North Pit. Three pit wall slides, actually. On three different sides of the pit. Thirty thousand ounces are still down at the bottom. We had unstable walls, and here's this new guy up here kind of controlling the place or monitoring here. We had to shut the pit down, just abandon it. That's it. I couldn't see any safe way. Peter Steen backed me up. He said, "There's no real safe way to go down to mine that ore." Most of the gold was--we had four benches to go, and most of the gold was in the bottom two benches. So you're going to take the risk of spending a lot of money cleaning up all these slides and not get the gold anyway. Besides, you're putting people at risk down in the hole, so we said, "That's enough." So that was probably the first step that I made. A lot of people still remember that. I'm the one that shut that pit down after Ron. It was actually Ron's watch, but I did it at the time.

So that started out kind of tough.

Swent: Could this wall failure have been anticipated?

Purtell: The wall that failed, the biggest, had never failed before. There had been little, small little slides here and there, but this was a major failure of the wall. That had just never happened before.

Swent: What was different that made it fall?

Purtell: Just a deeper pit underneath it. I think it just finally didn't have enough strength in it, and gave way.

Swent: The angle.

Purtell: Yes. The angle was too steep on that particular wall. So we abandoned it, started over. So now our ore supply was basically going to come out of this North Pit area while we did some pre-stripping of the South Pit to get ready to go back into the South Pit. Well, now we're done. We've got to go mine ore over here, and it's not ready yet. So we struggled. Since that time, there has not been a steady feed of ore to the grinding circuits anything like we had in the past, with a real nice, predictable grade. We had a high-grade stockpile that we had put up on top, and it wasn't carrying the grade it was supposed to, so we were short up there. It was a struggle from day one, since either I was acting or the general manager. It was a struggle because it was a different mine altogether. Trying to get people to respond to that. You know, "This is not the same mine. You have to do it differently. Think differently, look at it differently. Come

on, come on, come on." That has been a challenge from the beginning.

Swent: Who were the people that you're talking about?

Purtell: Just at the mine. The mine people, the managers, the engineers. "I know we've always done it this way, but let's look at it differently now. Besides that, I don't know anything about mining, and I think maybe you should try this." [chuckles] So you use some of that. "How about if you look at it in this way? Look at it that way?" And it was probably a little different thinking.

Swent: The exploration wasn't turning up what they had hoped for?

Purtell: Right. We had the underground. We tried the underground exploration. We drilled some holes in the top, and it looked like there was going to be a real good potential for an underground. That was going on also when I was acting general manager. That turned out to be a no-show. We just couldn't find anything. Got a little bit out of it, enough to pay for the exploration but not enough to really show a bonanza of gold.

So through that period of time up to this date, actually, it has been hand-to-mouth, where McLaughlin Mine has never had to do that. If it looked like it was going to be a shortfall of ounces in the mill, they'd run over there to this little pocket of ore, and they'd muck out some high-grade ore, and they'd send it to the mill. So they were always able to meet your budgets easily. Always had that extra working face to go to. We don't have that. The only working face we have now is the bottom of a pit that takes only about two shots to go into, so you mine it out and have a week and a half.

And reclamation we call it now. It's a working face, reclamation [chuckles]. You send your drivers and loader operators out and 'dozer operators and start finishing reclamation work, looking as if we're finishing up the mine. So you're not making gold when you do that. You're waiting for them to do some more work in the pits so you can go back in the mine some more. So it's been real different, real different.

It's a totally different mine. I stepped into that not knowing mining. I mean, I kind of understood, just from what I had picked up before, kind of how the mine operated. Well, now that understanding didn't make any difference any more, because that's not the way it is now. This is a whole new thing. Different setup altogether. So that for me was the biggest challenge I had when I came into it, was "What do you do? I

don't know mining very much at all. So now what do I do? I still have to get this thing. I'm still telling these people we're going to make 250,000 ounces a year. The engineer says we can do it, but he can't tell me how [chuckles]." So it was a real challenge for a while. And still is.

Swent: We haven't talked at all about employee relations.

Purtell: Here it has been pretty good. It's real open. Always has been, still is now.

Swent: All of these places are non-union.

Purtell: Yes, we're all non-union here.

Swent: And Creede was, and Grants was.

Purtell: Creede, right, right. Grants was non-union, too.

Swent: Right. Were you in a union at Union Carbide?

Purtell: Union Carbide was union, very much so. That was bad news. Hated that.

Swent: Did you belong to the union?

Purtell: Oh, no, no. Any other group you had to work with to do any project work was a union.

Swent: Who were they?

Purtell: Chemical and Atomic Workers.

Swent: OCAW.

Purtell: Yes.

Swent: But since then it's all been--

Purtell: Been non-union. And it's great this way. Most of these people-- I think the big part of it is the openness. They understand what's going on. If they don't know what's going on, someone will explain it to them. Very open. That has made a big difference here, especially in these last couple of years. Everybody knew mine life was coming to an end, and it's just "How do you do this? How do you deal with it?" And openness has been the way we've done it. Every step of the way. "If I can give you a date, I'm going to give you a date and if I can't, I'll tell you I can't give you a date. But I'm going to try as best I

can." So that's what we've done in the last year and a half. Oh, we've got 60 percent of my time and the HR's time has been--

Swent: HR. That's human--

Purtell: Human resources.

Swent: Who is doing that now?

Purtell: Don Field. Has been getting ready for layoff, shutdown.

Swent: So this is personnel rather than mechanics.

Purtell: At the same time, you've got this other problem. You still have to make gold. You still have to make that mine produce. You know there's resources. There's still gold in that pit, and you have to get it out in the best, the most efficient way you can. And they thump on you at the corporate office all the time to "get your costs down, get your costs down." And that's the way you're supposed to do it. The way you get your costs down, a good way to do it, is get more gold out of the pit. [laughter]

But now we're less and less of that. The grade has dropped off steadily since we had the North Pit failure. From then on, it has been a steady drop in grade. That has been a struggle. But we've done pretty well, even up to this month even. We've still said we've produced 20,000 ounces or 19,000 ounces, whatever it was, and we've done it. We've done it pretty well. We've had a few months' struggles here and there, between, the rain months that killed us.

Swent: Yes, we haven't talked about that.

Purtell: Haven't gotten there yet. Maybe that's probably the next step, after Ron and the North Pit. We struggled in there, and then the South Pit. We started mining over there, and the rains in January came.

#### Torrential Rains in 1995; 100 Feet of Water in the Pit

Swent: This is January '95.

Purtell: January '95. Torrential, torrential.

Swent: Unprecedented.

Purtell: Oh, yes.

Swent: Hundred-year rain, wasn't it?

Purtell: Twenty-two inches of rain in twenty-three days we had up here.

Swent: A hundred feet?

Purtell: Twenty-two. Oh, a hundred feet of water in the bottom of the pit, yes. We were able to mine a few upper levels, and that's the only thing that really saved us at that time. The guys here did heroic--I mean, all the mechanics and TIC, everybody that was here. Heroic efforts. We had pumps and pipes everywhere. I think we installed something like 15,000 feet of plastic pipe and maybe fifteen or sixteen booster pumps of different kinds and different sorts, all over this place, pumping water from Site 5, which is the waste water runoff area, and trying to keep water out of the pit and out of the mill area. Everywhere. Water was everywhere. And we had water being pumped, going like crazy. And we saved the day in the end. We had no problems. We had very little water left at Site 5 area down there at all. What was left down there was okay to discharge. It was right on the edge, but it was okay to discharge. So, I mean, it was a battle.

Then we had six-tenths of an inch of rain in February. It allowed us to take a breath, get some systems put together, add a few more feet of pipe, make a few more tie-ins, and then we got hammered again in March. Got nailed again. We had fifty, fifty-four inches of rain, I believe it was, for that year. And most of it was in that period of time.

Swent: Why couldn't you just pump it up and let it go down the creek?

Purtell: We couldn't discharge it. Non-discharge. See, any rainwater that hits any disturbed area in the pit was considered contaminated water and had to be handled somewhere along the line. So we chose to pump it up to the tailings pond to try to keep the mine operating, so we were pumping it to tails. We had a lot of room at that time.

Swent: So you're bringing this up--

Purtell: Right. Pumping the water up five miles in spare pipelines. Wherever we could find a pipeline, we had water coming up in it. Putting water in the tailings pond. The process, I think, raised the tailings pond fifteen feet, elevation. The water came up fifteen feet.

Now, in 1996, we get into another rainy season, and it starts raining again, and we have maybe six or seven feet. Eight feet of freeboard, I think. When we came into the rainy season, we had eight feet of freeboard in the tailings pond. And no longer could we pump water from the mine, so we thought, well, last year we got hammered early in the rainy season, at the end of 1995. Coming into 1996, the rains were not too bad. A nice little rainfall here and there. We had a couple of one-inchers in an hour, but we were able to handle them. We had some other things in place down at the mine to help. So we survived. We learned a lot in the first year and made some changes, knowing we can't pump the water anywhere. The mine has to deal with all the water that hit so we set up a system of pumps and pipes that would send any South Pit or run-off water to the North Pit.

##

Purtell: North Pit was mined out. We kept an area open that we were going to try and mine called the Zodiac Pit, which was another small, like a little notch pit that was left in there for us to mine. It left us with a big open lake. That's where all the water, then, from the mine was diverted. Any water from the South Pit went all to the Zodiac Pit, we called it now, the North Pit area. All runoff from the stockpiles or any water from the Site 5 waste areas, all was pumped to that area, all to the North Pit. M-1, which is a pond right next to--

Swent: M-1?

Purtell: M-1--that's what it has been called for years--was filled up rapidly. When did we first discover that? It had to have been the fall of 1995. We started seeing cracks forming in front of the M-1 pond, on the pit side, which told us we couldn't keep very much water in M-1 anymore, so it's no longer to be a very large water source. It used to hold about 200 acre feet, and we don't even fill it halfway up now because of the problem.

What started showing up is, as we started working into rains in late '95 and early 1996, the west wall of the pit started sliding. It turned out it was the same material that one wall of the North Pit was made out of, and it had to be laid back to a 23-degree angle or it wasn't happy. If you laid that wall back to 23 degrees, you wouldn't have any M-1 pond, and you'd probably be in the truck shop yard and everything else. That's how far you'd have to lay it back.

But there were slip planes all over the walls down there, and it started sliding. Big blocks of material would slide into the pit. And you'd mine it out as much as you could and keep the

haul roads open. Then it was in about November or December of 1995, the east wall of the South Pit had a one-and-a-half-million-ton slide. The whole wall gave way, basically. It was at about a 43-degree angle. It stayed that way. It was doing really well. There was no real problem. But over the years of exposed walls up on top, there was a mudstone underlayer with the basalt cap on top, and the mudstone started to decrepitate in the weather, and it just gave way. Lost all its strength and just caved in in one big section and dropped down and buried the mining face that we had been mining on. That had saved us from the water and was now buried in slide.

So now we're coming into the rainy season of 1996, and we don't have much of a bench to work off of anymore. Rains are starting to come at us, and the rains of late '95, early '96 weren't quite like the ones in '95. We've had about twenty-seven inches of rain this year, but they would come in three-inch rainfalls. We'd have three inches in twelve hours or two inches in ten hours or something like that. Those hammered us because they would run off really bad. And we started losing it again. We'd just get an area open at the bottom of the pit, then it would fill up with water, and we'd have to pump it all out and either redrill it sometimes, shoot it again, do a lot of-- different problems. So that has been the continuing struggle.

Now we're past it, past the rainy season of '96 right now, and we're two benches from the bottom, and the lower west wall slid on us about a month ago, and we're dancing around it, hoping it won't slide any more. And we're probably going to make it. It's looking pretty good, like we're going to make it to the bottom of the pit, finally. I just asked these guys if they could--. During my watch, the North Pit didn't get finished, the Zodiac Pit didn't get finished, and I'd like the South Pit at least to get finished. One out of three pits need to get finished on my watch.

Swent: Did you ever lose any equipment in any of these?

Purtell: No. The North Pit slide, we lost a pump. It was buried in one of the slides, but it wasn't anything expensive to speak of. We almost lost a drill in one of the North Pit hole slides, but an operator, actually the foreman, went down and started it up and backed it away from the wall, and it survived it.

The closest call, I guess you'd say, chance of personal injury, was when the east wall gave way because it was very sudden. All these other walls, when they start to slide, you can think of a slide as an avalanche-type thing. It's not an avalanche. It just suddenly starts. You see movement start, and

if you'll watch, rock and soil just raveling off the wall. Depending on the speed of the slide, it ravel faster than not. But it will just come down very slowly. The east wall slide, though, was a very quick, sudden failure. And it happened between shift change, between a graveyard and a day shift. It could have been catastrophic if there had been people in the area. It did bury a working area that they had been drilling on and were getting ready to shoot. So it could very well have been a fatality at that area, so that was luck. Luck was with us that day.

But everything else has been slow. Handle it. As it slides into the pit, you mine it out and keep on going and hope for the best.

A Very Good Safety Record: Three Times the National Average

Swent: You've had very few accidents.

Purtell: Right. It's been pretty good. This is one of the safer mines around. Safety record has been good. Last year, 1995, we had two lost-times, where I think the national average was closer to five or six.

Swent: What were they?

Purtell: One was a broken foot, and a twisted back.

