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Western Mining in the Twentieth Century

Sheldon P. Wimpfen

TIN PEAKS & SILVER STREAMS: A MEMOIR

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Errata

Page 73 change "inflated" to "subsidized"

Page 82 the actual height of Illimani is 21,201'

Page 165 the premier was not Adler but Adenauer

September 1997



FOREWORD

Sheldon Wimpfen's autobiographical memoir came to the Regional Oral History Office as the result of a notice in the August 1994 newsletter of the Mining and Metallurgical Society of America [MMSA]. After reading about the oral history series on Western Mining in the Twentieth Century, then in its eighth year, Mr. Wimpfen wrote to offer a copy of his memoir for inclusion in The Bancroft Library's collection of materials on mining.

Wimpfen is a mining engineer who has known nearly everyone in the industry and worked almost everywhere, often at the highest levels; without question his story belongs in our documentation of the careers of contemporary leaders in the minerals industry. Consequently we requested and obtained his permission to make copies of his memoir available to other libraries and individuals.

We are grateful to Sheldon Wimpfen for his detailed recollections which will be valued by future researchers.

Eleanor Swent, Project Director
Western Mining in the Twentieth
Century series

September 1995
Regional Oral History Office
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University of California at Berkeley



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TIN PEAKS AND SILVER STREAMS -A Synopsis

Sheldon P. Wimpfen

Route 4 Box 393 Luray, VA 22835

August 24, 1994

The annals of a mining engineer whose career began in the gold mines of the Colorado Front Range in 1934 where he worked underground at Minnesota Mines, the Red Elephant and the Capitol Prize mines.

The author moved to Arizona where he worked as a nipper, mucker and miner at the Octave gold mine near Congress Junction. Weekend dry gulching rewarded him with a three ounce nugget, enough for a trip back to Texas. There he went to work as a sampler of the silver - rich ore and worked up to mine engineer at the Presidio Mine in Shafter.

The lure of travel took him to Mindanao where he explored for and found a gold mine in the Diuata mountains. Then he worked three years near Baguio on Luzon at the Balatoc gold mine He traveled through unmapped areas of the Mountain Province.

The threat of invasion by the Japanese took him back to Shafter, Texas although he was headed for Tanganyika. Then he went to The Benton Mine in Oregon's Siskiyou Mts. When the infamous Order L208 shut down gold mines, the author went to the tin mines of Potosi, Bolivia and worked also at Pulacayo, the hell hole of South American mining. After a brief tour as associate professor of civil engineering at Texas A&M, teaching Army Special Training Programs he volunteered for the US Marine Corps.

When WWII ended he worked in New York City as assistant editor of Mining and Metallurgy, before moving to Washington, DC to be editor of the Mining Congress Journal. In those capacities he visited many US mines. He joined the fledgling Atomic Energy Commission to run its program on recovery of uranium from low grade resources.

With the need for more uranium to meet military demand during the Korean War, the author moved to AEC's Grand Junction Operations Office as its first

manager to direct the efforts of the largest group of geologists and engineers ever assembled in the search for and production of a single element.

When the pressure for more uranium began to wane he moved to Wilkes- Barre, PA to work in the anthracite mines. After an engineering post in San Francisco he moved to Richmond, Virginia as vice president of Reynolds Mining, the raw materials arm of Reynolds Metals. This post took him to Haiti, Jamaica, Mexico the Virgin Islands, Trinidad and British Guiana.

He moved to Peru to be president and general manager of Southern Peru Copper Corporation. one of the world's largest copper mines. Toquepala was operating and the development and planning for Cuajone was in progress. He visited Cuzco and Machu Pichu. His work in Peru ended with the takeover of the communist oriented military and the ouster of elected president Bellaunde.

In 1970 the author joined the United States Bureau of Mines as assistant director moving on to become chief mining engineer. Programs under his direction resulted in the discovery of Greens Creek, Red Dog and Quartz Hill in Alaska. These projects came close to failure due to the Public Land policies of the Carter administration.

He visited Pakistan and Turkey to assist on various mining problems.

After retiring from the Bureau in 1980 he worked as a consultant on projects in Iran, Guinea and the United States. He was involved in the study of siting and deep basing the MX Missile and the design of deep structures that could withstand large atomic blasts.

TIN PEAKS AND SILVER STREAMS

INTRODUCTION

From the Andean heights of Peru to the broad expanse of west Texas, Sheldon Wimpfen has experienced in his years on earth what would take most people through several lifetimes

He survived spear wounds in the mountains of Mindanao in the 1930s, armed attack in the South Pacific in the 1940s, upheavals of the Atomic Energy Commission in the 1950s, political unrest of Peru in the 1960s, the bureaucratic maze of the US Bureau of Mines in the 1970s and chili recipes of neophyte Virginia cooks in the 1980s.

In the 1990s, he remains a valued consultant on mining and many other subjects.

Most of his life has been devoted to mining, first as a student and laborer in Colorado, Arizona and Texas and later as a mining engineer, director and company president and, most recently, as chief mining engineer of the US Bureau of Mines and a consultant to governments and private industry.

This book, of obvious interest to mining professionals, is also a fascinating tale for the layman whose knowledge of mining extends no further than the cursory treatment in elementary geography books.

Sheldon's father and mother were German immigrants. His father was a hat maker by trade. During Sheldon's growing up period the family moved from city to city as success and failure dictated. These moves gave Sheldon an early opportunity to see new places, make new friends, and to explore and experience new environments. This background plus his natural curiosity about new places, people, and the unusual provided an ideal background for his chosen life work--mining engineering. His professional education provided opportunities for employment in mining enterprises and related activities which took him to the Philippines, South America, Europe, Middle East, and wide travel within the United States.

Sheldon's descriptions of places, people, events, and experiences as they unfolded during his eighty years show a man with a keen memory and an unusual ability to observe the situations occurring around him.

His account of numerous employment experiences in the mineral industry is not unusual for the graduates of the mining schools in the West. The schools

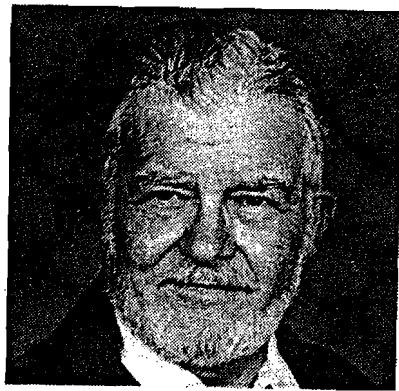
provided a background in all phases of the mineral industry, including engineering, geology, metallurgy and mineral economics, with the objective of providing a background for the student to become a manager of a mining enterprise. Sheldon worked his way through the technical fields, and achieved the ultimate goal for which he was trained, a goal attained by those few who possessed the inherent talents and the necessary drive.

Sheldon wrote this book at the urging of his and Happy's daughter, Karen, and son Sheldon, Jr. They will learn much from this book of their father's and mother's struggles, disappointments, successes and joys during their years together. Hilda, his wife and partner in retirement, will gain new insights into Sheldon's life and career.

For the many who have known Sheldon Wimpfen, been associated in some of his activities, or have been involved in the mineral industry, you are most likely to find yourself or someone you know included in one or the other of his life experiences. I did, as Sheldon's annals renewed old and pleasant memories for me--perhaps they will for you.

Elton A. Youngberg

WIMPFEN, SHELDON PHILLIP



Office: Mining Consultant
(Home) RFD 4, Box 393
Luray, VA 22835
(703) 743-5995

Born: December 3, 1913, Norwalk, CT

1944-1946 U.S. Marine Corp., Pacific Theatre
1934 BS, Mining Engineering, University of Texas, College of Mines & Metallurgy

1980-date Mining Consultant
1970-1980 U.S. Bureau of Mines, DC, Asst. Dir. then Chf. Mng. Engr.
1967-1970 Southern Peru Copper Corp., Toquepala, Peru, President, Gen. Mgt. & Dir.
1959-1966 Reynolds Mining Corp., Richmond, VA, Vice President and Director
1958-1959 Western Machinery Co., San Francisco, CA, Gen. Mgr. Plan. & R&D
1956-1958 Glen Alden Corp., Wilkes-Barre, PA, Vice President
1952-1956 US AEC, Grand Junction, CO, Manager-Op., Off.
1951-1952 US AEC, Washington, DC, Asst. Dir. Div. Raw Mat.
1948-1951 Am. Mining Congress, Washington, DC, Ed., Mining Congress Jnl.
1946-1948 AIME, New York, NY, Assistant Editor, "Mining and Metallurgy"
1943-1944 Texas A&M College, College Station, TX Asst. Prof., Civil Eng.
1942-1943 M. Hochschild Cia, Potosi & Pulacayo, Bolivia, Mine Eng. & Mine Foreman
1941-1942 Benton Mine, Grants Pass, OR, Asst. Supt. & Mine Eng.
1940-1941 Am. Metal Co. of TX, Shafter, TX, Asst. Mine Foreman
1938-1940 Balatoc Mining Co., Baguio, Philippines, Chief Chemist & Assayer
1937-1938 Premiere-Pili Mining Co., Mindanao, Philippines, Exploration Eng.
1935-1937 Am. Metal Co. of TX, Shafter, TX, Mine Eng.
1934-1935 CO and AZ, Various Mines, Miner

Member: Mining & Metallurgical Society of America; Society of Mining Engineers of AIME; National Defense Executive Reserve; Mining Club of NY; Board of Governors, National Mining Hall of Fame & Museum; Registered Prof. Engr. Colorado and DC.

Awards: Outstanding Ex-Student TX College of Mines 1954; Servio Hominibus Award; Sigma Tau Sigma 1954; Meritorious Service Award US Dept. of the Interior for initiation, management, and development of the Minerals Availability System; Legion of Honor AIME, Distinguished Member, AIME



SHELDON P. WIMPFEN
Route 4 Box 393
Luray, VA 22835
(540) 743-5995

126,000 WORDS
1995

09/03/95

TIN PEAKS & SILVER STREAMS ©

by
Sheldon P. Wimpfen

CHAPTER 1.

CONNECTICUT - MINNESOTA - MARYLAND - MAINE

CONNECTICUT

Years later I lived in Texas. By now I can forgive Mom because I wasn't born there. It was 1913, the year of the first income tax. I hated that and have ever since. Norwalk, Connecticut was the place.

One of my earliest memories — I can't be certain always if I am confusing memories with other's descriptions of those early happenings — was of Dad receiving his first car from the salesman who drove it into town. Dad drove that car around the square in front of our house until he ran out of gas, because he didn't know how to stop the thing.

Only bits and pieces of those early years remain somewhere lodged in a failing memory. I would hope that I am not remembering things that never happened. I recall the house was red and located at the foot of a hill. It fronted on a tree-grown rectangle that was like a park. Almost all else seems to escape me about that house, but I do recall it had inside plumbing and a coal stove in the kitchen.

Later, about 1917, we moved to 152 Main Street - a big white house on the road with the street car tracks. What a great place to flatten pennies into a long narrow strip with a slight curl. A strawberry patch, a black walnut and two maple trees stood in the front yard. They were great to climb and were enticements for an active boy. There was a big old wood stove in the kitchen. One of my daily chores was to rise early and start a fire in that

wood stove in the kitchen. One of my daily chores was to rise early and start a fire in that kitchen stove. Once the fire got going pretty good, you could use either wood or coal to bring it up to operating heat. Later on, gas became the thing to use and Dad bought a gas stove. It was some kind of a fireless cooker as there were huge insulated covers that you could lower on chains over a pot. Then even, if you turned off the gas, a lot of heat would be retained. I liked it because I didn't have to start it up with kindling.

Another one of my chores was to start or at least renew the fire in the main furnace in the basement. It ate a lot of wood. But then oil came on the scene and Dad converted the furnace. He got one of the first oil burners in town, an Arrow, I think it was called. It must have been an experimental unit as men there from the oil company were there on almost a daily basis checking out the recorders on the burner. And there were a lot of recorders measuring fuel used, temperature, operating times and other data.

A wood fence across the rear of the yard had a flat board on top for high walking. One day Claire Bouton, whose yard adjoined a rear corner, pelted me with apples and knocked me off the fence. I hit the ground pretty hard and was knocked out. A terrified Claire called her Dad, whose upholstery shop was close by. After my few scratches were smeared with iodine and Claire said her sorries, I was able to recover.

Another, and humiliating, memory is of the time I was playing in the sand pile and got stung on the bottom by a bumble bee. When our next door neighbor, Mrs. Armstrong, heard my howls she came to my rescue. That was fine but when she pulled my britches down in front of all her kids in order to treat the bite, I was crushed.

It wasn't only those accidents that stay fixed in memory. There were lots of good times and great picnics with good food. Beans were a diet staple. Some Saturday mornings I'd build a fire alongside a backyard pit. Mom would fill a big gray crock with layers of bacon, onion, beans and molasses. I put some coals in the bottom of the pit, and in went the pot. Coals were packed all around and on top and then a dirt filled burlap bag served as a cover. By then it was nine o'clock. But by five or six in the evening, the beans were ready. With fried clams and homemade blueberry pie - what a feast!

There were good friends to share the picnics and other outings. If we weren't going off somewhere with a friend, then they came to visit or went on outings with us.

Sherrick Bauer, Junior Brazil and Tom Smith were my buddies. We all had bikes. Mine was a green Columbia bought for \$32 with hard-earned quarters, nickels and dimes, saved over a long time. The four of us rammed around on our bikes and took to the unpaved country roads. My bike had no chain guard and threw me for a fall when my long trousers got caught up in the chain. Then I invested in some trouser clips.

On hot summer days we often fished in a pond back in the woods, then cooled off lying on the sawdust - covered ice in the nearby icehouse. Heaven on Earth!

In the winter that same pond echoed to our shouts of glee as we tried to skate on its rumpled surface. I think we were down more than we were up.

Once our Dads took Tom and me to a more remote pond and left us for a week-long campout. With a box of 500 .22 shells, we really learned how to shoot accurately that week. My gun was a Stevens single shot, with a rolling block that I had bought for \$3.25. We fished, cooked our meals hiked the area and did a lot of target shooting. We lose track of such friends, but the memories of good times together lingers.

Compo Beach was within bike riding distance. It was about 6 or 7 miles from home on Long Island Sound. My folks rented a wooden locker room at the beach for a place to change clothes and to leave wet bathing suits to dry. Changing clothes in the outhouse sized locker room with its wide cracks between the vertical boards provided a first opportunity to observe male and female differences. Clam bakes at the beach end breakwater were the usual feature event of a day at Compo Beach. Huge granite boulders cut in rough elongated cubes made up the protective breakwater. We climbed over and between the huge rocks playing hide and seek.

There were times, over parental objections, when we took long swims to a nearby island. Now and then we would raise a lobster trap. We never knew who owned the trap, but if we got there first and there was a lobster in it, he was ours.

This wasn't the easiest thing to do while treading water. First we had to be prepared with pieces of wire to wrap around the snapping claws. That done we could go on to the nearby island. On the island we would hunt for an empty tin in which to cook our stolen lobster. It was hard to wait till the driftwood fire turned our catch from green to red. Then we would hungrily enjoy the fruits of our theft. Why is stolen lobster the tastiest?

Those weekend jaunts were happy times but so were the weekdays in between. It did seem that Mom always had a chore or two for me to do. If it wasn't going to the corner grocery store for some needed item, it was sending me to a further store for something. When Mom sent me one afternoon to a grocery store about a mile away to get sauerkraut, I ended up in the doghouse. I had eaten all the kraut on the walk home.

Mom had a displaced southern lady of color once as a house maid. She carried a string bag to haul home the things that Mom gave her or whatever. Now and then Dad brought home a box of chocolates and Mom enjoyed them. We kids were allowed one a day. After only a few days one box turned up missing. Mom found it in the maid's string bag and

put it back on the table. That evening the maid announced that she was quitting. When asked why she muttered "Ah just can't abide to work for folks what steals back!"

It seems that the house servant population was always changing. Mom got hold of a German immigrant girl and for a time they got along fine but one evening Mom announced she just had to let the maid go and hire another. Dad hit that situation right on the head when he told Mom, "Paulyne, you may think that you're changing maids but all you're really doing is changing faults."

That joyful childhood seemed to change as World War I progressed. Dad was called up to serve in the German army and promptly enlisted in the US Army. After a short time at Fort Dix, he was mustered out and sent home to manufacture hats for the military in his modern production plant. In the meanwhile, Sis and I had broken all the German 78 rpm records.

We spoke German at home but that language became verboten with the war. Some schoolmates called me a Hun and chased me across the street in front of the schoolhouse. I was hit by a passing car. My feelings were hurt more than anything else but the driver, a friend of the family, took me home where Mom ordered me to bed. That evening there was a procession of my school friends with apologies and presents. I began to feel better almost immediately. I liked my schoolmates and I liked school.

For some reason I had to go to a different school for the third grade. It was a few miles away which was no problem when I could ride my bike. Winter was something else especially when it was icy or the snow was too much for my bike. Then I had to walk. It was an old one-room school house with a bell in the steeple and a pot-bellied stove in the classroom. His- and- hers outhouses completed the arrangements. I only went to that school for a year and then went back to the closer-to-home grade school.

Our fourth grade teacher was a Miss Schofield. She was a rather large lady. She ate walnuts from a glass jar while we did our sums and other things. She made us awfully hungry. Miss Pardee taught fifth grade. She wore a high choker collar. She was prim and proper. She gave the impression that she had been weaned on a pickle.