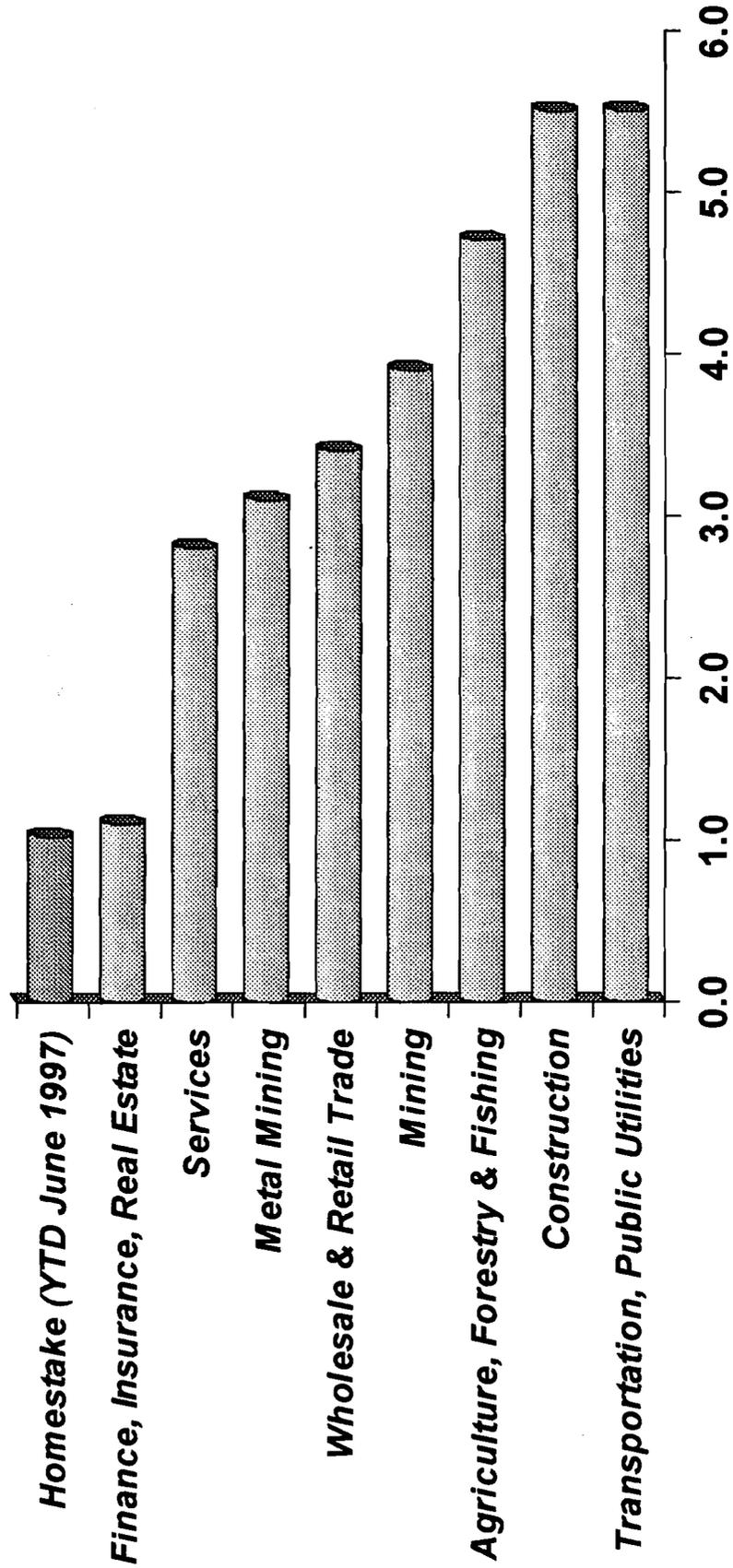
Swent: Both on the job?

Purtell: On the job. When you think about it or what's interesting about it is you figure with the tremendous rains in 1995, we had all the problems that period of time, the only real injury we had was the broken foot. A guy in the shop dropped a flange on his foot. Nobody in the mine, nobody out there working with all that pipe and slop and the weather and the nasty stuff was hurt. So that was saying a lot for them.

Our mill operations group out here is now on year number five. No lost-time injuries. Something that's difficult. I mean, here's a crew that works the longest and the hardest shifts, and they have no lost-time injuries in five years. The last one they had was a real fluke. A guy--it should never have been a lost-time injury, but the guy wanted his workman's comp and his disability, so he took it. That broke--they were on, I

# HOMESTAKE MINING

## Lost Time Injury Frequency



think, a three-year run at that time. No lost time. The guy gave him the trouble, so--

## V BEGINNING THE CLOSURE PHASE

### The Shutdown Brings New Concerns

Purtell: They've done really well. This place is pretty safe. It really is. It's a big push. Right now, when we get into a period of layoffs, it's kind of hard. Our biggest push right now is keep people focused. A guy knows he's not going to have his job coming into June, and he's not really paying attention to what he's doing, and it's kind of showing up. We've had some smaller injuries.

Swent: What about security?

Purtell: We've beefed it up a little bit. That was another change. We kind of had to go through an evolution. It's been one big happy family. We pretty well trust everybody. We do have security in the refinery and someone at the gate to watch people come and go, but we're not looking for employees running off with stuff. So that was a big change, when a guy came out to my office and said, "I heard a rumor in town you need to know. Some guy sold twenty-one hundred dollars worth of stainless scrap. And he said it came from the Homestake Mine."

I said, "Oh, that's interesting."

So we asked around. We noticed that some tool thefts had picked up, and things had started. So we added a few cameras here and there. That stopped some of the tool thefts in the shop, for instance. And put a guard that rotates around the weekends that will drive through boneyards and scrap yards, making sure there's nobody grubbing around that shouldn't be in there. It's a different thing now. It's not quite the happy family because some of the families are leaving.

Swent: When you start to wind down, this is a risk.

Purtell: It's a risk. And then our insurance group came in and talked to us about it, and it was kind of a semi-audit. They looked at what are you doing? What do you need to do? What have other people done? What do you need to watch for? So we instituted a few different things. That was mainly it. It's more cameras, and we had the guards come in on weekends. We didn't have that before. And they rove around, drive around, just to make sure everybody is staying honest.

Swent: So you're closing down your autoclave plant.

Purtell: June 28 is the date.

Swent: Next month. A month from now.

Purtell: A month from now.

Swent: And when do you stop mining?

Purtell: Probably about the same time. Maybe about a week before. It's just timing, when the last of the high-grade comes out, but I think it will be right about that time.

Swent: So will there be a layoff of personnel then?

Purtell: The time we're mentioning; 180 people will go out at the end of June. We had a small layoff in February, where we had thirty mine operators were laid off at that time. They were all temporary employees. Now we're going to get into the ranks of regular employees, and there will be 180 people laid off. But we're going to ask for volunteers. We're finding many of them want to stay over and finish up the reclamation work that has to be done after mining is done. Try and meet the letter of the law, where you have to notify an employee sixty days in advance when he's being laid off. We decided that we'd just tell everybody they're laid off at the end of June, and if you want to volunteer and stay on and help us finish up the work, it met the letter of the law. That's what we're doing. We're not finding any trouble getting volunteers, and we'll set up a big enough crew to finish reclamation in a couple of months.

Swent: That would be the thing, that you might not be able to keep the people to do what you have to do.

Purtell: Right. We started that. We had a pretty good program here when we came into layoff. Don Field is the one that's got to take a lot of credit for what went on. He had a lot of parts that went into it. We had this openness thing that goes on. Continuous communication as we start moving into it.

A Severance Plan and Stay Bonus

Purtell: We instituted, for one thing, a severance plan. We upgraded it. I think the Lead Homestake Mine, they had an hourly employee severance plan. If they were severed, they get two weeks' pay. If they worked ten years for the company, they get three weeks' pay. That's their severance. And we didn't feel that was proper. So now we've worked with the corporate office, and we've got it up. An hourly employee now will get eight weeks of severance here. That's a week for every year up to eight years, so they get up to eight weeks of severance here.

We also, then, later on realized that we need to finish this mine up, and somehow we've got to keep people here. In 1995 we had a 25-percent turnover at the mine, the personnel. We need people. We had to finish this thing. So we decided, what could we do? What we were interested in was a stay bonus.

Swent: What is that?

Purtell: A stay bonus. Stay here. Stay here until we lay you off, and we'll pay you some extra money. A simple process. It's like a bank account. I think we started it February 1, so if you're here for the month of February, you get a hundred dollars in your bank account. A hundred and fifty for the next month. Then it goes three hundred dollars, then four hundred, then five hundred. And we had it worked out to where June or July was going to be the end. They announced June, but the last month you get five hundred dollars. And if you stay here till the day we say it's your layoff day, you get the bank account. If you leave before, it comes back to Homestake.

So that was a pretty simple principle. As it got closer and closer to the month that layoff was coming up, the bank account got bigger and bigger. So far we've had very light turnover at this time. I'm amazed. We still anticipated a large turnover, but we haven't had it. It hasn't happened. So it's going along pretty smoothly.

The mine was going to keep some people for reclamation. The process area was going to keep some people. We're going to mothball the oxygen plant. That will take probably three or four weeks to do. So we'll pull some operators over there to purge it and seal it up and get it ready for sale, because it's a valuable commodity. We can sell an oxygen plant.

Thickeners that need to be emptied out. Pumps need to be drained. The flot plant has to be cleaned up. Get ready to sell it.

Swent: But you'll still be operating your mill, your processing plant for a number of years.

Purtell: We're processing stockpiles during that time. As soon as the autoclaves go down, we'll start processing the low-grade stockpiles.

Swent: But what process will you use?

Purtell: Direct cyanidization.

Swent: No flotation.

Purtell: No flotation, no autoclaves. Just crush it, grind it, and take it to the carbon-in-pulp plant, and that's all we do. It's pretty much like you do in standard plants, your conventional plants, other places. In the meantime, once these guys will be putting stuff up, we'll probably open up the autoclaves, and we'll clean them out to get the scale and stuff out of them that's in there at this time, and then drop the agitators back into place, and hope we can sell those. So it's part of the process. Selling the used equipment, selling process equipment that we don't need any more, get it off the books and get it out of here. So we're in the process of doing that.

The other part we're doing is the part that Ray Krauss, especially, is involved in, is getting UC Davis, the UC California system tied into starting to use it a little bit. You know, academia. Academics are kind of slow getting started, so he's starting out early. Getting a couple of people interested in doing some project work and getting a few grants for them to work themselves. Get their own grants to work and start doing some studies. Start getting to work that way so when the turnover comes, which is going to be probably in 2003 or '04, we'll already have people actively working on projects, and there will be a much smoother turnover that way.

So here we are, seven or eight years away, and we're already working on the shutdown that's going to happen in seven or eight years.

Waste Dump Reclamation Done Along With Mining

Swent: But you've been doing the physical part of reclamation practically from the beginning.

Purtell: Right. The mine has been that way. You reclaim it as you mine. The waste dumps have been reclaimed as we go. All expense. All we'll end up doing is--by the time we're done mining, there will be about two months' worth of work, and all the waste dumps will be reclaimed. Ready for seeding at that time.

Swent: You mean by the end of this summer?

Purtell: Yes. In October we'll seed them. The only thing that will be left long-term will be planting trees, and that will be summer work. We'll, I'm sure, bring some summer students in and plant trees.

The Pit Will Be Self-Reclaiming

Swent: And the pit, itself.

Purtell: Will be a lake.

Swent: You don't have to fill it.

Purtell: No. It will be a lake. Early on, it was permitted that way, with the final thing is we'll fence it off and it will be a lake.

Swent: But fenced off.

Purtell: Yes.

Swent: Not available for recreation.

Purtell: No. You really can't. We call this pit self-reclaiming, and already it's starting to do it by itself. This west wall slides we have, when this water starts to come up and it starts soaking the bottom of the west wall--

Swent: That's nature's way of reclaiming.

Purtell: Nature is going to pull that wall down. The east wall that has got mudstone exposed, it's going to decrepitate, and it's going to cave in, and you're going to have more of that until it

finally reaches an equilibrium slope of some kind. Then, when it makes that point, then that's what's going to happen. What kind of a lake you're going to have, what kind of access will you have to it. It's still going to be very high walls. I mean, it's going to be a very deep pit. And we feel that the water elevation will be down to about what we call the 1,700 elevation, which is 1,700 above sea level, but the top of your pit walls will be 2,000-foot elevation, so you've got 300 feet of wall to get down to that water, and what's it going to look like? What's it going to be? Don't know. Some places, the benching, the stair-step will still be there. But other places it's going to be flat because it's going to reclaim itself. So over time that's what's going to be how you deal with that. It will do some of that itself, naturally.

The water. Don't know the quality. That's a thing we're doing right now. One of the geologists, instead of laying him off, is going to be replacing an environmentalist that's leaving us, and they're going to--we have to do a water quality balance in some respects. Not only water into the pit. What kind of quality water can we predict will be in there, and go through a series of studies and make a model, a computer model, to try and predict what it's going to be like. So he'll be busy with that for quite a while. And that's more and more the standard. In Nevada, before you open a pit, you have to predict what water quality will be like after you're done mining. So we're doing that now. That has already started.