Our faults were punished by being required to gather sticks and twigs in the schoolyard which she broke across our outstretched hands. That got rough when we were unable to find slender twigs.

I jumped the sixth grade - unwillingly. But there were not enough seats for all in the sixth grade and I was at the end of the alphabet. It was hard to leave my friends and get thrust in with that older crowd. But even greater changes were in store.

MINNESOTA

Dad's hat manufacturing factory got in deep trouble. He had sold a large supply of felt hats to a chain store and placed a bond to assure the client that the order would be filled. He depended on rabbit fur from Australia where a longshoreman's strike held up shipments for months.

Dad couldn't fill the order, lost his bond and had to sell out to avoid bankruptcy. An outfit called Gordon and Ferguson in St. Paul, Minnesota was the buyer. Part of the deal was that Dad would move the manufacturing equipment and a group of key employees to St. Paul and put G & F into the hat manufacturing business.

Dad went ahead to get started on the new job leaving Mom to handle all the details of packing up, selling our home and all the related matters. The house was bare and we were ready to go when Mom realized that she had hidden some bonds that just hadn't turned up while the packing was going on. She was near frantic and tore around the empty house trying to recall her hiding place. It finally occurred to her that the hiding place had something to do with heat. That was the clue and it wasn't long before we found the bonds stuffed in a brown paper envelope and thrust deep into the cavity in one of the hot water radiators.

We made the move to St. Paul by train. Dad had sent me a raccoon cap complete with tail. I wore it all the time. We stayed in a hotel for a while with Mom and Dad out house hunting. They finally found a place not far from schools.

We lived in a place called Midway between St. Paul and Minneapolis. I went to school at Ramsay Jr. High, a massive red brick building not far from the house. We ice skated on flooded tennis courts at Mc Alister College. I helped deliver telephone books in subzero weather, hauling them on a toboggan and damn near froze.

Ice fishing was fun from inside a shack with a hole in each corner and a chunk of sheet metal in the center for the kerosene stove. Dad drove his Buick right out on the ice and parked alongside the fishing shack. We chopped holes in the corners and kept the opening stirred with a stick to keep it from freezing over. The fish froze after a flap or two when they hit the icy air. When the weather warmed we fished Lake Mille Lacs and caught lots of good wall-eye pike. Dad had a 5 HP Johnson outboard that was a great labor saver. That motor became important to a lot of other fishermen too when, after a storm on Mille Lacs, Dad hauled a string of boats back to the dock.

That summer we all went on vacation to Island Lake near Brainerd. Great fishing! I caught my first muskie, about 42" long. Trolling in the evening, I thought I had nailed a

big snag. The sudden eruption of that monster into the air started a 20 minute battle before I could bring that fish to the gaff.

Those lakes were characterized by sparkling clear waters. We had to drive in shallow water about 60 feet to get to the island where the cabins were. Dad would sometimes go out fishing with friends and I fished close to the camp from an old row boat. Sometimes I did better than he did in catching wall eyes.

MARYLAND, MAINE, CONNECTICUT & NEW YORK

But Dad had an opportunity to go into business again, this time with a partner in Baltimore, Maryland. So we moved again. This time we moved as a family. Dad drove to Duluth over the dusty unpaved road from St. Paul. At Duluth the car and all four of us boarded the SS. Octarara bound for Buffalo, New York. It was an exciting trip for me. We went through a canal to Houghton, Michigan and saw the red brick buildings of the School of Mines. I stayed up all night as we passed through the locks at the Sault Ste. Marie. Mackinac Island was a treat with its horse drawn vehicles and the huge hotel. What beautiful lakes!

The work Dad did in Baltimore didn't last long as his partner turned out to be a crook as well as a drunk. It became obvious that Dad's desire to get back in business for himself had overwhelmed the need for a thorough investigation of his partner to be.

The plan was that I would attend a huge high school call Baltimore City College. But I was spared that and attended Edgar Allen Poe High School a very small school. I used to eat my brown-bag lunch in the graveyard across from the school. Poe, in death, resided there and we irreverent kids would picnic on his tomb.

We lived near Pimlico where I sometimes found employment exercising race horses. But most of my free time was spent wandering in the nearby woods. Managed to get a hernia somehow and had surgery at John Hopkins hospital. Lindberg flew the Atlantic during my three week convalescence.

By then Dad was in deep trouble as his resources were depleted by bailing out his partner. So it was off to Portland, Maine where Dad was to install a hat manufacturing plant for Ayer Houston.

While Dad was getting started on his new assignment the family spent the summer at Old Orchard Beach. I struggled to get over my operation and hiked in the woods and dug clams in the shallow water of close by tidal streams.

It was easy to pick blueberries by the bucketful. Mom would turn them into delicious pies, my favorite. Nothing could possibly be better than a dinner of steamed clams, baked beans and blueberry pie.

There were more Atlantic flights that summer and some of them took off from the wide Old Orchard beach. Our cabin in the woods was next to that of Lily Pons, an opera singer. She practiced many long and painful hours. I resolved that opera was something I wanted to stay away from.

With summer gone, we moved to Woodfords Corner, a Portland suburb. At Deering High, I was in the Cadet Corps where we drilled with heavy muskets from some war of long ago. We wore uniforms that must have been the same vintage as our muskets. They had high stiff choke collars. We marched and drilled and now and then we would be in a parade.

I enjoyed the deep woods of Maine— shot my first buck at a small lake with a .22 single shot rifle. It was the same one that I learned to shoot with on that camping trip with Tom Smith. But it was suffering a bit of wear by now and sometimes spit at me when fired as the rolling block got sloppy.

Living in Maine didn't last long enough. Dad had the itch to go into business for himself again. So back to Norwalk, Connecticut where Dad managed to get a small hat factory going again.

Things weren't so good in 1929 and with the crash of that year Dad's business didn't survive. When the operation folded, Dad went to Texas and started selling hats for another company. Mom, Sis and I went to live with kinfolk at Rye, New York. I parked cars and did other odd jobs at Rye Beach during my junior year in high school. Found a beat up canoe after a heavy storm and fixed it up so it would again float. Bob Lux and I did a heap of exploring in that fragile vessel.

I have a vivid recollection of attending the ceremony for the graduating seniors. There was a compelling speaker who impressed me with his remarks about college. He said, "If you have the ZIP it doesn't matter whether you go to college or not. But if you haven't got that ZIP, you damn well better go to college!" Then and there I decided to go to college as I was sure that I had no ZIP. When I wasn't going to school or working, my time was spent at the Rye YMCA. Louis "Pa" Cope presided over that institution and was an inspiration to many of us teen -age kids.

Pa gave us the challenge of making the grade to go on a cross country trip that would take all summer. The memory of that cross country trip with Pa, Doc Schaefer and 13 other kids is still strong. What a wonderful trip! Each boy had to earn at least \$100 towards the

trip in order to qualify for the event. Someone contributed the remaining funds to make the trip possible.

We left Rye in three donated vehicles; a 1918 Cadillac touring car, a 1924 Dodge touring car and a 1926 Dodge Suburban, a car with a wooden body that was like a pile of kindling bolted together - the forerunner of the soon to come station wagon.

It was the summer of 1929. Off we drove to spend the first night in the YMCA gymnasium in Richmond, VA. On we went for memorable days seeing the countryside.

There were frequent flat tires. Each day we switched from one vehicle to another with Pa and Doc and several of the older boys doing all the driving. When we came to San Antonio, Texas, Dad met us, fed us bought a new tire for one car and bade us adios at the outskirts of town-the end of the black-top.

Across West Texas we went and on to El Paso where I had my first glimpse of the Texas College of Mines & Metallurgy. From El Paso we headed north on the road that followed the Rio Grande. Though not a drop fell upon us, there were heavy rains in the mountains to the west of us . We waited for flash floods to subside. But one traveler wouldn't wait and drove into the wide brown torrent that surged by in the flooded draw. He stopped when the water flooded his engine and he, his wife, child and dog clambered to the car roof. They were out from the bank more than 100' when the car turned over and the flood waters carried the folks away. There was nothing we could do to avert that tragedy that took place in the bright New Mexico sunshine.

West through Springerville and Quemado and on to the Grand Canyon. What an awesome spectacle? Some of us walked down to Indian Springs from the south rim and then toiled back up in the baking heat. Six or seven flats that day and we stayed overnight at Williams, Arizona in some tar paper shacks that passed for a motel. On to Las Vegas, a sleepy railroad town broiling in the desert sun. We laid around and ate ice cream waiting for the sun to set so we could cross the desert in the cool of night.

At the California boundary, it looked like we might not be allowed in as our vehicles failed to meet the state requirement. One car had a headlight pointing at the moon and a variety of other shortcomings. Pa was persuasive and we got through and went on to Los Angeles. We saw a bit of Hollywood and La Brea tar pit before heading up the coast.

La Brea was fascinating as it was the burial ground of numerous critters of that distant past when dinosaurs roamed the countryside. Someday, I decided, I was going to learn more about their life and times.

At Menlo Park I had my first airplane ride. It was in a Curtis Robin that flew over the Bay and city of San Francisco at \$5 each. The Robin only carried two of us at a time, side by side in an open cockpit.

Chinatown, the many hills, Coit Tower, Fisherman's Wharf and Cable cars linger in my memories of San Francisco in that summer of 1929. Went to buy Mother a memento of that city. Ended up at Gump's and, of all things not unique to any place, bought Mother a sterling silver engraved napkin ring. My ill-considered gift was a family joke for years.

The Bay ferry led us out on the eastbound leg of our journey through the Sierra Nevada and on to Reno. I well recall Winnemucca and an enterprising store owner that offered "All the Buttermilk You Can Drink-Five Cents." I think we drank him dry. Bonneville salt flats, Great Salt Lake, the Mormon Temple. Cold streams of water ran down the gutters of that immaculate city at the foot of the Wasatch. We were told that now and then a trout would be seen. We didn't see any.

The Rockies posed a challenge to our worn and weary vehicles that Pa Cope and Doc Schaefer were loath to take. So we departed the city towards the northeast and on to Yellowstone National Park. Old Faithful performed as did many other geysers. We were camped not far away from the site of the evening bear feed.

Garbage was dumped on a raised wood platform as dusk neared. Armed guards on horseback ambled in front of the bleachers available to the spectators. A group of black bears appeared and began to gorge. This didn't go on long before a few grizzlies came along and chased the blacks away. What a sight!

As we moved out, had an excellent view of the Yellowstone Falls. Have a vague recollection of the Badlands and Devil's tower. Then there is a memory gap until we came to Niagara Falls. A trip on the Maid of the Mist and a visit to Canada are vague as we neared the end of our two months and 8,000 mile journey.

That Fall Mom, sister Erna and I moved to New York City while Dad stayed on in San Antonio, Texas. New York wasn't my idea of a good place to live. I hated the congestion, the building block apartment houses and the monstrous school where one's identity was submerged or lost. I needed a job and finally found a drugstore on upper Broadway that needed a soda jerk. I applied and offered to work two weeks for free. That got me the job. The owner paid me ten bucks the first week and then \$14 a week thereafter. It was a regular drug store but I suspect that the most lucrative part of it was selling prescription booze and bootleg gin. I was the delivery boy and carried bottles all over the neighborhood. The tips were good. Now and then I would deliver a bottle to some lady that wanted me to take out the price in trade.

I got an additional part time job as usher in a theater. The two jobs while attending school left no time for other extracurricular activities. In addition there was homework to do. I qualified for graduation but didn't stick around for the ceremony.

CHAPTER 2.

AT SEA - TEXAS MINES - COLORADO - ARIZONA & TEXAS

AT SEA

Rustled a job in the shipping companies as the sea offered the opportunity to escape the city. I finally got a job with the Great Eastern Shipping Co. on its SS West Texas, an oil tanker. It was a small ship carrying less than a hundred thousand barrels. My job was as a mess boy for \$42.50 per month with room and board included. It was quite an experience!

My diary tells me that on June 27, 1930, I went to the subway with my knapsack and kept moving to finally locate the SS West Texas. I was assigned the job of messboy. Within a few days we were put in dry-dock for some repairs before putting to sea. My diary says, "The steward got a woman on board supposed to be his daughter, but ye gods, he treats her like a husband treats his new bride."

Stores came aboard for the trip. Lots of lifting and carrying getting those bags and boxes up the gangplank. My diary of long ago reads, "I had to clean the dirty first assistant's cabin. I took some Lysol and put it in hot water making suds. I was washing his bunk with a weak solution and had left the bottle on the table. The Chief Engineer, Olson, came in dead drunk, greeted me cheerily and then drank about 3/4 of a glass of pure Lysol, enough to kill a horse. I ran to the galley and took a cleaver to cut open a can of milk. Dropped in a raw egg and got the mess down the man's gullet. Hell was a popping. Doctors, emetics, police, ambulance. I was the only material witness. Last we heard he came to and asked for food. Boy, drink is a terrible thing!"

"July 3, 1930. We are on our way-but to where? Next trip out I'm gonna sign on as an ordinary seaman. Besides, they get \$47.50 per month. They still have the same work day as the mess crew - four hours on and four hours off."

The first trip was to the nearly new refinery at St. Nicholas on the island of Aruba, off the coast of Venezuela. When it came time to leave we didn't have a full crew. So the skipper rented a horse drawn rubber-tired wagon and we began a patrol of the many bars and cat houses. We retrieved almost all the crew and loaded them in the wagon and finally got them aboard. We headed north to dock on the west side of the Hudson River some days later. Then I finally remembered that it might be a good idea to tell Mom where I was.

The next trip was to Goose Creek near Baytown on the Houston Ship Canal for another cargo of crude. We saw waterspouts in the Gulf of Mexico. My job as messboy involved

making up the officers bunks, cleaning their cabins and the mess hall and officers galley in the midsection of the ship. At meal times I walked back on the flying bridge, an elevated walkway above the deck to the stern where the engines, crew's quarters and main galley were located. There I filled the stack of four or five tins held together in a single package and toted the assembly to the officers galley amidships. Each tin would fit into a hole on a steam table to keep it hot. Then the mess man would serve the officers mess.

When the meal was over it was my chore to clean the galley and end up with mopping the floor. One day the Cuban mess man didn't wait for the floor to dry and tracked it up with his dirty footprints. I remopped and warned him not to walk on the wet floor again using some pretty strong language.

I was doing something at the sink when I felt his arm around my neck as he jabbed me on the shoulder with a knife. I wriggled loose and picked up the mop bucket and did my best to flatten it against his head. He finally came to and never bothered me again.

Goose Creek was something else! Girls from nearby Baytown came aboard and visited the cabins looking for trade. They were all a rough bunch. But it was depression times and perhaps that was the only way they could make a living.

We had a fat Jamaican cook and a little cockney steward whom I won't forget. I was getting my daily orders from the steward when a crew member came in with a complaint. The steward called for the cook who came running. The complaint was that the cook was straining the soup through a sock. But the cook had an answer, "Boss , me no us'em dirty sock, me us'em clean sock."

After several trips I was promoted to Ordinary seaman at \$47.50 per month. There was no union then and we worked four hours on and four hours off around the clock. But they were trying to form a union. I was asked to join and resisted. When the organizers persisted I told them I would join and raise hell against the union from within. Then they left me alone.

Each trip was an experience, some good and some bad. The practice at that time was to sign on for a ship's round trip. At the end of each trip you were paid off but could sign on for another round trip if you were wanted. The worst trip I ever took was on a gasoline tanker.

On the trip out from the east coast, the tanks had to be cleaned. First gear was rigged to carry air into the empty tanks. A two foot diameter canvas tube was lowered into the tank to be cleaned. It had wings at the top to collect air that the tube carried to the bottom of the tank. Two men at a time were assigned the cleaning task. There was no metal on

anything we wore. Even the old canvas shoes we had to wear had no eyelet's. We wore a harness with a hoist ring on the back so we could be pulled up if we passed out.

We climbed down the rusty ladders to the floor of the tank. We used wooden scoops and string tied brooms to gather up the rusty scale on the floor of the tank. Loaded into a wooden bucket, the scale was pulled to the deck and dumped overboard. We waded in six or eight inches of gasoline while doing the cleanup. The air funneled in by the whim sail gear helped but thirty minutes of this work was about all one could take in a day. A few of the crew could handle up to an hour.

Afterwards everything tasted of gasoline. I think you could have run an automobile engine on my urine. It took weeks for the lingering gas taste to vanish.

Yet, I liked the sea and wrote Dad that I was going to stick with the sea and become a mate or captain. We were docked near Goose Creek on the Houston Ship Channel taking on a cargo of oil. Folks that lived in Goose Creek usually claimed Baytown as that was better known.

Apparently Dad didn't think too much of the idea of my being a sailor and suggested that we take a fishing trip. That was right down my alley so I left the ship and we drove west to San Antonio.

One morning as I pulled on a sock - bang, a scorpion bit me on the heel. I was one sick lad but managed to keep going through the nausea and headache and just plain pain. That afternoon Dad took me to some museum where there were all sorts of reptiles and scorpions. I learned that, at times, scorpion bites could be fatal. Somehow, that didn't make me feel any better.

On to Del Rio where we headed up the road towards Langtry. When we dropped into the canyon and crossed the Devil's River bridge, Dad turned off and we went through many gates as we headed up the Devil's River. Finally there was no more road so we packed in several miles more and made camp alongside the sparkling clear waters of the Devil's River. We fished and explored and had a lot of fun. We drew our drinking water from a nearby spring. There were many.