So that part of the reclamation--I mean, we talk about reclaiming. The waste dumps are done. We'll have to monitor them for a long time. There are places we're still getting some acid drainage just coming out of different areas that has to be taken care of. And we're looking right now to get a passive treatment system, like a wetlands or a marsh, if you want to call it that, where any of these waters, if there are slow enough flows, you can bring them into a marsh, wetland, where bacteria will take care of the problem with water, and then you can discharge the water without any problem. That's the ultimate goal.

We realize now that we have a pretty good setup to do that. We've got a bunch of small ponds down below there. Tules are growing in them all over the place. We've got some trees already growing on the banks. They survived the high rains with some of the lower pH waters that flowed into them in the 1995 rains. So it looks like there's a potential you can do something there. So that's our long-term plan, is to try to get that to work.

### Reclamation of the Tailings Area to Create Wetlands

Purtell: The longest long-term, of course, is reclamation of the tailings area, which is a difficult one. We've accrued funds. For every ton of ore we run, we accrue so many cents to cover that reclamation cost. So the economic side is taken care of. The original plan, I think, was to add two or three feet of--it would be kind of like a gravel, which would be a capillary barrier, and then put topsoil over the top of that, and then plant it as a meadowlands, I believe.

We've done a test plot on the back side. We actually diked off an area of our tailings pond and filled it with tailings and let it sit for a couple of years to dry, pushed the dirt around just a little bit, put four inches of topsoil on it, and it's a beautiful marshland right now, wetlands. It just looks perfect down there. But that was with oxidized tailings. It's not with the type of tailings we are depositing now on top of the tailings pond.

We have another area we're going to dike off in probably the next year. We'll fill it with what we call the direct CN tailings, direct cyanidization tailings. They'll have a little bit different character than the autoclave tailings, so we need to see how that will work. What it could very well be is we can make our tailings pond area, can turn it into a wetlands. Much cheaper than trying to let it dry, contour it, put gravel on top, and then topsoiling. And it's probably much better habitat, too, for wildlife.

### The Layoff Process

Swent: Do you have any responsibility to retrain people?

Purtell: We have so many people that are senior, we can't see the layoff time. For instance, we're keeping almost all our senior operators, operating the facility. At the mine. We have some people down there that have to bring in ore from the stockpiles to the crusher. They are senior operators. We looked at it, for the layoff, does the person qualify? Is he safe? Does he show up to work? Does she do her job the way she is supposed to? Period. If they are so, then you take them on by seniority. And all our operators are senior, so we don't really need to retrain anybody to speak of.

We've given some of the salaried employees an opportunity if they had, say, been promoted from a mechanic to a maintenance foreman, would you like to go back to the pool? So we've offered that opportunity, too. That's part of the layoff process.

We also have to meet the EEOC standards. Our lawyers and corporate H.R. people went across our layoff list and looked at it to see if we laid off all the old folks and kept all the young folks. And make sure we didn't violate any criteria there. We didn't at all. We were well within all the standards. It's done pretty fair. Very few lost-time injuries so far. I'm going to knock on wood on that one, because there could be some people out there still that might want to take a run at us and try to get some workman's comp instead of looking for another job, and that's always a possibility.

Swent: Do you have any sense as to whether they're going away or some people are going to stay around in the area?

Purtell: The big majority of people were locals, and it's hard to tell. A lot of people we're talking to now, they want to stay with mining. Mining is a very high-paying, well-paid job. If you go into the community right now, there's not too many jobs available. The ones that are available are maybe six or seven dollars an hour, and these guys are used to making eighteen, nineteen dollars an hour. So they're looking to go back into mining, and there's a lot, a lot of activity in the mining industry right now.

Swent: Not here but--

Purtell: No, not in this area. But around.

Swent: Nevada?

Purtell: We're having a job fair, which is another part of the layoff package we're putting together. And we have eleven mining companies going to come and talk to people.

Swent: When are you doing this?

Purtell: It's on June 7.

Swent: Here?

Purtell: We're going to have it down in town at the Brick Hall, they call it, a big hall down in town, so bring those people down and just everybody meet down there and interview them.

State of California and JTPA Support for Laid-off Workers

Swent: This is part of what I was asking about retraining.

Purtell: That's an interesting setup. One of the better points about California. Sometimes you think they have kind of a welfare state. But one part of their welfare isn't too bad. You sign up for unemployment if you're a laid-off employee, and you can go to the career center down there. They'll help you write a résumé, they'll take you to a counselor, and they'll talk to you about what you want to do, what you feel you--if you want to keep doing the same thing, they'll test you for your abilities--

Swent: This is the state.

Purtell: The state is doing this. I'm sure some of our unemployment insurance money is going here. But they take care--they have counselors there. They'll sign you up for unemployment at the same office, take you to a counselor, test you. If you want to train, I think they'll pay up to a year's worth of training, college, if you want to go to college. If you have to relocate, say, go to another area, they'll pay, I think, up to eight hundred dollars in moving costs. If you are in this job-training thing, instead of being twenty-six weeks unemployment, you get fifty-two weeks of unemployment. So there's a lot of things that's impressive but they have got to be put together.

Swent: And they're setting that up here.

Purtell: Well, it's right downtown, in Lower Lake, yes. What we do, we told them we have so many employees coming up. We kept telling them, "It's coming." We don't want to pound them with all these people. They said, "If you can tell us ahead of time, we can write for a grant," and that's what they did. They have got grant money from the federal government to take care of this. They just wrote, "Homestake Mining Company is laying off umpteen employees at this time, this is what our plans are, and this is what it is going to cost." And they can get grant money; it will be paid for from the federal government, I believe. That's JTPA, Job Training Partnership Act. I was amazed to hear there's that much for these people down there. Our goal, as I said, was 100-percent re-employment is what we're looking for. I think there will be a good chance it's going to happen.

Another thing Don worked up is he has a transition committee. People from hourly to salary kind of representing different groups of people. Sat and discussed, What do you want to do? What services do you want Homestake to provide for you,

basically, during this layoff period? And then these guys also served as the kind of communications link with everybody around the place. So everything has worked out well. It has worked smoothly. People, I think, are feeling they're being treated fairly. You always have the angry ones. You know, "Why me?" You have a lot of people, still, who I don't think believe the layoffs are happening. Some out there. There got to be. So it's been an interesting time.

Swent: But your ultimate close-down won't be for another--what? Eight years?

Purtell: Well, yes, till about 2003, 2004, something like that.

Swent: So that's a ways off.

Purtell: A ways off. And that will be about 110 to 120 employees who will be here until that time.

Swent: Do you think you will stay that long?

Purtell: I don't think I'll stay that long [laughs]. This is the longest place I've been anywhere in my life. Eleven years in one place.

Swent: Eleven years here.

Purtell: Eleven years here. So it's been a long time. Never expected to be here. I got here when they put the first ton of ore in the crusher. I saw the first autoclave roll in the building, and I thought, I'll be here five years and go on and do something different. And I'm still here, eleven years later. Doing this. Shutting down another mine!

### The Purtell Family

Swent: And Sharon is working.

Purtell: Yes. She got a job. "She got a job." She earned it. She went to dental hygiene school. She dropped her licenses when she went from Arizona to New Mexico; she dropped them. When she came to California you have to be licensed, anyway, here, so it took her about a year. Make-up classes for a period of time. Continuing education. She had to make up all those classes, all those credits.

Swent: Was she able to do that at the local college here?

Purtell: No. She had to go to Sacramento and San Francisco to do that. And then two times at the board to get her license, but she got it. And has been working for about a year, down in Kelseyville. At the only dentist in town. It's hard to tell if she would want to leave, either, right now. I've got a son, Tom, who is fifteen. He's a freshman in high school. Of course, there's no way. All his buddies are here. Wouldn't want to go anywhere.

Swent: He's at Kelseyville High?

Purtell: Kelseyville High. And my youngest one just turned nine. Never been anywhere else.

Swent: What's his name?

Purtell: Justin. He doesn't want to go anywhere. All he knows is California. "Why would you want to go anywhere else?" Even though he has traveled some, but still, he doesn't want to leave. And there's things. We drove through Eureka, Nevada, and my wife turned her nose up. "How can anybody live here?" She said the same thing about Creede [chuckles].

Swent: Eureka is more like another Grants, though.

Purtell: It's different.

Swent: It's not as pretty as Creede.

Purtell: No, no. It doesn't have the quaintness of the town, like Creede had.

Swent: We haven't mentioned your children. Tina is your oldest and only daughter.

Purtell: She's the oldest and only. Twenty-one years old right now.

Swent: And she's back here, living in Kelseyville.

Purtell: Yes. She's back, in Kelseyville. She went to Albuquerque for a while, lived there for less than a year, gave up there, came back here, and went back to school, and she has been off and on taking courses at Mendocino College. She's actually pretty close to an associate's degree, so she's been working pretty diligently.

Swent: Where is Mendocino?

Purtell: It's got a branch in Lakeport. The main college, itself, is in Ukiah.

Swent: But she's at the Lakeport branch.

Purtell: At the Lakeport branch.

Swent: And your second is--

Purtell: The second one is Eric. He's about twenty, and he's bumming [chuckles] in Sacramento right now. Actually, he's working.

Swent: "Finding himself," I think.

Purtell: He is. That's a good phrase. He's finding himself. Steady work. He has worked as a temp in a furniture factory, but he knows he doesn't want to do that. He'll be going back to school, I'm pretty sure, here, pretty soon. And there's Tom, freshman in high school. Skate-boarder. And Justin, the youngest.

Swent: And you live in Kelseyville, which is about twenty miles from here?

Purtell: All I know is in time. About forty minutes from here.

Swent: Forty minutes. Nice little town.

Purtell: Not bad. Small. After living in the small towns now, I don't think we'd ever go back to a big town. It's interesting. Have trouble when you go to the big cities any more. All the noise and the commotion. All of seven stop lights in the whole county of Lake.

Swent: One of which had to be installed because of the mine.

Purtell: Of course. We had to put it in [laughs].

Swent: Maybe they'll take it out when the mine goes.

Purtell: I don't know.

Swent: I don't think so.

Purtell: The whole place is getting bigger now.

Swent: Yes. Lower Lake actually looks much more prosperous now than it did even a couple of years ago.

Purtell: It's growing. Yes, it's growing pretty good. I think it's getting ready to really go. It's just the start. It's going to happen. They're going to get some things going. About the time

we're winding down, I'd say. Don Field was just at a what do they call it? BORT is the term. B-O-R-T. Business Outreach Team I think is what it is. He was at that meeting this morning to talk about the shutdown, and he said the three people in front of him got up and talked about all the things that are going to flourish in the county. And he got up and talked about how Homestake Mine is winding down in the community, so that was kind of a letdown, but in the end, we've actually helped, I think, a link between the really bad times and helped the community prosper up till now. And they're going to move ahead. We'll still be here. I mean, it's not that we're going away, but we won't be here as big, I think. And that's kind of the disappointment in its own right.

#### Maintaining the Morgan Valley Road

Swent: Yes. Now tell me just briefly about this highway out here that has been slipping for years, and it looks as if they really put in a major highway at this point. It's about five miles west of here?

Purtell: Yes. There are two different areas where the road has been giving way. The first area, closest to the mine. Actually, the first time it slid was in 1986, when we had the heavy rains at that time. A section of it dropped out. Actually took out a lane and a half. I was driving down the hill. This was on a Saturday. I had come up and done some drawings and went down and saw the road going. So got hold of the mine, and they got two of the big loaders from the mine, and they went down and just cut the side of the mountain out to allow traffic up and down the hill right there. Then the county paved it over. That was the end of that story.

And then in 1994, I think it was, the section closest to town started to slide, and it has moved, just creped, and they kept paving over it for a while, and it finally, in 1995, the rains in January 1995, it really went down.

Swent: That was the end of that.

Purtell: It dropped out. Really. So they kept it, moving a lane of traffic, anyway, through that area for a while, until they did this fix on it. This upper section then started to slide again. The closest to us started to slide again. They tried to work with it and realized it's going to keep on going, so they took the road and cut it up on top of the hill.

Swent: Actually re-engineered it.

Purtell: Yes. Relocated the whole road. And hopefully it will stay up there. But you look in the areas where they've cut the sides of the hill, it's already starting to slide, so it's--some of us, I guess from out of California, always figure that everything in California wants to go to the beach. And that includes the roadside. And that's happening right now. It's sliding to the beach.

Swent: Homestake built the road or had to build it first?

Purtell: We built it, yes. We built the--

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Swent: We were just talking about the road that goes from Lower Lake out to the mine. There have been continuing problems with it.

Purtell: Yes. Originally, we built it. We had to upgrade the road from Lower Lake to about seven miles out, and then build the road from that point to the mine, so the rest was all done by us. The original intent was to build it to county specifications and then turn it over to the county for them to maintain and take care of from that time on. They did a lot of foot dragging early on.

And we ended up, after three years, the first three years, I believe, we were doing most of the maintenance work on it. We made an agreement with Lake County on their side that for five years they would spend at least \$3,500 per mile on maintenance, and anything above that we would have to spend. Or we would reimburse them 50 percent of anything above that amount along the road. So the first time, the big road thing that we had was the slide down below. We ended up paying for part of it, and that was the very last year of the agreement [chuckles]. We had to finally pay on it. The agreement expired last year, so this work they're doing down there right now is being done on their account, I guess is how you'd say it, to their account.

It turns out that they can get some money from FEMA, the Federal Emergency Management Act, I think it was, from the flood. It came from floods. Immense rains and everything else. So they wrote them up as a flood damage.

Swent: That was probably legitimate.

Purtell: Yes. It was a way to get 100 percent of the money, and I think they wrote up the claims, but the budget being not approved from the federal level, they wouldn't release the funds. But there's

a window in time, I think six months from the time the claim is opened to the time the damage is repaired, they will pay up to 100 percent of that, if you do it in that window of time. Well, the federal budget wasn't approved about half a month after we got the claim opened, and the monies were released, finally, about two months before the project should have been completed. But they didn't change the time. This six-month timeframe didn't get moved up from when the budget was approved then. So they had two months to finish this work. There was no way they could do it. So what they ended up--they were reimbursed 88.5 percent, some oddball number like that. And they asked us if we could help them, so this next Tuesday, I think, June 4, I'm going to go down to the board of supervisors and give them a check for \$60,000. That's 50 percent of the cost that's not covered by the FEMA damage claim, so we're still part of the community. Still helping them fix the road. But we'll definitely have a statement in there that this is not to be the usual [chuckles]. We're not to be fixing that road all the time.

That's one of the things about being in a rural community, though. When you figure in the city the number of people per mile that pay taxes on fixing roads and streets and stuff, it's so much greater than out here in the rural areas. You've got these miles and miles of road with three or four people living in those few miles. But those roads have to be upgraded and maintained for everybody, so they do have a problem. I understand the plight, so that's why we're helping them out in this one. It's part of being a good neighbor. Part of the community. Helping out when we can. While we're still making some money, we'll help them out. Next year we won't be making as much money. We'll have to see. It will be a little harder every year.

Swent: Have there been accidents on the road there?

Purtell: Oh, we've had some. Don't know if there's even been a fatality. We've had some. Well, there might have been one. A truck driver, I think. Early days. Took a turn too fast and flipped his truck. But we've had some. Off-the-road. And weekenders. You see traces of accidents sometimes when you come up to work on Mondays. All in all, it's not too bad.

Swent: It's a nice road.

Purtell: We had a problem in the last year crop up. A lot of our employees have driven the road for years, and they decided they wanted to get home fast. They start passing on the double yellow line. We've got a lot of that going on, so we ended up saying that Homestake still claims that that road has to be safe, and if

an employee's license number shows up on somebody's desk twice, they'll get written up for safety violation. That stirred up a lot of brouhaha in the area. But we held to our guns, and people have quit passing on double yellows, and we don't hardly ever see a license plate number any more or unsafe driving. It seems to have straightened itself out, anyway, so far.

Swent: Who was reporting the license numbers?

Purtell: Other employees. If it was a person up in the area, a local, I guess, in the area, we would act on it, too. But mostly it was our own employees. They all come up at the same time. Some people were doing it all the time, so we knew pretty much--it wasn't too long before we knew who we had to slow down, so it has worked out pretty well.

Swent: And you're still running your tours.

Purtell: Yes. Don't know how long we can do that because there's really no pit to see. Two times a week, Fridays and Saturdays, we have local tours from out of the Lake Chamber of Commerce. And Marion Onstad, who used to be the secretary here, has since retired, does the tours for us. This time of the year I think I've seen four school buses up here already this last week, so everybody is on their field trips. We're getting a lot of them that come up here. We had one school that couldn't afford it. They had been doing some work on mining. I think they spent three or four months, a project, on mining. And one of the girl's kid goes to the school and said they couldn't afford the field trip, so we paid for the bus. They'll be up here next week for their tour, so they have a field trip, anyway. We help them out where we can.

Swent: Well, I think we've covered all of my major questions, Pat. You've done a great job! I must say, this has been a heroic effort on your part.

Purtell: My voice is still holding up.

Swent: Yes. Is there any more you'd like to say about your own management style? You've pretty well covered, I think, the differences that you might have made.

Purtell: Yes. Each manager is different. Mine is more getting out and about. Don't write memos hardly at all, where a lot of other people wrote a lot of memos. I don't do that. It's not my style in its own right.

Swent: Have you continued the meetings?

Purtell: The round-table? Yes. About every other month we have a round-table meeting, and the employees get a chance to talk to the manager, face to face. We still do that. It's productive. You know, when they hear the answer straightforward, straight out, it makes more impact than to hear it written in the newspaper somewhere, a little article.

Swent: How many employees do you have as of right now?

Purtell: Right now we have three hundred and four, I think. Three hundred forty-five, I think, was the top, say, in the last three or four years. It's been about three hundred and forty-five employees. It's about three hundred and four now.

Swent: And after July you'll have?

Purtell: A hundred and ten, a hundred and twenty.

Swent: A big drop.

Purtell: Yes. Somewhere in that range. We know we can consolidate some stuff, get a little more efficient in some of the things we're doing. There are still so many things. That's probably the hard part. How many people do you keep? There are so many new regulations and old regulations and permit conditions that you have to meet that you have to have people. Like, our environmental department is going to stay pretty much at four people for, really, in essence, a small mine. We've cut back on our water sampling and a lot of our other sampling in the area, but there are new hazardous materials requirements, and stuff we need to do now, that we need these people.

We have a water treatment facility for drinking water and stuff in here, and we have to have a licensed operator to run it. We've got to keep him on the staff [chuckles]! So you end up with--I won't say extra people. In some ways they would be extra. In old days they would be extra. Right now, there's just so many regulations and requirements that we have to--record-keeping on OSHA. CAL-OSHA also monitors us. So those two groups require and demand more and more record-keeping.

Swent: Yes. I think we're all snowed under by the records.

Purtell: So that makes a difference on who you have to keep. And that was some of the selection, especially in the admin[istration] areas. Which people do you keep? Which ones have been trained to do what? And cross-trained where? Who knows how to keep what records? You know, that was part of the drawn-out procedure, was figuring out those people.

Swent: You have a lot of people here that have been here a long time. Georgia and Debbie. They've been here a long time.

Purtell: Yes. Most of the time. Georgia, I think, was before startup, I believe.

Swent: That's Georgia McAllister and Debbie Aber.

Purtell: Yes, it's interesting how many people now, you start looking around, have been here ten years and eleven years, twelve years.

Swent: And they'll probably stay on until--

Purtell: Most of them, yes. Georgia didn't make the cut. Extra person.

Swent: But she's from here, isn't she?

Purtell: Yes.

Swent: So she'll probably stay.

Purtell: Oh, I don't think she will go anywhere out of Lake County. But everybody knows who didn't make it. They all know. So continue from there. We'll always look again. As we go along, get more efficient, I'm sure there will be a few more, a trickle out here and there, but a little different philosophy than my boss. His philosophy is cut it to the bone and add beef back. I'm looking at let's cut it almost to the bone, and if we have to cut a little bit more meat, we will, or add a little more meat, we will. But split that hair a little bit more.

Swent: Who is your boss?

Purtell: Gil Leathley. He's the VP-Operations now.

Swent: He's a Britisher, isn't he?

Purtell: Scotsman. He's been around a lot of places.

Swent: Would you do anything differently if you had it to do over?

Purtell: I would build the autoclaves different to start with [laughs]. But I learned how, so that's not fair.

Swent: You would build them the way they are now?

Purtell: Yes, I think so. There would be some different things done. All in all, I don't really see anything. This is one of the best-run of any of the Homestake operations that I've been in. The best

one I've seen. Be in and operate within. A great bunch of people. Always have been. It's been a real pleasure working here.

Swent: You're going to miss that nice drive.

Purtell: I don't know [laughs].

Swent: I suppose it isn't quite so thrilling if you do it every day, but I certainly enjoy it.

Purtell: It's in the dark for me every morning.

Swent: Oh, yes. It's nice country up here, though.

Purtell: Yes. I wouldn't mind getting back to the Southwest. I enjoy the high mountains, the Rocky Mountain-type atmosphere. I like that. Someday we might have a mine there. And I'll raise my hand again.

Swent: Dig out Creede again?

Purtell: Sure. Let's go at it again. We'll make it work. Some of the interesting things--right at the end of the Creede life, just before I started coming out here, we were doing some tests on it. We knew the price of silver wasn't going to come up, and we were trying to figure out a way to get the processing cost and everything down. And we had it down. I think silver was at \$5.85 per ounce. Our costs were, like, \$10 an ounce at the time. Grade had really dropped, and we were having trouble. So a couple of metallurgists got together over there. Rich Bohling, and Ken Skiff was actually there, too. He's in Lead right now. They started working on a way to try and--let's see. Let's just ship the silver out and forget this lead and the zinc and everything else. There's got to be a way we can get it down. So they decided, let's see if we can just leach the silver out, cyanide, leach the silver out of the concentrate. In one pass, they figured well, if we do this and we have to add a little bit of capital over here, it will cost us maybe a little over seven dollars an ounce to produce it, instead of ten. So in one week they dropped three bucks an ounce off the production cost. And two weeks later, it was shut down [laughs]. So we never got to really go for it at that rate. It would have been interesting to go at it and, all right, let's make a few more steps, improve that little bit of leaching recovery or something to get that up. Maybe we could have gotten it down to close to the \$5.85 range, where they might have survived.

- Swent: And of course that's one of the big arguments against this intensive reclamation. If the economics changed, somebody might want to go in there and reopen that mine, and maybe it's impossible now.
- Purtell: It would be tough to get into it.
- Swent: What is the mine--when you're coming out here, the first little valley that you go through?
- Purtell: It's called the Baker Mine. That was an old quicksilver mine. We were down there last year doing some exploration, trying to find out if there might not be another ore body down there [laughs]. Wasn't.
- Swent: And this Reiff Canyon Road. That goes on over to Rumsey, over to Davis Creek?
- Purtell: Yes. It goes over, across the dam. I haven't been down in a while. We've had some rains. I wouldn't try it, I don't think. It's one time they usually blade it. That's right, like, in March.
- Swent: I wouldn't dare do it in my car then.
- Purtell: I wouldn't now, because we've had some heavy rain since then, and I bet it would be a bog hole.
- Swent: Some day perhaps I'll try it. There's a road through Cache Creek.
- Purtell: It comes out. The one to ask is Ray. He knows. He used it, to break the monotony of the drive to Sacramento to here in the early days.
- Swent: He knows all the ways to go.
- Purtell: He used to go that way every once in a while, so he knows where it comes out down in Rumsey, too.
- Swent: I'd love to try that, but I don't want to do it in a good car.
- Purtell: That probably wouldn't be a good idea.
- Swent: Okay. Well, I guess that's enough, isn't it?
- Purtell: I hope so.

## VI A SHUTDOWN THAT IS PARTLY A STARTUP

[Interview 2: October 24, 1997] ##

The Administration Office Moved to the Grinding Area

Swent: We covered a lot of things in our first interview, but there are some things I thought we needed to pick up. You have moved.

Purtell: Yes, we did. We moved everything.

Swent: Everybody and everything. We're in a different office now. This building is down at the mine, rather than up at the mill, and I was puzzled by that move. Why did you move?

Purtell: It turns out we needed to consolidate everybody more than anything else. Actually, a couple of reasons. Partly to get everybody in one building. That way it eased communications. Probably the most activity that we're doing is all related to the grinding area now, get it out of the stockpile into the grinding circuit. That's the real important part. So if you have everybody in the grinding area, you have a better chance of success in making that work. So we moved everybody. Some maintenance people and a few operations people stay up in the process area, but everybody else is down here.

Swent: Let's just get this straight. The process area is five miles away.

Purtell: Five miles away. That's in Lake County. This office, which is now the new administration building, used to be the old truck shop. It still is used as truck maintenance, but mostly now it is the new administration building also. So all of our environmental group is here, HR [human resources] is here, administration, administrative manager, buyers are downstairs. We changed the warehouse that was in the process area. We installed a truck ramp down here and now unload all of our stuff.

All of our materials are received in Napa County instead of Lake County.

So we moved a lot of things. Actually, the physical warehouse--most of the parts were stored in the process warehouse; they are now in two converted truck bays down at the truck shop, so the main warehouse is now in this building also.

Swent: What kinds of things do you have in the warehouse?

Purtell: Electric motors, parts for the grinding circuits, parts for the Geho pumps that pump slurry up to process. A lot of those in there. We store a flocculant we use in the thickeners for settling the slurry. It is now stored downstairs. It used to be stored in a building in the process area. It was trucked down here as needed. Now we use it all down here exclusively, so it's all in this area. Nuts and bolts, valves, everything we need that goes on to run a business. The majority is needed down here now, so that's where it is.

Swent: And all your paperwork is done here.

Purtell: Right. The lab stayed in its location because you can't move all that equipment, so they're doing their work up there, and we're all tied together with the computer system, so they do their analysis, do their assays up there and put them on a sheet of paper, and they all get sent down by e-mail to everybody that needs them, so they're like they're next door. They're the only ones that really stayed in place. Everybody else pretty well moved down here with us. The maintenance management is down here, operations management, all down here. Plus all the administration of the mine, period, is all here.

Swent: Who made that decision?

Purtell: It was Gil Leathley who kind of pushed the issue a little bit, but in the end I knew it was needed. When we had the operations before, we were spread out everywhere, communications with a lot of people--especially, like, the environmental group was in a building kind of in the middle of nowhere, no man's land, and to get together with them was a difficult chore. So we now have an environmental manager actually right next door, and the two technicians are all in this building, so we're all together now. It does make communications a lot better. Because we are smaller, we're doing more things together.

For instance, our environmental engineer is actually a geologist, was a geologist, and is now an environmental engineer.