While exploring one cave and looking for arrowheads, Dad's hand rested on a ledge when I glimpsed a rock rattler about a foot from his hand. It sort of upset Dad when I blasted away with my single shot .22 and rock fragments bloodied his hand. He got over his mad real quick when I pointed to the dead rattler.

We had long chats and Dad taught me a great deal, mostly about my future. In the end I was convinced that I had better go to college. So when that idyllic two weeks was over, Dad drove me to Langtry. With my pack on my back, I waved bravely to Dad as he

turned the car around and headed back towards Del Rio. I was facing a long trek to El Paso to enroll in the Texas College of Mines .

But the opportunity was there just waiting for me. A freight train was stopped and it didn't take me long to mosey over and hop aboard a freight car with an open door. I had the car to myself and made myself comfortable for the trip west. The movement of the train and the clackety-clack of the wheels lulled me to sleep that night.

When I woke up the next morning, sunlight was shining through the freight car door. But we weren't moving! After some time I summoned enough courage to look out the door to see the road paralleling the train tracks and small buildings on the far side of the road. I pulled back and waited some more but nothing happened. I finally got up enough nerve to poke my head out and look back. I was in the last car on the train!

I pulled my head back in and waited another half hour before another look out, this time toward the front only to discover that I was in the only car on the train! Quickly I grabbed my pack and bailed out to saunter across the street and into a diner for a cup of coffee and a donut.

I headed west walking out of that small town of Alpine, Texas. About 7 or 8 miles west of Alpine I came to the summit of Paisano Pass. Its name must have gone back a long way as Paisano was the Mexican nickname for Spaniard. Tired of walking I rested in the shade of a large Mesquite tree and slept for a bit. I woke to the sound of abundant swear words. There alongside of the road was a Model T pickup with a very flat tire. I left my shady spot and went over and offered my help. As I was about to rest my hand on part of the slatted box on the truck bed, the owner yelled to warn me off. It seems that his load was burlap bags of rattlesnakes.

I helped him fix the flat and welcomed his offer of a ride. I stayed with him all the way of the day long trip to El Paso. It didn't make me too happy to have that buzzing cargo of snakes just inches away . I needed more than a casual cleanup before I could register. I think I smelled like snakes! Sneaked into the almost vacant dorm, and showered and spent the night.

TEXAS MINES

My bank account was about \$540, money carefully hoarded over a period of years. So I registered with confidence as a freshman to work towards a degree in Mining Engineering. It wasn't exactly what I wanted to do. I always had dreams of becoming an archeologist and digging up important finds to enhance our knowledge of the past. But I couldn't figure out how to make a living at that. So mining seemed my next best choice.

The big expense was room, board and laundry which was about \$28 per month in the dorm in a shared room. Bob Estes from Midland, Texas was my room-mate. We have been friends ever since.

Freshman were really low men on the totem pole. Answering the beck and call of upper classmen was our constant chore. Violations or even suspected violations were always adequate justification for a paddling. But it was always done with good humor and did not engender antagonism towards our "masters." Included among those paddle swingers were Fred Stewart, J. B. Andrews, John Payne, Bob Emmett and Charlie Davis. Each had a good arm.

John Payne writes in 1993, " You should be grateful for the beneficial way I treated you as a freshman as I am sure you are a better person as a result."

Mines was a small school in 1930.— less than 500 students and only a few girls. It was strictly an engineering school but that was about to change. It seemed that all the students were poor. We had patches on the patches on our jeans.

I needed to supplement my funds and searched for some kind of work. I got a job as a sales clerk in a ladies shoe store. Although the scenery was great, I didn't care much for the job, so resumed the hunt to find other employment. I found one in the Hotel Hilton gift shop - again as a sales clerk. Didn't care much for that either and besides it was about a 2 mile hike to town and the same thing going back to Mines. Talked to "Cap" Kidd about my problem and he put me to work right there on the campus.

The several buildings on the andesite intrusive that made up the hill on which the campus was located was rougher than a cob. My job was to build paths from one building to another. This involved lots of drilling and blasting on the weekends followed by plenty of wheelbarrow and shovel work.

Later on my task was to replace the broken window lights on the old pilot mill building. I knew even less about glazing then I did about drilling and blasting but was determined to give the job my best effort. I had to remove the pieces of broken glass, clean the frame and insert new panes with glaziers points and putty. All this for 25 cents per hour.

Sitting on a window ledge with my upper body on the outside, I was very busy cleaning a frame when I heard a call. Cap Kidd had been watching and rasped, " Sheldon, at the rate you're doin' those windows, it costs more than two-bits per pane. Speed it up!" My proficiency improved rapidly as there was always the risk that another student would replace me.

Trying out for football and flunking algebra wasn't a good combination. Beulah Liles taught us Algebra and good sense. She called me in for a conference and made it clear that I had to make a decision about what I had come to Mines to do. I dropped football and managed to squeak through Algebra with a D.

Actually there wasn't enough time to do all the homework, get enough sleep and keep up with the class. The meals at Kelly Hall, the dorm, were good and served family style. Big pitchers of milk were refilled and drained by us growing youngsters. My job of rock work seemed to make me unusually hungry. But I was thin and answered to "Slim."

There were some unusual ways of having what we called fun. The windows at the end of the hall were directly over the entrance to the mess hall. Now and then we dropped water filled balloons on emerging patrons. This was sure to be more than annoying and now and then a dripping target would charge into the dorm looking for a fight. By that time the perpetrators, and everyone else for that matter, had retreated behind locked doors and there was no one to fight.

Now and then we would have water fights between ourselves using the fire hoses in the hallways. Once when we were thus engaged Cap Kidd entered the dorm only to get a full blast from a fire hose right on the chest. I forgot what our punishment was but it must have been worth it.

It wasn't too difficult to gain entry to a locked dorm room if a bit risky. One could climb out a window onto a ledge of the Bhutanese type structure and carefully walk to another room and enter through an unlocked window. Then, take a drawer or two and stack everything else in the room on top of the drawer in such a way that when the lawful occupant opened his door all would come crashing down. This act would result in reprisals but seldom inflicted on the right party. Mayhem was a result.

Prohibition was in effect if not fully enforceable. We would amble across the bridge to Juarez - fee 2 cents - and walk around to one or the other of the many bottle shops. A bottle of Berreteaga sugar cane brandy could be had for about 79 cents. We would each take a swig to get the smell on our breath and then pour the balance into a hot water bottle artfully concealed under our shirt and belt buckle. Then back across the bridge and on to the party!

There was a brewery in Juarez, just the thing for Saturday beer busts. A bunch of us would walk the bridge and on to the brewery where \$4.50 would buy a keg. That keg went a long way and before it was finished we were fighting and throwing one another into the irrigation canal.

When the keg was empty there was the long walk back to Mines. It was far enough to sober us up but that didn't always work. There was a wooden bridge across a dry gulch on the Mines access road. It had a railing topped by a flat two by six. There were those less than intelligent times when we challenged each other to walk the rail, some 25 feet above the rocky bed. But the Lord really does watch over fools and drunks and we all survived.

Painting the M on Mt. Franklin was a big event. We struggled up the mountainside with mortar boxes, water cans, bags of lime, hoes and brooms. Then to work. That M is made up of lots of big boulders and is about 60 feet high and 70 feet wide. It took lots of lime and hard work to give it a new face that would last another year. This task has been carried on for many years and the M is visible from every flight into El Paso.

St. Patrick's Day was another big event. Oro Grande, an old mining area about 50 miles north east of El Paso was the place where we celebrated the saint who, among other things, drove the snakes out of Ireland. He should have come to Oro Grande as there were plenty of snakes there on which he could have exercised his powers.

For freshmen, St. Patrick's day was a sort of initiation. Am not sure into what, but we were adequately hazed. Blindfolded, we were made to crawl into an old adit. We were warned of the many hazards, such as "Stay hard by the right rib or you'll end up down that winze with a broken neck." It turned out later that the hazards were inventions of the upper classmen. We were forced to eat snakes eyes which turned out to be oysters. We were paddled, beered and fed and all in all had a great time.

That summer between our freshman and sophomore years, Bob Estes, my room-mate and I decided to go to Beaumont and take a chance on getting a tanker job that would take us to the East Coast where we could visit my Mom and Sis. Bob was the proud owner of a tiny Austin, small, uncomfortable but economical. We headed out and on the way camped out some. When we got to the Texas hill country near New Braunfels, we spent the night at the home of one of Bob's kinfolk. Then on to Corpus Christi where we stayed with another of Bob's kin and rustled a job at Beaumont. We finally landed one.

It was Bob's first trip to sea and he suffered for a while but enjoyed it when he recovered from the sea-sickness. We landed somewhere in South Boston. We found our way to Scollay Square and then took a bus to New York. After seeing the sights of the town we

headed back to the Texas Coast on a Cities Service tanker. Sis got us the jobs as she was working for Cities Service at the time.

The trip back was rough! Bob signed on as an ordinary seaman and I went as Chips helper. We were both seasick this time. I had to work with an electric drill to drill new holes and tap them for the hooks that held the doors open. The vibrations against my suffering tummy were something awesome.

Off Cape Hatteras the seas ran high. We could stand at the stern and see the waves above our heads and then we were on the crest and could hear the propeller chugging partly out of the water. This was the SS Kansas and like the previous ships I'd been on was a triple expansion steam engine. But unlike my first trip which was coal fired the Kansas was oil fired. It was still a great sight to see the three huge cylinders where the steam expanded to move the huge connecting rods to the crankshaft.

The head, or sanitary facility, on the SS Kansas seemed strange. The sole feature of the head was a sheet metal trough about 2' wide and 12' long. The trough had a smooth wooden bar about 4" wide at its outer edge. At times there were as many as six men at a time seated on this wood bar as they attended to business. I guess you could call that a communal crap.

Bob went on home to Midland but I stayed with the ship to earn a few more bucks to get me started on my sophomore year. The dorm at Kelly Hall was a thing of the past as the building was needed for more class rooms. There were some 400 students at Mines in the 1930-31 school year. There were even a few girls taking some classes. None of the girls were working towards any of the engineering degrees offered. But they were a welcome addition to the campus, especially on windy days. When there was a girl or so in a class, the empty tomato juice cans used by the tobacco chewers disappeared.

And pranks like we played on Orville Willet, our English teacher, just didn't happen. We irritated him once by placing a coil of grease mixed with sawdust in his desk drawer. The only thing in lacked in being realistic was the stink.

With girls on campus and active hormones, I had a date when I could afford it. There was a hock shop in town run by a guy named Ehrlich. One of the Ehrlichs was a guy about 8 feet tall. I was always sure that I could get five bucks on my log log duplex slide rule.

It wasn't too hard finding a place to live. Al Williams, Henry Hawk and I went to a home on North Kansas St. owned by a Mr. & Mrs. Bonorden. Bob Estes wasn't too far away. It was much nicer than living in a dorm but not nearly as much fun. We had to find places to eat and that often meant walking to town.

There was a place called the Oyster Loaf Cafe near the railroad tracks that we ate in often. It always had a special of "All you can Eat for 25 cents." Not bad either! Sometimes it was chili or lima beans cooked with bits of ham. Lentil soup was popular and we doctored it up with ketchup and hot sauce to give it more flavor.

Now and then we took the longer jaunt to Juarez. There we could get tacos guacamole with two bottles of Carta Blanca for two bits - the same price that the girls behind the billboard charged to satisfy other appetites. To get to the International Bridge, we had to walk through south El Paso. That was the habitat of girls of all sizes shapes and colors who hawked their wares from behind old fashioned Dutch doors, the kind that could open halfway down. As we passed by they would quote their prices that ranged from fifty cents to two bucks.

There were weekend events that were lots of fun. Crockett Riley had an old Dodge touring car and we would chip in for gas and go exploring. The "we" frequently consisted of Jerry Faust, Bob Estes and Bud Guyler. Several times we climbed Guadeloupe Peak, the highest point in Texas. Once we went out to Aden Crater, nearby in New Mexico. We were equipped with ropes and climbed down a fumarole and dug in the bottom. We found some unusual bones that were later identified as belonging to a giant sloth that inhabited the area in Triassic times.

There was a time when the team looking for a place to locate the McDonald Observatory was considering the Franklin Mts. They came to Mines to try to find someone that knew the trails to the peak. I spent many weekends alone on the mountain and knew the many trails quite well. I was hired to lead the observatory crew and the army packers from Fort Bliss. Many army officers didn't much care about having some teenager show them anything. But I kept to the trails I knew and so did most of the observatory locating team and we stayed in the saddle all the way to the top. At one point on the trail we looked back and could see the army officers leading their horses as they moved on steep ground instead of sticking with the trail.

When we had picked a site to set up the test telescope, we made camp and got ready for the night's work of sky searching. The entire effort was a gross failure as there was a sandstorm nearly every night. The McDonald Observatory was finally located near Fort Davis.

We explored the old tin mines located on the east side of the Franklin Mountains. Samples of cassiterite were easy to come by. On one trip there we ended up with two flat tires and used greasewood to fill a tire casing. Tied on with old fence wire, it finally got us back to town.

Finally I acquired a car. It was an old Essex and sort of a wreck. I stripped off the rear part of the body and made a small flat bed pickup out of it. I took it on a fall hunting trip to New Mexico with some friends. Camped out in an old range cabin. We were envious of one guy who brought his girl friend along. We shot our bucks and it was time to leave. The old Essex didn't want to start in the sub zero weather. But when we had built a fire and pushed the glowing coals underneath the oil pan, it warmed up enough to start.

Actually I had a need for something that would serve to take girls on dates. For \$65 I bought a 1928 Whippet with a rumble seat - the green dragon. There were other cars in between, but none that lasted like the Green Dragon. It had a Continental Red Seal engine that was simple and reliable.

One of its biggest attractions was the rumble seat. The girls just loved to ride in the Green Dragon and I drove it everywhere - even up and down the steps in front of the Main building. The engine was easy to overhaul. The con rod bearings were poured babbitt and I learned how to rebuild them as well as do most of the other maintenance chores that were required all too frequently. It was economical to run getting about 20 miles to the gallon of gas and about 200 miles to the quart of oil.

Gasoline cost around 15 cents per gallon and a friend at a nearby service station saved me the oil drained from other cars for me to filter and reuse.

In my junior year I was working as geological assistant and earned about \$40 per month. I made thin sections and polished sections for various consultants to augment my income. Also worked as an assistant for John G. Barry, a consulting geologist. That meant I hauled gear to and from the car, drove the car, fixed flats, cut samples and made surveys and maps of properties being examined. It was good training.

On one trip to the Ash Peak Mine near Duncan, Arizona, Mr.Barry was working with Robert Sayre who represented the Howe Sound Mining Company in the southwest. I was doing some mapping with a plane table and carried the survey into a short adit that went to a stope that was mined to daylight. Mr.Barry gave me hell for taking a plane table underground but Mr.Sayre came to my rescue saying if it worked it ought to be done that way. Examination of the old assay records showed that Herbert C. Hoover was once the mine assayer. In the evenings we sat on the steps of the long old bunkhouse. I did a lot of listening to the geologic discussions and the stories. It is the tall tales that stick in my mind more than the technical stuff.

Bob Sayre told of an examination trip in the West Elk Mts of Colorado where he reluctantly shot a male black bear that had become a pest. He told how he skinned out the bear, put it on top of his pack and started down the mountain. Approaching a clearing on

the trail he saw a female black bear. "I decided to ignore her." Bob said. "So I moved straight down the trail and that she-bear waddled towards me. So I backed up and skirted the clearing through the woods on the right. But the bear ambled towards me again. Tried the same thing to the left but there was no escape. You know I had to mount that bear three times before she let me pass!"

There was a hand drilled adit we examined and sampled that had been beautifully driven by a long gone prospector. Years later it turned out that he had been on the right track towards a good ore body but gave up just 40 feet too soon.

Fred Searles, onetime president of Newmont, tells of an experience he had while searching for large low-grade orebodies in Arizona. He was staying at the old Duncan Hotel. "One evening," Fred said, "I was headed up the long staircase to turn in for the night when a fellow came running across the room yelling, 'Mr. Searles, Mr. Searles,' I asked him what he wanted and he said, 'I understand you're looking for a large low-grade copper deposit!' I confirmed this and the fellow said, 'Well, you just have to come and look at my claims. I've got a tremendous deposit and for low-grade, hell it can't be beat!'"

Bill Orme-Johnson's Dad owned and operated the El Paso Machine Shop and seemed to do well despite the depression. They lived in a large home in the east end of town and the parties they held were just great. Bill went steady with Jean Mary McGee and sometimes I dated Kitty McGee.

There was always plenty to drink at the Orme-Johnson's, but then the 18th amendment was a joke. Sort of like trying to outlaw sex and eating. . Perhaps a bit of both are good for us.

Jerry Faust dated Betty Brand. I did some tutoring and had one mighty pretty client in Jean Kilgore. Tutoring gets folks close and soon we were going steady and got married the week after graduation in June 1934.

John G. Barry was President of the College of Mines and Metallurgy. His yearbook statement was, "The Flowsheet this year is planned to depict the Romance of Mining. There is no career open to young men which lures with more adventurous prospects. Travel, out of the way places, new conditions, congenial companions, freedom from conventional constraints, possible wealth, all beckon. This is all true but----! From twenty-five years of experience of the life may I sound, not a note of discouragement, but an important consideration. There is such a story book glamour that some are caught by it who do not weigh the payment early enough. Be sure that you have within yourself the resources to live alone, to take sole responsibility, to meet situations where there is no one to lean

upon; and, upon the other hand, that you can mix with all sorts and kinds, your own nationality, foreigners, high and low, and find them good. There is variety, change, great interest and experience open to the man who because he likes engineering is willing to endure hardships, unlimited working hours, loneliness, danger, and separation from family and urban life. It is not a life of play boy adventuring. The real romance of mining is hard work, stimulating , invigorating, and broadening to the man who likes mining and creative efforts."