Swent: Dean Enderlin?

Purtell: Dean Enderlin. He's also very adept at taking care of computers, so if someone's computer crashes we can send him to go fix a computer. He can go up to the stockpile and identify material we're pulling out of the stockpile because there's not too many who know what to look for because we're millers, not miners, so we use him for that. Versatile people. And that's what we need.

John Mack, who is the administrative manager, also this summer his job was reclamation. He's a mining engineer by background, so I figure if he knows how to move dirt, then he can reclaim it, too, so he was in charge of the contractor that did about almost \$800,000 worth of reclamation this year.

Utilizing more of our talents, everybody, by having us together. It makes a big difference.

Swent: Well, I'm glad to have that clarified because I thought when you stopped mining and continued processing that the center of things would be up there at the processing plant, and I was mystified by this move down here.

Purtell: The process area up there was more autoclave-driven. I can see why they had a lot of the management up there because I think in the early days it was going to be the autoclaves were going to be the tough things to operate, and we needed to be on top of them. Well, they were a money sink. A lot of the money went in operations.

Swent: They were a money what?

Purtell: Money sink. You spent a lot of money to operate autoclaves. It was upwards of \$10 to \$12 a ton extra to operate an autoclave, so it's expensive. And they were a new technology, so that's where they put it. Now, the focus is at this end, so we might as well move them down to where the focus is. Our money is mostly being spent in the grinding area, pretty much, right now. Up in the process area, really, other than the refinery, it consists of a bunch of tanks stirring up mud, where we add the cyanide.

#### Grinding is Critical to the Operation

Swent: What is the trick in the grinding?

Purtell: Grinding is material-intensive. Getting it into the circuit, grinding it fine enough to pump it; the other part is the pumping part of it.

Swent: And that's here also?

Purtell: It's also here. We pump it from the grinding area to the process area; the slurry that has the gold in it. To make our tons, to make tonnages that we've budgeted, we need to make sure and get the densities out of the thickeners, the grinders can grind it enough, grind enough of the tonnage so Geho pumps can pump enough of it. Those are the critical issues now. Getting it up to the tanks right now. If they just pump it to the tanks, the tanks will take care of it. So it's all at this end now, the grinding end. It's really the critical part.

#### Modifying the Crushing Circuit for Higher Capacity

Purtell: We're doing some modifications on the crushing circuit right now, trying--because our tonnages are increasing, which is something that, I think, you'll see in almost any mine if you--especially in our condition. Our grade is fixed. Whatever is there is there; do we want to run it? If it doesn't hurt your recovery too much, you just run as much as you can, so that's what we're trying to do right now. At one time, we started out with a budget of--when we had autoclaves and a lower-grade circuit, it was about 6,400 tons a day. We increased it to 7,000 tons a day when we went to just the lower-grade material that we're running right now in the stockpile. And right now, in most of the months now, we're averaging closer to 7,400 to 7,600 tons a day. And that's the push. It's to get as high as we can.

Our crushing circuit was getting to be costly because we were having to run extra shifts that we didn't think we needed to crush the tonnage we needed to keep the grinders going, so what we've done is we're putting in a single stacker to take care of two smaller ones. We know our crusher can crush more tons.

Swent: Single stacker.

Purtell: The belts now--past the crusher, after the crusher crushes it out, it goes out to the stacker, where the belts are forty-two inches wide, and they can only handle about 1,000 tons an hour, so that holds us to that tonnage. Well, now we're putting in a larger stacker that has a sixty-inch belt. We think 2,000 tons an hour is more realistic. That allows us to crush a lot more

tons faster, help us on our manpower costs. Also, just efficiencies of doing it at the higher rates make a difference. So that's helping us.

And from there, that point, we're also looking at going in and modifying all our air permits. The original permits we were permitted was for 8,000 tons per day, and it has actually turned out to be a cap for us. We cannot run more than 8,000 tons a day without being in violation of our permit, the air permit. Strictly dust. It was a dust-control matter. But it got woven into almost every other permit we have. The air permit in Lake County, for every ton you put in you put in so much cyanide, you might devolve HCN into the air, so it's all limited on the tonnages that we can process.

We know we can probably process more than 8,000 tons a day in our grinding circuits, but there's a cap right now. We're trying to work to get that raised so we can go with much higher tonnages. It makes more sense to run faster, higher tons. Originally, we thought if you ran more than 7,000 or 7,200 tons a day, the recovery of gold would drop off dramatically. A lot of the lab tests showed that it might do that, depending on the ores we had in the stockpiles. Now they're running in the mills, and things are really going--7,600 tons per day. A small drop on recovery, maybe half a percent, but it's not enough to offset the more tonnage that goes through the mill, so that's what we're doing right now, is economical balance between running more tons and recovering more gold.

Swent: Part of this is because of the fall in the price of gold.

Purtell: Well, yes. It always gets to the saying I've always had. If you're in the mining industry, if the price of your commodity drops, you run more tons; if the price goes up, you run more tons. I mean, just run more tons. It makes more sense. For us here, it really makes some sense, too, because if we can run--All the tons in the stockpile all have to be run through--Because it's for reclamation purposes, if nothing else. If we don't run them through the mill, they'll have to be put back in the pit because the stockpiles weren't put together like the waste dumps were, where we have a control of acid drainage and everything, so all that would have to be moved into the pit, so we're going to run those tons.

Now, if we can increase our tonnage to, say, 7,700, 7,800 tons per day, that would cut a couple of months or three months off the end of the mine life and processing would end three months earlier. That's probably worth close to \$6 million to the company. You don't spend those \$6 million in those latter years.

You spend a little bit more by running the higher tons, but it's not anywhere near the \$6 million, say, at the end of the mine life. So that makes sense, too.

A mine that has an open-ended ore body that's going to go and go and go, those you're going to run--you maximize your through-puts because that makes most economical sense to do that. If that means increasing your tons, increasing, increasing, you want to do that. If the price drops, you need more product; it helps the cost; you sell more product. If the price is high, you want to sell more product, so it all comes together [chuckles]. Simplified Economics 101.

Swent: Right!

This stuff that I see out there at the end of the building, those great big piles.

Purtell: Big stockpiles, yes.

#### Mining the Stockpiles for Maximum Tonnage and Recovery

Swent: Right. Have they been ground?

Purtell: No. That's just 14 million tons of ore that has been dug out of the ground and put in a pile. Kind of segregated by grade, by lower-grade and higher-grade material. We kind of have an idea where--what we're trying to do now is trying to run as much of the higher-grade, all of the high-grade material we want to run out now first. That's the other part of the economics. You run your higher grades first, get your money back faster, et cetera. So we're doing that right now. We have an idea of where it is. All we've got is some old fly-over maps and isometric drawings and stuff from the early days that show kind of where we are, and that's all we have to run off of. But it's all--you have a question.

Swent: I'm confused. "Where you are." What do you mean?

Purtell: By running the higher grades. The stockpiles were built over years, trying to segregate grades. So what we try to do is make sure that we're running higher-grade material now, and we spent a lot of time and effort trying to put them in the stockpile in a certain way so we want to run them that way.

Swent: So now you need to know which pile is which.

From Homestake Mining Company's  
1997 Progress Report

Production at the *McLaughlin mine* in northern California decreased to 118,500 ounces during 1997 from 185,500 ounces during 1996 and 241,800 ounces during 1995. In June 1996, mining operations were completed and the autoclaves were shut down as the orebody was depleted. Through 2003, lower-grade stockpiled ore will be processed through a conventional carbon-in-pulp circuit. The effect of the decrease in production on unit operating costs largely has been offset by a reduction in expenditures. Total cash costs in 1997 were \$254 per ounce compared to \$250 per ounce in 1996 and \$242 per ounce in 1995.

Purtell: Yes. Maps. And the other thing that we do also is we have this budget that we present to the board and to the big boys up there and say, "We're going to try to produce so many ounces every month for you." By being able to predict that, that helps them in their costs and analysis that they're doing on the mines, too. So we say, "We're going to produce 10,000 ounces during a month, and we want to be able to be sure to run the right grade material to get those 10,000 ounces."

This last month we've been having trouble. We've run into-- It's in the range of the higher-grade materials, but it's at the very low end of it, .068 ounces per ton. We're running hard, but we're not going to make our budget.

Swent: Point 0?

Purtell: Point 068. We try and run more of it. That's another reason. If your grade isn't what you predicted--We predicted that our grade for the month would be .075, and it's .068 right now, so you think, well, if you run a whole lot more tons, you might be able to make up that difference in the grade and still make your 10,000 ounces for the month. We can't do that. There's no way we can catch up with that. We're still going to run hard. So the idea is to try and stay on the higher-grade material.

Swent: Are you working three shifts, around the clock?

Purtell: The mining--reclaiming the stockpiles, which is our mining these days, they run the trucks two shifts a day, and then we have a loader that loads ore off the pad to the crusher on the graveyard shift. That's one of the things, by adding the stacker we're trying to eliminate, is that graveyard shift. We think we might be able to crush just two ten-hour shifts a day, four days a week. We're going to activate our hydraulic shovel, the O and K.

Swent: The what?

Purtell: The O and K. It's a German shovel. It can load, easily load 2,000 tons an hour, and if we get enough trucks to go with it, it will load it and take it down to the crusher. So the idea is to run really efficiently for ten hours and we'll do that in four days, and everything else will shut down, and you're not spending money on crushing anymore, and so you're done for the day.

That's kind of what our plans are right now is to try to forge ahead that way. We're working toward that. Recently, we looked at contract mining. We asked for bids. The jury is still out whether we're going to go to a contract miner or not, but

contractors sometimes can haul material cheaper than you can do it yourself, so we're looking at that right now.

Swent: Haul it?

Purtell: Haul it from the stockpile to our crusher. Our own fleet wouldn't do it. We'd let somebody else do it, and we would just sell our equipment and let them do it. The jury is still out.

Swent: Has the move from one county to another made a difference?

Purtell: Not really. It hasn't made much.

Swent: Your permits were not affected?

Purtell: No. Each county has its own permits anyway, so that didn't bother us at all. A quandary we had at first was we moved down here and the post office was concerned because there's no postal address at this location. So we said, "Just keep delivering our mail to Lake County, and we'll be okay." So that's continued to be delivered up there, and we pick our mail up at the guard post, at Post 1. Whenever a truck goes through and the mail is there, they deliver it [chuckles].

Swent: Has it made a difference in taxes?

Purtell: No.

Swent: The tax revenues for each county didn't change?

Purtell: No. The taxes are based on number of ounces in the ground, number of ore ounces in the stockpile right now, so we've gone through a re-evaluation basically of the tax rate we have right now. It has dropped off every year because the ounces that are available for processing have dropped. It's kind of like assessed value of the land with the gold in it. Well, now we've got it in the stockpiles, it's no longer in the ground, there's a difference in how we wrote it up.

Swent: I'm thinking if there was some sort of payroll tax that the payroll had been in Lake County and was now in Napa County.

Purtell: I don't think so. I don't think we made a change in that at all. You have to ask John Mack for sure.

Swent: How did your employees feel about moving?

Purtell: Most of the guys really didn't have to do too much moving. The managers: they all dug their heels in. "Don't want to do it. I

like my office here. I don't want to do that. It's awful hard working down there." But now that they've done it, I think everybody agrees that it was the thing to do. It has worked out. They've got a nice, new, painted office. Some who didn't have windows, they now have windows. So it worked out pretty well.

Swent: You kept the corner office.

Purtell: I had to make it big enough for me, though. I had to be in a bigger office for the general manager [laughter]. This was the biggest one. It's convenient. They convinced me I needed to put carpet on the floor. I wasn't going to do it because it just gets too dirty, but no, no, no. It's the general manager's office. You get carpet on the floor. So we did that.

Swent: They think it makes a difference?

Purtell: Oh, yes. It looks pretty good. It turned out pretty good.

#### The Former Office Becomes an Archive Center

Swent: That clarifies it for me. I was puzzled by that move.

Purtell: It's a nice building sitting up there, but that building--what we're doing with it right now--it's interesting. One of the things as the mine shuts down, a lot of them find out is what do I do with all this paper? I've got all these land documents, I've got all these historical papers. The thing we're doing is we kind of picked some of these bigger offices up in the other building and labeled them as an archive office. I think the old accounting area, which was the biggest one, is the mine archives; and anything with mining or geology you put together that are no longer being used, we put those in files up there.

We also put a computer up there because some of those drawings that we have in that computer, the maps that we used in the stockpiles, are still there, so we can still put out--we have a printer that we can print out the big maps and show us what we're doing. So we made that an archive area.

I think Ray Krauss's old office is going to be the environmental archive room. The metallurgical type archives are in the old mill manager's office. So we're trying to segregate things into different areas. Since it's going to be used by the

U of C [University of California] system<sup>1</sup> anyway as a study area, we figured it would be a good job for some college students through their lifetimes to try to figure out what to do with all those files and make sense out of them after they're all put in those buildings.

But for us to try and sort through all of it--what should we keep and what should we not--it's difficult to do anyway, but now it's going to be a study area, so--this is what happened at this place. The history is all going to be in that building up there. So we'll keep it all there. We're not throwing anything out.

Swent: That is UC at Davis.

Purtell: That will be the lead.

Swent: Have they sent anybody in yet? Are they in here studying at all?

Purtell: Oh, yes, some. On the outlying areas. We don't want them to come in and work on areas where we're still operating.

Swent: No. Of course not.

Purtell: But there's some of that with the McLaughlin Reserve, the serpentine reserves. We had some biologists come in and--is it the entomologists that's the bugs, insects?

Swent: Yes.

Purtell: They were out looking at the ground during springtime, especially. What different kinds of plants were in those areas. So we've had some studying going on in those areas. Of course, Davis Creek has been a long-going study since it was built. They still have some people looking at the lake down there. But beyond that, everything else, there's too much activity going on. Don't want too many people in the area.

[tape interruption]

Swent: We were looking at our notes, and I see that record retention is one of the items here.

Purtell: It's down at the bottom, yes.

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<sup>1</sup>The Donald and Sylvia McLaughlin Natural Reserve, part of the UC Natural Reserve System, managed by UC Davis.

Swent: So we've talked about that pretty well. I'm glad to know that you are doing that. Did you finish the South Pit?

Purtell: I'd say we did, yes.

The South Pit Finished with a Backhoe in High-grade Ore

Swent: When we interviewed last time, you were saying you really wanted to finish the South Pit.

Purtell: We did it. We did. We got to--I think the 1,260 elevation was the elevation at the bottom. It was a slot in the ground that was so narrow it was almost hard to get a haul truck back down there to fill it up, but we actually were able to make it big enough for the shovel to finish up. The last day of mining was done with a backhoe in a high-grade vein. That was the end of it. Within a week's time we started to see--well, we turned off the big pumps and in a week's time water started to flow. Ground water started to well up in the bottom of the pit. Yes, we did it. I wasn't sure.

There was a pit-wall slide in a few places, and it was getting awful deep, and steep walls. It was actually kind of eerie down at the bottom. When all the equipment finally left and you stand at the bottom of this pit, it was pretty eerie. And kind of nerve-wracking when you hear rocks raveling down the walls here and there. So you didn't spend too much time there [chuckles].

Swent: No.

Purtell: Yes, we did [finish it]. That was a good accomplishment, to get there.

Swent: In a high-grade vein.

Purtell: High-grade vein. Backhoe digging in a high-grade vein. As high as we could get. It was great [chuckles]. So that was good. The last ore that was hauled out. And it was pretty much on time. I think we looked at when the mining itself was going to end. It was right at the end of June, like we predicted. A lot of the employees--and we did keep them in some of the reclamation work around the mine for a period of time after that, so actually all the way into September, I think, even in October of that year we had some employees that were still here. As they were finding work, they were leaving, but we had three or four dozer operators

toward the end of the life there. Did some of the touch-up work on the clay capping.

Swent: How many employees do you have now?

Purtell: Right now we have 115. We have ten people on the ore haul crew. We call it the ore hauling crew, but in essence they are mining there, picking ore up off the ground in a logical sequence and bringing it to the crushers. It's mining in its own right. They are using the haul trucks. We just two weeks ago got the O and K shovel back in shape again. We did a lot of maintenance work on it. We felt it would load better than the 992 shovels. The 992 loaders that we had, the Cat[erpillar Company] loaders, were trying to work in the stockpile, and the material had been sitting there for years in places and actually started to compact so hard that it was getting difficult for the loader to dig. The O and K has got much better breakout force and can dig it without any trouble, so it does pretty well.

So we're going to go back--besides the higher tonnage rate, the Caterpillar 992, the ones we have, maybe twelve to fifteen hundred tons an hour is all they can load, with a short move, but the O and K can do much better.

#### The Team Organization Holds Up

Swent: I was wondering if your team organization was holding up.

Purtell: Yes, it's still real teamwork. There are some informal reporting lines that we never tied up. Royce Smith, our operations superintendent, is on his way to Lead now, as we mentioned earlier. That left kind of a gap. I have a general foreman and an operations woman reporting to me. There was another foreman, operating foreman, similar to general foreman, refinery foreman, Gary Lappin, who was watching the process end. We had Blaine Olson, chief metallurgist, up at the other end also, in the lab. Well, those guys, Gary and Blaine, they worked together to keep the process area going, to make sure the recovery is right and there's enough carbon in the tanks and everything else, along with Mary Soderstrom. She's a metallurgist also, so they work together. The whole thing is a real good team effort. Everybody knows what they have to do, and it's holding together really well.

And the maintenance and operations are working well together. That has always been fairly strong here, on the

process side for sure. And they're doing a really good job to pull it all together.

A Remarkably Good Safety Record During Shutdown

Swent: Has your safety record held up?

Purtell: Yes, we've done pretty good. That's still, you know, kind of a thing of pride. Even through the layoff time, we had--I think we had six lost-time injuries on there. Two for sure were true-to-life lost-time injuries; the rest of them--the other four were individuals--that thought it was time to go on workman's comp. They had back problems and everything else, and they went that way. But we took them as lost-time injuries. Since the shutdown of the mine and into the summer, we've had one lost-time injury since then. And it was a minor one. But it was a lost-time. Other than that, it has pretty well held together.

The problem, I think, during that period--I don't know if I mentioned it--a morale problem in a lot of ways when, right during the period of time that we were looking at the shutdown coming up, the employees, especially in the process end, that were going to stay didn't really know what their jobs were going to be at that time. We couldn't really tell them until we got everything well organized. So we had a lot of people that knew they weren't going to have a job, and the other people that were going to stay didn't know what their job was going to be.

So it was a period of turmoil, and it's hard to keep people focused on safety and working well and everything else. That was a real concern that we had going into this. And to end up with--there are some minor injuries, I'm sure, but people weren't paying attention, thinking about something else. And we only had the six lost-time injuries; two true lost-time injuries during that period was pretty remarkable. It's done really well. We've been proud of that one. That's still holding up pretty good.

We just had MSHA in here just the other day, and he was bragging about what a great operation it was again. It seems that every inspector comes in here decides that this is one of the better ones he's ever been in. That's a good source of pride, too.

Crew Reorganization and Turmoil for Two Months

Swent: It is. What about theft?

Purtell: We had a rash of that right around the time the mine was ending. I think a lot of people will see that before they get laid off, they get their eye on that grinder over there that they want to take with them, and they get it out the door somehow. So that has happened. It has dropped off now. We don't have near the problem with that.

Since the mine shut down and we've now settled into a routine, and people know what their jobs are and how things are working and where they fit in. There has been a change. I mean, it's kind of I won't say laid back, but mellowed out. We don't have near the turmoil with everybody getting on each other. It's a lot different operation. The crews themselves, operating crews, were kind of mixed together. They themselves had worked together probably for up to ten years, and they were kind of like a little family and worked on this shift work together like brothers and sisters, almost. What they've done--the turmoil that was created there was a need to try and make more uniform crews, with the skills that each of the operators had. That took about two months, and everybody was settled in again. They're now on another team, and they're working together, and everything went pretty smoothly. But it all took time. Right now it's going pretty well.

Swent: And these people probably will stay, then, till the end?

Purtell: Right.

Swent: There won't be many more layoffs.

Purtell: No. There shouldn't be. What we have right now, especially in the operating groups, is probably the level we need to operate at for the rest of the life. We have the fixed positions that you have to man to keep it operating. We have those in there right now. The thing you look at is support groups down the road. Do you need the same level of assaying that we're doing right now, for instance. As things go on, probably not. We'll probably drop it down. Some mines do one assay a day, and that tells them how well they're running. We're still doing--each shift gets an assay to find out how the different shifts might be working differently. Now we're getting into a routine. We're not seeing that much of a difference in the day-to-day operation because it's the same ore.

Because of the autoclaves, we got used to a lot of different assays because there's a lot of different controls you had to have on the autoclaves. You don't need near as much on these.

#### A Proposed Addition of Carbon-in-Leach

Purtell: We will be adding--we're going to actually ask for money. I shouldn't say that word. Proposing. We're proposing to add another aspect to our carbon-in-pulp circuit: carbon-in-leach, CIL, it's called. We're noticing that our ores are what the millers would call preg robbing. The gold would leach out, and it latches onto carbonaceous material in the ore, and you don't extract it very well. But if you have your own carbon in there that the gold can leach onto and actually be picked up right away, you have a chance of getting it.

Also, if you get the carbon or the gold out of solution, once it goes into solution faster, the leach kinetics, as they call it, also increase. You get a better leach. We think we can increase our recovery 2 or 3 percent by adding this. Even though we're winding down, we still have some people out there looking at some things that can help us improve what we're doing.

That's one valid reason for having some of the assay work we're doing right now. It's still, in some respects, fine-tuning how we're going to run the circuits for the rest of the life. We need to get it really organized when the next round of ores, when we get the lowest of the grade ores, when the average is going to be .054 ounces per ton. We have to have it down tight, ready to go. We really have to have it together when we get to there, so that's what we're kind of doing right now at this period of time, is get it so we know where the circuit is running as efficiently as we can, and recoveries are high.

Swent: Exactly what is that you assay?

Purtell: Right now we're assaying the rock. The feed into the grinding circuits is assayed. When it gets to the head of the leach circuit, for instance, before it goes into the leach circuit, we'll measure it. As it gets to the CIP circuits, so we know what head grades are at different areas in the circuit. Then you assay, of course, for tail. What's going out after the extraction process has taken place, what goes out the other side. If you start seeing some high numbers in places they shouldn't be, that gives you an idea that you need to get out there and look at it tighter or something. But we haven't seen the real

big swings between day-to-day shifts like we used to at times. I think it's because it's all the same ore going all the same place, pretty much, and not too much difference.

Trying to Sell the Autoclaves

Swent: Did you sell the autoclaves?

Purtell: No, we didn't. We thought we did. We had a group who came from Sao Bento, where one of the first autoclaving circuits were put in down there.

Swent: Where is that?

Purtell: It's in Brazil. They were running autoclaves, concentrates, and they were looking to expand the size of their circuits, and they understood that ours was available. We had a gentleman come up. He looked at them, and he said, "I want the oxygen plant. I want your flotation circuit. I want the autoclaves."

We said, "Well, thank you very much."

He said, "I'll get back to you." He went back--

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Swent: So there was a tariff imposed on used equipment.

Purtell: Used equipment, yes.

Swent: And it would be cheaper building it there.

Purtell: Yes. It's cheaper to build it there than import it.

Swent: Oh, what a shame.

Purtell: So he went away. A couple of weeks ago, we got a call back from him. He said, "The laws have changed in Brazil. Do you still have those autoclaves?" [laughter]

So we said, "The autoclaves are still available." But since then, we sold the oxygen plant. We have an agreement ready to be signed with Getchell Gold in Nevada, for the oxygen plant and some of the thickeners that were in the circuit, CCD circuit, counter-current decantation circuit, and the pre-ox circuit. Some of the equipment is being sold.

Swent: He can't have the whole package then.

Purtell: No. The flotation plant is still available. That's still there. He can have that if he wants it. They grind the ore and then float the gold and pyrites out, and that's what they would put through the autoclave. We had a whole-ore autoclave.

Swent: Are you not using the flotation circuit at all?

Purtell: No. Not at all. It won't do us any good. The reason we put in the flotation circuit was to supplement the sulfides in the autoclave. The ore coming out of the mine was less than 4 percent sulfide, and the autoclaves could handle 4 percent sulfide, so we put the flotation circuit in on the low-grade stream of ore that was going up, and we would float the gold and sulfides out of that, send that to the autoclave, and that would increase the recovery also on the low-grade ore, so it was beneficial for us to do that because we had room in our autoclave to do that.

At Lone Tree, I think, they're doing it. They had put in a flotation circuit to do a similar type thing.

Swent: I wonder--the thought occurs that perhaps they exerted some pressure to have those Brazilian laws changed.

Purtell: I wonder [laughs]. They could have.

Swent: It might not be just chance.

Purtell: Mining in Brazil is starting to explode down there. A lot of people are looking at investing money. Even Homestake is doing some exploration work in Brazil.

Swent: There might be some pressure there.

Purtell: Yes, I think so.

Swent: So you think you still may have them sold one of these days?

Purtell: He may call back. We've had, oh, I don't know, four or five different people who have looked at them; some not real serious, others--one guy who came has a chromium or cobalt mine or something in Africa that he would like the autoclaves for. He came and looked at them and said he'd send his engineering group to look at us, and we haven't seen him yet, but who knows?

Swent: How do you go about spreading the word? Does it just go by word of mouth?

Purtell: Well, partially by word of mouth. We have also contracted to a used equipment dealer. They have handled all our mobile equipment. Any equipment that we're not using any more all went on a list, and they have these brochures, color brochures, that go out all over the place to different people that are interested in them.

Swent: Who are they?

Purtell: M & E, Machinery & Equipment, out of San Francisco, actually.

Swent: It's quite a business.

Purtell: Yes. They're the ones that are working with us with Getchell, to get the equipment sold, so it's working out pretty well.

Swent: Does Homestake have an interest in Getchell now?

Purtell: No. Actually, it's a public company.

Swent: So the oxygen plant is sold. Has it been carted off?

Purtell: No. That's going to be here for a while. They've got a project. I'm not sure of the timetable on it, but they're going to have it paid for by June of 1998, and they have until June of 1999 to move it off the property.

Swent: How do you go about moving something like that?

Purtell: You take it apart, the way it came in. You take it to pieces, and you move it out, just the way it came in. Lots of truckloads to go out of here. But the thickeners--they're going to cut them up and load them on trucks and reweld them together at their operation over there. So they've got a plan for it.