I was proud to have worked for John G. Barry. Years later in Grand Junction, Dr. Barry came to work for me in the great search for uranium deposits.

COLORADO

It was off to Colorado for me. John Barry, was consulting for the Minnesota Mines at Empire, Colorado. It was a venture by the Gold Medal flour miller into mining. I was engaged as the assayer at \$125 per month but got bumped from that job by a buddy of the manager. The new assayer was Lou Undereisser, an experienced assayer. I learned a lot from Lou but went underground to cut samples. The narrow veins were characteristic of the district. The gold occurred in pyrite in quartz. It was decided that hand sorting to upgrade the flotation mill heads was necessary. I moved into the crew building the Gilpin County type sorting bin.

All mine cars dumped onto a grizzly where the plus 4 inch material slid down onto a four foot wide solid sloping grid where a crew of hand sorters picked out the large lumps of waste and low grade. It was labor intensive, but worked to raise the heads to about half an ounce. But that still was not enough.

I stayed at Guanella's lodge until my bride joined me. Then we found a house for rent in nearby Georgetown. The house was just across the street from the Capitol Prize mine. But I was still working at Minnesota Mines in Empire. There was a short-cut across a pass traversed by a steep narrow road. The scenery was great and I often traveled the pass route till a portion of the road supported by timber cribbing rotted out and the road was no longer passable. It would have been a long drop if the road had given way with a car on it.

I began to drift around and became a regular 10-day miner., one who works a pay period at a mine and then switches to another. Tried the Red Elephant mine near Lawson and then the Glory Hole near Central City. Finally moved to the Capitol Prize with a real short commute of walking across the street.

I learned a lot of geology and mineralogy in these various mines. My job in the Capitol Prize was running a dry buzzy in a narrow stope. These dry stoppers with hand rotation were called "widow-makers." It was easy to see why as we worked in a cloud of dust every minute that the drill was running. The yellow beam of the carbide lamps we used was almost obscured by the dust. When I had inhaled a few pounds of silica dust, I came to the conclusion that a dry buzzy just wasn't my thing.

Winter was coming and I had to find another job in the mines. Just across Loveland Pass it was not too far on to Leadville and the famed Climax Molybdenum mine, a block caving operation. I wrote a letter and was offered a job as a chute blaster at \$5.66 per day. The money sounded good and we packed the little green Whippet and headed up to Silver Plume and on to Loveland Pass.

But the fates had other things in mind. A con rod bearing failed on the long steep incline up to the Pass and we had to retreat to Georgetown. There once more I undertook the chore of pouring new bearings and scraped, blued and scraped till I was able to fit them on what were most likely out of round crank shaft bearings. Guess the fates were being kind to me. The half-life of a Climax chute blaster was pretty short.

I learned a bit later just what a chute blaster had to do. Huge chunks of ore would frequently choke up a finger raise or a main ore pass. It was the chute blaster's job to get the muck dropping freely again. To do this meant taking a handful of 1" x 2" lath into the chute, lash them together with a stick of powder on the end piece. Then it had to be pushed up under the clogged muck in the chute. The dangling fuse would be left hanging out of the chute. When this device was in place, the chute blaster would crawl out and ignite the fuse hoping that his blast would get the muck moving again. If this failed on the first try, there was no option but to repeat the process with a bit more dynamite.

Finally we were able to get to Denver. There I went to see Arthur C. Daman of the Denver Equipment Company. Fortunately he recognized my name as the winner of a Denver Equipment award, and offered me a job in sales. That wasn't what I wanted. Mr. Daman told me of an Arizona gold mine where his company had just finished building a cyanide treatment plant and gave me a letter of introduction to the mine manager, A.E. Pratt. So it was off to Arizona with high hopes. Before we got there we had to hock a few things to buy gas and food, but it didn't seem to matter too much. After the Loveland Pass experience prudence seemed to dictate that we travel by the lowest route possible. We headed south from Denver through Colorado Springs and Pueblo. Canned bully beef and beans were the diet mainstays and we picnicked on those on Raton Pass. On to Cimarron, Taos and Santa Fe. West from Albuquerque through Grants and Gallup.

We found that frijoles were cheaper in that area so switched to those plus tortillas. On to Holbrook, Winslow and Flagstaff. Down Oak Creek Canyon, through Sedona and then Prescott. We had camped out along the way and eaten sparingly. But we were dead broke when we got to Prescott. We hocked wife's watch so we could keep on. Small wonder that my mother-in-law was convinced that she had a worthless son-in-law.

ARIZONA

Down Yarnell Hill to Congress Junction where we turned off for Octave. Found Mr. Pratt and gave him Arthur Daman's letter. He read the letter and then asked if I had any experience at hard labor. As Mr. Pratt was more than half deaf, I showed him my palms. After fixing three flats that day they were pretty dirty and made it look like I was experienced. Mr. Pratt said I could work beginning the next morning at \$2.50 per day as a nipper.

We found a place to live about two miles back down the road towards Congress Junction. It wasn't much. A long wooden board and batten building with a narrow porch on both long sides . Twelve doors opened from the porch, each to an "apartment" that was 10' wide and consisted of two rooms 10'x10' each opening to a porch. The "apartments" were separated from one another by a painted canvas "wall" that was 8' high.

There wasn't much privacy to put it mildly. If someone was cooking cabbage, we all were abundantly aware. Frijoles were even worse. No matter what went on, all the other residents knew about it. Pinto beans were a dietary staple.

There were two outhouses, in order to separate the sexes. Getting together in the apartment just seemed too embarrassing. But there was plenty of room out on the desert with mesquite trees, creosote bushes and dry arroyos. There wasn't much question as to what was going on when couples ambled away from the bunkhouse carrying a blanket.

Water came from a single tap that was fed from a water tank on stilts. The tank was replenished now and then. But the rent was low-\$12 per month, almost a week's wages. The NRA, National Recovery Act ,was in force and we worked only 5 days per week.

In an effort to supplement income, I built a dry panner with a crank operated bellows and screens above the bellows. Working along dry washes, I would pick out the sand and gravel from crevices and feed them to the dry panner. Some weekends were better than others and I could usually pan out between \$5 and \$10 for the two days' work.

My job as a nipper was interesting. It took me all over the mine. Underground I was charged with picking up all dull drill steel and hauling it to the shaft station and on up the inclined shaft to deliver it to the blacksmith for re sharpening. Riding up the incline with

dull steel or down with sharp steel, I often wondered what would happen if there was a sudden drop of the skip and how I might end up like a pincushion with steel stuck through me at all angles.

In my frequent trips to the blacksmith shop I came across some old wooden nail kegs filled with a variety of hand forged candlestick holders. It was the practice in blacksmith shops to test applicants for the job by having them make a candlestick as that involved almost every blacksmithing operation. I took a few candlesticks but didn't have the foresight to keep more.

One unsavory task was hauling up the honey boxes as they needed replacing. The honey boxes were empty dynamite boxes located near the spot where carbide lamps could be recharged. You emptied the slaked carbide, and whatever else you wished to dispose of, into the honey box and then refilled your lamp with fresh carbide. This use of the slaked carbide was intended to allay the odor and it worked to a very limited extent.

The mine and mill were owned and operated by A.S.& R., the American Smelting and Refining Company. The Octave mine was on some of the first patented claims in Arizona and were originally owned by the United Eastern Co. The vein was primarily bull quartz, about 6- ft. thick and inclined at 20-30 degrees. The inclined shaft from which the mine was operated was in the vein. A number of levels at one, two, three and four hundred feet provided access to the vein for stoping. Level pillars were left for later recovery and the open stopes only required an occasional timber for support.

When gravity wasn't quite enough to slide the broken ore down to the chippy chutes, double drum slushers were available to do the job. Most of the stoping was done with "Mexican" setups where a jackhammer was suspended by hook and chain from the collar of a piece of drill steel. Drifts were driven with 4" leyners mounted on a post. The quartz vein was very hard and it took a lot of steel to get in a round. Blasting on the levels was done on a turn sheet that sure was better than mucking off the rough.

Soon I was promoted to mucker and worked with a miner who had to put in 18-20 six foot holes per shift to break his round. It was my job to help the miner set up his column, arm and saddle, lift the drifter in place, muck out the previous shift's broken round and then help the miner load, tamp and spit his blast holes. If a miner failed to pull his round he was kicked back to mucker.

It wasn't too long till my miner failed to pull his round and I got promoted to miner at \$3.50 per day. I was in tall clover! At the same time, although I didn't know it, I was ruining my hearing.