Swent: Are you still maintaining the road, the highway?

Purtell: No. It's a county road now. We turned it over to the county. We did help them when they had the problems with the--I guess it was the storms of '95, where part of the road dropped out and they ran out of funds, and we helped them meet some of the funds. We don't own that road any more. We don't maintain it. It was turned over to the county.

Swent: I noticed there's some work being done out there today, and I wondered if it was still any of yours.

Purtell: No, it's all county. They do a pretty good job maintaining it. The problem with it is it's a long road, and they figure it's

only, sole purpose is--Homestake is the only user. We're the major user. There are other homes and stuff along the way. But in their mind, it's a rural county. They don't have a whole lot of funds, and they won't maintain that much of a road, so we help them when we can. But they've done a pretty good job taking care of it. Especially every time a storm comes through and the road slips out somewhere, they make sure they get some insurance money for it, so it has worked out well for them.

Water Balance Is Always a Big Deal

Swent: Are you doing anything special for El Niño [weather system] that everybody is talking about?

Purtell: No. Other than debating whether it's going to be an El Niño or Niña, whether it's going to rain or drought. We don't know. If it's going to be large water events, we've got a big pit over there that can handle a lot of water. I mean, we'll be directing a lot of water over there.

Swent: You no longer will have to worry about it.

Purtell: No. It won't be the pumping like we did before, where we had to try and keep the pit dry so we could mine in it, and not fill up the tailings pond so we could put tails in it and everything else. Now it's a matter of, for us, if we're going to get enough water to keep the cyanide levels of the tailings pond down. The pit area is not a big deal. I mean, we're just going to direct a lot of water. Up to 9,000 acre-feet of water we can hold in it before it gets to the level we want to maintain in it, so there's a lot of room for storm runoff there. It's not as big a concern as it was in the past.

Swent: Do you do any pumping out of the pit?

Purtell: Not now, we don't.

Swent: I mean now, to get your slurry water or anything like that.

Purtell: No. Water balance is a big deal here; it always has been. Because you had six or seven years of drought, for one thing. How to use which water. We were pumping Davis Creek reservoir all the way to the tailings pond because in early days we never returned any water back to grinding. Well, now we're returning it back. And even runoff that came out of the pit area was pumped, and we would use it in the process. That always ended up

in the tailings pond. And we had just struggled every year to try and keep the water in the tailings pond at manageable levels.

Now we're seeing a change. We're not pumping pit water any more, and all of a sudden we're just losing a lot of volume in the tailings pond, faster than we anticipated. Now the concern is, how do we make sure that we'll be able to use the water that's in the tailings pond when we want it, and make sure that it comes to our pumps, for instance. They're off on the side of the pond.

So tailings management: now where do you deposit your tailings on the outside? It's getting to be critical. To try and make sure the water always comes toward your pumps, for instance. We always said we're going to try and maintain our cyanide levels at thirty parts per million or less. As long as the pool shrinks down, it's harder and harder to do because it concentrates in the water, and you need to figure out some way to do this.

And we're working on cyanide destruction of water, using an ammonium bisulfide circuit to try and break that apart. That's going to be, hopefully, only for summer use. In winter, you get enough rain. Usually, it moves it down far enough for us that there's no problem. But if the pool gets too small and we're using so much, it's going to be difficult to do this. That's going to be another challenge as we come--

In the next couple of years we feel it will be a real challenge for us, this water utilization. How do we do it? If the tailings pond does drop down to a point where we can't utilize as much water grinding as we'd like, we're going to have to put pumps in the pit, probably, and use that water as a supplement to tailings water.

Davis Creek water: there's a lot there; we've done well. The storms of '93 and '95 basically have filled the pond both times. It's got plenty of water in it. We have a supply there, but we can't supply to the circuits fast enough. The system was set up to originally supply water to just one grinding circuit alone. At that time, even when we used it in the early days, it was real marginal. After running the grinding circuit real hard, adding water to make the slurry, the truck shop would run out of water. The system was just right on the edge of being the right size.

Now we've got some scale in the pipes and a few things. It just doesn't supply the water like we want it. So we have to come up with another water supply. Besides that, we've added a

second grinding circuit that wasn't there in the early days, too. So it's almost a requirement we have, tailings water of some kind to come down here to keep slurry coming through. So that's going to be our challenge as the years go on. The next couple, three years will be the challenge.

Swent: Water balance.

Purtell: Water balance. It's a new system, a new use of water, new places, new ways, so--

Swent: Water for the trucks: this is to keep the dust down?

Purtell: No. Water for the trucks we just take out of Davis Creek water and just fill the tanks up, the big tanks, and then go around and wet the ground down. We use fresh water for that. It used to be pit water, but now it's fresh water. M-1 Pond was right here behind the mine. That used to be a supply of--any runoff anywhere around the area, the stockpiles or in the mine itself, would be pumped to M-1 and used wherever we could there, either process or for dust control.

It started building up with slimes, and then we started seeing cracks along the wall on one side of M-1 Pond, and we decided that we needed to make sure we didn't have the pond, say, catastrophically breach into the mine, so we have now breached it so there's no pond any more. That water is not available to us. So strictly Davis Creek water or tailings water right now. If we need water later, it will be pit water. That's down the road.

Swent: Well, there's always a challenge, isn't there?

Purtell: Oh, you bet.

#### Don Field Orchestrates Layoffs and Retraining for Minimum Pain

Swent: When we talked before, you were talking about a job fair and retraining programs for the people that you were laying off. I wonder if you wanted to say any more about that. How did that go?

Purtell: Well, the job fair was a pretty good success. The people that wanted to be in mining--I think every one of them found a job in mining. And I think--I guess the numbers we put together--Don has asked the JTPA, for instance, to keep up with us and let us know where everybody went.

Swent: Who's Don?

Purtell: Don Field, Human Resources. And from the people that we've kept track of, 85 percent of them were either employed or in training. The other 15 percent were just lost. They didn't keep in touch with the training that was available to them, or they just went off on their own and got a job somewhere and haven't bothered to keep track. But everybody, I think, that we laid off was either employed or in training for a new job, within a year of that, after the layoffs. So we're pretty pleased with that. That's a pretty good number. I would bet if you found that other 15 percent, the majority of them would probably be employed, too. We just don't know about it. So it worked out really well.

We had the stay bonus that helped keep people here until it was ready to go, and timing was just perfect, with a couple of mines in Nevada that were coming on that needed people. It all worked really well. Everything just flowed nicely. A lot better than I thought it would in the end [laughs].

Swent: I wondered about the stay bonus, whether that has been effective.

Purtell: I think it did. There were people that definitely stayed around. They told their future employer that hey, if I stay until this date I can get a bonus, so a lot of them accommodated these people. And it worked out well, especially the ones that knew they were going to go into training. "All right, I can stay. If I was going to stay until July, why, I'll stay until September instead. They need me, so I'll stay until then." I think that helped push the people in that period of time.

It was beneficial. It's a morale booster, if nothing else, to know that "they might be laying me off, but they're going to treat me right on the way out the door." So I think that was a positive aspect of it.

Swent: Were there people who were angry?

Purtell: There were angry people just because we were changing their lives, and it's hard for--a big change like that makes a lot of people angry. They respond differently. The thing that is noteworthy is we did not get one single lawsuit that was related to a layoff. That, in itself, I would say, says we treated people pretty fairly. There were several people that were included in the layoff because of their job performance, for instance. Now, they were angry because they just didn't feel that that was right. They had more seniority, and they should stay. None of them sued us. I mean, in the end, we showed them,

"Here's your employment review and some of the things, so we think this is right." And in the end, it came out right.

We had a couple of people that stated right till the last day that, "My gosh, I'm going to come back and I'm going to sue you. You did me wrong." Again, I think that was their reaction to being laid off. It's a major thing in someone's life to lose their job.

Swent: Sure, of course. Was there any vandalism?

Purtell: I don't think there was. That was the thing. We were kind of looking for--is someone going to trash out a piece of equipment or do something? It was a real concern. And I don't really know if we had anything that we considered an act of vandalism on the way out the door. I think it was partly we treated them right. They knew it was coming, way up ahead. Of course, a lot of them didn't realize, even as much as you told them, that by the way, we're shutting down on such-and-such a date.

A lot of them--it didn't sink in until two weeks before. And they were the angry ones, probably, the ones that really--the realization that this was really coming to an end. They were the ones that made the biggest impression. Everybody else, I think, had a feeling, a sense that this was happening, and it's moving along logically, and they're trying to make sure things go right for us, and they're trying to take care of us. So overall I think no one would have a reason to get us, I guess, if you put it that way.

Swent: That's a tribute to you.

Purtell: And Don. I think Don has been--he orchestrated a lot of this stuff. He and I worked together on it, but he orchestrated a lot of it and worked it through. The thing, too, we worked--severance was another one, early on. It was--I think the standard for an hourly employee was two weeks' severance; that was it. We got all the way up to eight weeks, I think, working with the corporate office. A few changes like that, that did make a difference in how they viewed the company on the way out the door.

Don and I both said, you know, a lot of these people are going to go out and they're going to take work in the community. They're not going to leave Lower Lake, and they're not going to leave Clearlake, so they're going to be around. We'll be living with these people for a long time, so it would behoove us to treat them right [laughs]. That was part of the philosophy, just trying to do that.

And working with the community on it, too. Let them know that this was happening. That was the other part of it, besides the employees, was working with the community to let them know well in advance, just like the employees, that this is our date, this is when this is going to happen, get ready. So that the JTPA was able to request funds to fund the programs well in advance of the shutdown. So that's part of the reason, I think, it went so smoothly. They were able to staff up for the number of people they were going to put on, so it all worked out real well.

Swent: Were you able to transfer people within the company to other projects? The Nevada mines?

Purtell: Some. It was a few. That was part of the problem, that the Ruby Hill Mine was one we were hoping would come on line a lot sooner or else we'd be able to span it better. The mine in Eureka. But the gap got big. I think it was close to a year, actually, by the time--for a while, it looked like they were going to be able to get started and get going much sooner. It didn't happen. A lot of our employees said as soon as Ruby Hill is hiring, let me know. And we do know. We have some people down there now. Once Ruby Hill got going, we did transfer some to Ruby Hill, that stayed on for a while. They've transferred down. But we didn't have many places to transfer people. That was part of the problem.

We did get a lot of people in different mining companies that we knew, and they even went down and said, "Well, when Homestake gets something going, we're going back to them."

Swent: Really?

Purtell: There was a lot that did that. We haven't seen too many transfer back, but there's more at the Ruby Hill Mine than I thought. We knew a couple of our maintenance employees that were laid off here are now maintenance employees at Ruby Hill, so they're finding their way back.

Swent: That's good. I didn't know how that timing worked out.

Purtell: We missed it. It would have been nicer to get it up sooner, but that's the way things go. It didn't work. We were hoping we could stretch it. We got closer, anyway. There was a period of time there it was going to be almost two years between. It worked down to about a year by the time it finally ended. But it was still too far to try and just hold onto employees, to wait for a transfer.

It's lunch time.

Swent: [laughs] I was just going to check my list here. Personnel planning, benefits, community, land and legal. I guess we've pretty well covered those. Your planning and permitting you did from the beginning.

Purtell: Right. We didn't do much in terms of changing permitting or anything as we were winding the mine down.

Swent: Moving it didn't change.

Purtell: No. What we're doing in some of the permits is actually releasing some of the permitting that we had. We're finding, like, air credits, for instance, dust credits. That's a bankable or marketable topic now. We're not generating as much dust, so we can take that as a credit and sell it to another mine or to another operation anywhere in the Bay Area that can use it as a credit.

Radio channels. We had four channels that we used on our radios. They're actually a credit. We can sell those.

Swent: Oh, really?

Purtell: Yes. I don't know how much you get for them, but because we are licensed to use them and there are not too many out there any more, you can sell them. So those are the kind of things that as we look at what was permitted and what we can get away with right now, what we can use or discard, that's what we're looking at, more in terms of permitting.

Now, of course, air permitting. We're looking at redoing the air permits so our tonnages can increase, so that might make a difference, too. That has come since the layoffs, actually. Oh, by the way, we need to change our permit to run these higher tonnage rates. I didn't think we'd ever get this high tonnage, actually, so I was never concerned about it before. It's just been moving steadily up ever since we went into this new mode.

#### The Shutdown and the Local Housing Market

Swent: About housing: I was wondering if you have any comment to make about the shutdown and change in the value of houses around here. I remember you said that when you were in Creede that there were Texans and Kansans who came in. They were not mining people.

Purtell: No. Most of them were summer homes for those people.

Swent: Right. Has there been anything like that happen around here?

Purtell: No. You don't see that. The market is funny. We started to see a real high increase in value of houses in the Lake County area probably about a year before layoff. The price of homes in the Santa Rosa area got so high that people were actually commuting from Lake County to Santa Rosa, so the housing values, like Hidden Valley and Lakeport, started to drive up. Then I don't know what they did down there in Santa Rosa, but people quit doing that, so the housing now got depressed. We added probably with our layoffs--I would bet you over a hundred homes went on the market at that time again. I don't know what it ever really did. They're still selling. They're selling homes all over the place.

Swent: Oh, they are?

Purtell: The home market itself has been depressed, though, too. I don't know if it had anything--any value, any problem. Some people were smart. They sold their houses well ahead. They knew it was coming. That was part of the idea of telling people, "Here, we're going to lay you off." And we had some people who sold their homes and moved into a rental house or sold their home and rented it back for a period of time, until they moved out. It's hard to tell what kind of impact that really had on the whole real estate market in the area. It's hard to tell because the market itself was so dynamic, one way or the other. It's difficult to put a real gauge on it, but there were a lot more [For Sale] signs put up.

But now, even if you drive around the county today, it's almost--I want to say, like, when I first showed up here in 1985, it seemed like the county was for sale. Everywhere you went, vacant lots. Every place was for sale. Well, it's kind of happening again. You see a lot of For Sale signs up again. I think that's more just a sign the county is starting to grow in different ways. They're trying to bring in other little industries here and there, and it is picking up. The population is growing in the area.

Swent: Lower Lake certainly looks a lot more prosperous.

Purtell: Oh, yes. It's not near the vacant lots [laughs].

An Attempt to Explore the Baker Mine

Swent: No, it's really kind of booming. Now, you had told me off the tape about a woman at the Baker Mine?

Purtell: Yes, yes. [laughs] I don't know what her name is, but when we went down there at one time--I related some of the past history that there are some old tailings from mercury there, and they wanted to go explore it for gold at one time. I think our geologists were on the ground briefly at the time, and then later on we wanted to go back. We were doing a regional exploration to try and--we were really winding down here. Let's really give it a push to find out if there's any more ore in this area that we can keep everything running.

So we wanted to go to the Baker Mine. Well, talking to--I think Scott Moore, I think it was, said that there's a woman that has a house right up next to the Baker Mine over there that will not let us come on the property because we are with Homestake Mining Company. Well, what's the big deal? Well, she lived in Lead at one time and had a grandmother there. It might be her mother. Claims that the Homestake Mine mined under their house and stole their gold. So she has held this against Homestake Mining Company all these years, that we're just a crooked bunch of crooked miners, and by gosh, they're not coming on my property.

Well, she went on two weeks vacation somewhere, and the husband was real anxious to have Homestake actually do some exploration work on that property. So while she was on vacation, we sent a couple of geologists over in the area, and they got all over the place, looking for samples. It turned out there wasn't any gold there to speak of, nothing for us to really go after again. But it was just an interesting comment. I mean, how Homestake Mine, the mine at Homestake and Lead. It's just people. It seems like everybody has either been at it or knows about it or something. It's amazing, for all the years it's been around, how it gets around.

Swent: And those attitudes do persist through generations.

Purtell: Oh, it does.

Swent: That's amazing.

Purtell: [laughs] Yes, we're still "a crooked mining company." Wouldn't let us come near. It's interesting.

Swent: Yes. Well, you were sent to Creede to instill professionalism. How do you feel about that? Have you been able to instill professionalism here?

Purtell: Oh, I think we've done it here, with a lot of help from other people. I'm sure that worked out. That was a comment by Gary Boyer, who hired me in Grants. I didn't really know. When I went to Creede, no one told me that this is your mandate or this is why we're sending you there. But after I came here, after Creede had shut down and we were trying to start, we were kind of roommated in a house, roomed in a house together during start-up. And he mentions, yes, the only reason we sent you up there was we wanted to instill some professionalism in that group up there. He said their maintenance department needed some help badly, and we thought, you know, get someone up there that could do that.

Because I didn't understand for a 300-ton-a-day mine why they had so many people in the staff functions. To me, it was very heavily staffed. We had a general manager, an assistant general manager, and a couple of geologists, and a mill manager, a mine manager. Let's see. What did we have? And on the mill side, for instance, we had an operations general foreman. When I first got there, I was called a maintenance general foreman, and then later on it was maintenance superintendent of the whole property. But still, I couldn't understand why we had this size of a group of people just for that 300-ton-per-day, with a small flotation circuit.

Swent: As many as you've got here.

Purtell: Yes. It just seemed way too big. That's where I asked them at one time. This was when he brought this up. "We knew it was too many, but we needed someone there to go see if they could put some sense of order in the area up there." I didn't really--I was there for calendar residence ten months. And in those ten months I bet you five, almost six of those I was out here. And there was shutdown in the middle of that, too, so didn't really have a real chance to get after--

Swent: You did have a good preview there of what a shutdown can be, though.

Purtell: Oh, yes. Well, I worked at Grants. We were shutting Grants down. It was actually in the throes of--In the last two years I was there, they were shut down in the summer. We did a lot of summer maintenance work, partly because the price of yellowcake just wasn't all that grand, so we shut down in the summer, did maintenance work, and would start back up again in the winter

months and run in the winter months. It still for me was an operating place when I left it to go to Creede.

I never paid any attention to the silver market before. Went up to Creede, and silver was dropping at that time. It was down to \$5.85 an ounce or something like that. I didn't think much of it. We were doing okay. We were running--didn't get a chance to get into it that much and then to find out, oh, by the way, the last budget we just submitted is going to shut this place down. So it was going to be a loss, no matter what we did, so they ended up shutting it down.

They kept it going for a period of time, as they had that North Amethyst exploration project that they felt was going to keep everything going. If you just stretched it out far enough, it would be no problem. They never made it.

But that shutdown was a lot different than this one.

Swent: Yes. And you learned some lessons there about how not to do it, I think.

Purtell: Yes. It wasn't a good way to do it at all. To me it was kind of an emotional knee-jerk. Someone found out we were going to shut down, so let's just shut it down today. I mean, that just left everybody out in the cold. Really, really, it was no way to do it.

#### A Convoluted Shutdown; Partly a Startup

Purtell: Now, this operation was interesting about shutting it down because we only half shut it down. That's the whole thing that was different about this one, too. We shut down part of it and kept the rest of it running, so--. And then changed how we were going to process. It was a convoluted shutdown relative to just saying, "Okay, the ore is gone. Shut the mill down. Let's all go home and find new employment."

Swent: It's a lot more difficult from a management point of view, I would think.

Purtell: Yes. It would have been so much easier, I think in the long run, for everybody to say, "This is it. On June 26, we're done." And if everybody then knows that and there's no convolutions, who's going to stay and who's not going to stay. Okay, the autoclave is going to shut down, so the next day is the new circuit, the

way we're going to run it. Is that going to be ready to run? So this was all going on in the middle of all this, was trying to organize it. It got convoluted after a while. It would have been, I'd say, much easier just to say, "Shut it down."

Swent: Sort of the problems of startup and shutdown, both.

Purtell: Together, it was. It really was. Because we were shutting down; in theory, we shut the process down and then started it up in a different mode. Used a lot of the same equipment, but it was starting it up and running it in a different way.

Swent: Two different headaches.

Purtell: Oh, yes. And then there were months there that we were still putting piping in and trying to get other tanks brought into the system and clean out all the equipment that wasn't going to run any more and try and mothball stuff. So it was quite an organized dance going on [laughs], I guess you'd put it that way, for a while. Even after we shut down. But I guess I've gone through several shutdowns now. Let's hope the moniker of the "Shutdown Guy" doesn't hang on me [laughs].

Swent: You seem to have organized this one very, very well. Well, we've covered the questions that I had. Is there anything else that you--

Purtell: I'm really not sure. I can't think of much of anything else on there. No, not anything else right offhand to mention. We've talked about a lot already. The first time around, I think we got a lot of the information at that time.

Swent: We really did. Are you doing any work other places?

Purtell: I helped them on the design of Ruby Hill mill. I've been out there a couple of times, just to look at things, see how they're doing. Kent Billhartz the same way, maintenance guy. He's out doing that. Norm Birdsey is over there right now, trying to get their operating manual put together so that they know how to run it. That's what he's doing for them. So we're helping here and there.

The Pinson operation. Of course, we just got into it. We're now 50 percent owners. Royce went over there, Royce Smith, went over as--he was seconded to them to help in the milling operation because their mill supervisor was retiring. It ends up that he was there for almost six months. Did some changes over there. So that was a help. He was a helping hand over there where he can.

Our lab guys went out and did some work with them on assays and trying to get their lab organized so they can do their own assays. We're helping out where we can. If we have the manpower and someone needs help, we send it to them. It's one thing we've been trying to keep up, anyway.

Blaine Olson, our chief met[allurgist], also spent, oh, gosh, I guess it was through this last summer at the Round Mountain project, where we're 25 percent owners. They built the mill. And he helped quite a bit, along with John Turney. Following that project for Homestake.

So we get around.

Swent: Yes, well, that's good. Thank you very much for taking the time for this, Pat.

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APPENDIX

WESTERN MINING IN THE TWENTIETH CENTURY ORAL HISTORY SERIES



## PREFACE

The oral history series on Western Mining in the Twentieth Century documents the lives of leaders in mining, metallurgy, geology, education in the earth and materials sciences, mining law, and the pertinent government bodies. The field includes metal, non-metal, and industrial minerals. In its tenth year the series numbers thirty-five volumes completed and others in process.

Mining has changed greatly in this century: in the technology and technical education; in the organization of corporations; in the perception of the national strategic importance of minerals; in the labor movement; and in consideration of health and environmental effects of mining.

The idea of an oral history series to document these developments in twentieth century mining had been on the drawing board of the Regional Oral History Office for more than twenty years. The project finally got underway on January 25, 1986, when Mrs. Willa Baum, Mr. and Mrs. Philip Bradley, Professor and Mrs. Douglas Fuerstenau, Mr. and Mrs. Clifford Heimbucher, Mrs. Donald McLaughlin, and Mr. and Mrs. Langan Swent met at the Swent home to plan the project, and Professor Fuerstenau agreed to serve as Principal Investigator.

An advisory committee was selected which included representatives from the materials science and mineral engineering faculty and a professor of history of science at the University of California at Berkeley; a professor emeritus of history from the California Institute of Technology; and executives of mining companies. Langan Swent delighted in referring to himself as "technical advisor" to the series. He abetted the project from the beginning, directly with his wise counsel and store of information, and indirectly by his patience as the oral histories took more and more of his wife's time and attention. He completed the review of his own oral history transcript when he was in the hospital just before his death in 1992. As some of the original advisors have died, others have been added to help in selecting interviewees, suggesting research topics, and securing funds.

The project was presented to the San Francisco section of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) on "Old-timers Night," March 10, 1986, when Philip Read Bradley, Jr., was the speaker. This section and the Southern California section of AIME provided initial funding and organizational sponsorship.

The Northern and Southern California sections of the Woman's Auxiliary to the AIME (WAAIME), the California Mining Association, and the Mining and Metallurgical Society of America (MMSA) were early supporters. Later the National Mining Association became a sponsor. The project was significantly advanced by a generous bequest received in November 1997 upon the death of J. Ward Downey, UC Berkeley alumnus and

early member of the mining series advisory committee. His own oral history was completed in 1992. Other individual and corporate donors are listed in the volumes. Sponsors to date include nineteen corporations, four foundations, and 113 individuals. The project is ongoing, and funds continue to be sought.

The first five interviewees were all born in 1904 or earlier. Horace Albright, mining lawyer and president of United States Potash Company, was ninety-six years old when interviewed. Although brief, this interview adds another dimension to a man known primarily as a conservationist.

James Boyd was director of the industry division of the military government of Germany after World War II, director of the U.S. Bureau of Mines, dean of the Colorado School of Mines, vice president of Kennecott Copper Corporation, president of Copper Range, and executive director of the National Commission on Materials Policy. He had reviewed the transcript of his lengthy oral history just before his death in November, 1987. In 1990, he was inducted into the National Mining Hall of Fame, Leadville, Colorado.

Philip Bradley, Jr., mining engineer, was a member of the California Mining Board for thirty-two years, most of them as chairman. He also founded the parent organization of the California Mining Association, as well as the Western Governors Mining Advisory Council. His uncle, Frederick Worthen Bradley, who figures in the oral history, was in the first group inducted into the National Mining Hall of Fame in 1988.

Frank McQuiston, metallurgist for the Raw Materials Division of the Atomic Energy Commission and vice president of Newmont Mining Corporation, died before his oral history was complete; thirteen hours of taped interviews with him were supplemented by three hours with his friend and associate, Robert Shoemaker.

Gordon Oakeshott, geologist, was president of the National Association of Geology Teachers and chief of the California Division of Mines and Geology.

These oral histories establish the framework for the series; subsequent oral histories amplify the basic themes. After over thirty individual biographical oral histories were completed, a community oral history was undertaken, documenting the development of the McLaughlin gold mine in the Napa, Yolo, and Lake Counties of California (the historic Knoxville mercury mining district), and the resulting changes in the surrounding communities. This comprises forty-three interviews.

Future researchers will turn to these oral histories to learn how decisions were made which led to changes in mining engineering education, corporate structures, and technology, as well as public policy regarding minerals. In addition, the interviews stimulate the deposit, by interviewees and others, of a number of documents, photographs, memoirs,

and other materials related to twentieth century mining in the West. This collection is being added to The Bancroft Library's extensive holdings. A list of completed and in process interviews for the mining series appears at the end of this volume.

The Regional Oral History Office is under the direction of Willa Baum, division head, and under the administrative direction of The Bancroft Library.

Interviews were conducted by Malca Chall and Eleanor Swent.

Willa K. Baum, Division Head  
Regional Oral History Office

Eleanor Swent, Project Director  
Western Mining in the Twentieth  
Century Series

January 1998  
Regional Oral History Office  
University of California, Berkeley

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