Engineering for the mine was done out of Tucson where A.S.& R. had a regional office run by Burrell Hatcher. A.E. Ring was the mining engineer. He did the surveying about once a month, set lines for drifts and performed other functions. He decided that we should put in a raise to connect our drift on the 400 level with some old workings and an inclined shaft that went to the surface some 700 ft. from the main shaft.

I was assigned the job of driving the raise for the connection. I was given an R104 stoper that was a great advance over the dry buzzys used in the Capitol Prize. It had built in rotation so you didn't have to keep twisting the handle of the machine. More important the R 104 used water and dust was greatly reduced although the operator was continually doused with gray mud.

All was going well until one day I was told that I was to start using replaceable bits instead of conventional steel. Timken, a specialty steel company, had recently invented the replaceable bit and wanted to get them in wide use. I was opposed to the idea as, if I ran into trouble and failed to pull a round, I would get kicked back to mucker.

It was a relief to learn that I was to be an exception so that the test of the Timken bits could proceed. There was plenty of trouble. Some of the replaceable bits were as brittle as glass and shattered and others were butter soft and soon got pounded dull. I failed to pull my round on quite a few occasions.

Mr. Ring set spads for the line on which I was driving the inclined connection. But we were not connecting. I got a buddy to go down the incline and we knocked on the rib here and there in an effort to see where the new opening I was driving was in relation to the old shaft.

After several days of this, I decided to take a chance and put in a round at right angles to my raise. The round broke into the old shaft about 15 ft. up from the bottom. So much for engineering! I never heard a word about my unauthorized action to place the connecting round.

I kept looking for an engineering job and an offer came from a mine on the east side of the Bradshaw Mts. On the Thanksgiving holiday of 1934, we drove up to Prescott, down towards Mayer Junction and up a hairy road to the mine. It was near a community called Crown King, close to the crest of the range.

There were a number of small operating mines in the area. They really should have been called prospects. The one that was looking for an engineer was a narrow vein with one ore shoot exposed that was pretty high grade. I was told that it averaged about half an ounce per ton. I think it was called the War Eagle mine. They offered \$90 a month and a house. But I figured I was just as well off at Octave, so we headed back.

Going down Yarnell Hill, I saw a tire go rolling out ahead of the car and for a moment couldn't figure where it came from. The sudden bumping and banging of the left rear wheel on the unpaved road quickly let me know what had happened. It was a long climb down the valley and a long hunt. Finally I found the tire on its steel rim and managed the tough climb back to the green dragon.

The holes for the lug bolts on the wheel rim had busted out and there was no way I could fasten the tire back on. At least none that I could figure out. So we moved on slowly riding on the rim. Shortly after we turned off to Octave at Congress Junction, the tire rim gave up the ghost and we bumped on riding on the wooden spoke ends. Got within two miles of our home and we were on the hub. End of trip!

It took about a week, but I was able to get a second hand wheel from Phoenix for about \$6.25 - almost three days work!

TEXAS

Weekend dry gulching efforts were rewarded with the find of a three ounce nugget. How beautiful! Although gold was selling at \$35 the ounce, I could only get \$60 for my prize from the Bradshaw Trading Post in Wickenburg. But that was enough!

I quit the drill runner job at Octave and we headed for El Paso in mid December. Went up to Mines to see Cap Kidd for a lead on another job. Learned that C.E. Wheelock Mine Superintendent at The Presidio Mine at Shafter, Texas was in El Paso for the Christmas holidays. I went to see him about a job and was told they only employed Mexicans. I told him that I was just as good as any Mexican and sure needed the work. Finally he caved in and said that if I turned up at Shafter the first of January he'd put me to work. I went on alone to Shafter and got on the payroll as a sampler at \$2.00 per day. I never let on that I was a graduate mining engineer from Texas Mines.

Dick Basustow had been general manager, but had just left to head up Bralorne mines in British Columbia. The Presidio Mine had 65 miles of workings and lots of old stopes that had to be sampled as the company planned future mining. The sample crew of three consisted of me and two other Mexicans. One was Raoul Alfaro the other his nephew Luis Salmon. We had to lug lots of moils, sample sheet, bags and hammers long distances to the work sites. There, Alfaro used his carbide lamp to mark the 8" wide samples that usually ran 4-6' high. We placed the sample sheet on the stope floor to catch the cuttings and moiled out samples that were about 1/2" deep. We numbered the location and wrote out a sample ticket and tied up the canvas bags to be hauled out at the shifts' end.

It was a good way to learn the mineralogy of the mine. It wasn't too long before I could look at an ore face and come close to estimating the assay in ounces silver per ton.

We took a lunch break at noon, usually on the surface at the East shaft. The lunches that Luis and his uncle had looked so much better than mine that I would urge them to trade. Before long they were bringing me extra food from home. More importantly, they both worked to teach me Spanish. Both Luis and his uncle were treasured friends for many years. I was godfather to Luis' firstborn. It was sad to learn that Luis died in 1985 at the age of 86.

Within a few months I found a place to live and over the wails and protesting of my mother-in-law, Jean came to stay in Shafter. But she didn't like the life there and her mother came and rescued her one day while I was at work. El Paso was too far away for much of an effort to induce Jean to come back and our short marriage ended in divorce.

Somehow or other, Abe Amis, the mine engineer, learned that I was just smart enough to hold the dumb end of a survey tape. It wasn't too long till Abe "showed" me how to calculate latitudes and departures and even keep survey notes. He commented that I was a fast learner. Rode to work every day with Abe in his 1934 Ford V8 - one of the first. Abe took a job in Bolivia and I bought his Ford with 6,000 miles on it for \$250. Vincent Burnhart from the Colorado School of Mines was Abe's successor.

In the summer of 1935, students from Texas Mines visited Shafter under the guidance of Prof. Graham. Prof. expressed surprise to see me working at the mine office. When the students had left Waddy Wheelock called me to his office and gave me the third degree - lots of questions. He asked me why I hadn't told him I was a graduate engineer. I asked him if he would have given me a job if had known and he said "Probably not!" But he moved me to junior engineer at \$90 per month which wasn't all that much better than the \$2.75 per day that I was getting as a sampler. Actually that job started out at \$2.50 per day, but we all got an increase of \$0.25 per shift when silver went from about \$0.54 to \$0.64 per ounce.

Mine geology for the west end of the mine was done by Vince and I was assigned the older workings of the east end. We had two diamond drills and increased to three by resurrecting an old Sullivan S drill from the mine's treasure island, the graveyard for worn out and unused equipment. We also had one drill to use from the surface. One of my jobs was to set the drills for any new hole, log and sample core.

All the diamond drilling was based on the geological clues that might lead to new ore bodies. What a thrill to exercise one's ingenuity and discover a new orebody. With my first such discovery came a salary increase to \$100 per month. Ore grade cut-off was

about 16 oz. Ag per ton and mill heads were running close to 30 oz. Ag per ton. Mining was at the rate of 300 tons per day from the replacement orebodies in the mine.

It was touch and go too often. Everyone sighed with relief when an exploration drift suddenly passed from unaltered brecciated Permian dolomite into a replacement zone of high grade ore. A single orebody could provide breathing space for a long time. But there was never any relaxation in the search for more ore.

As geologist for the east end of the mine, I was warned not to do anything on the 600 ft. level off the east shaft. Basil Prescott, a well known geological consultant on replacement deposits, reported that the east end offered no hope for ore. But I was curious and stole time whenever possible to examine the 600 ft. level. When Waddy Wheelock took a vacation, I moved a drill to a site that looked good to me and started a downhole. At 16 ft. the very first drill hole intercepted ore grade material.

This initial discovery led to more and the east end finally went down to the 950 ft. level before water combined with declining ore grades became an overwhelming problem. This area of the mine was the principal ore source between 1938-1947 when the mine shutdown.

Mike Brennan was the diamond drill foreman and was responsible for the mechanical operation of the drills, bit setting and the like. But Mike wasn't always sober when we needed bits. So he taught me how to take a bit blank, drill it out and set the diamonds. In time I could do a fair job of bit setting, good enough anyhow to keep the drills operating when Mike was hors de combat.

Once when Mike was in vacation I handled setting all the bits. The bortz diamonds of different sizes were kept in Marbles waterproof brass match holders. I really got a shock when one of these turned up missing. What a relief when a small Mexican boy brought the box to me. It had slipped through a hole in my pocket.

Garth Impson was a diamond driller. What a character!. At age 30 he had all his teeth pulled and crockery chompers installed. Claimed it was the smartest thing he ever did.

We had some interesting problems with the diamond drilling program. Once a bit whipped off about 90 ft. above the drill station and we were unable to fish it out. It was a bortz bit worth about \$1200. To recover the bit we drove a small raise to the hole bottom only to find that the bit had fallen into an open fault. As the odds were against finding the bit, we were about to give up. Then the idea of using a powerful magnet came up and after a good bit of fishing done from real close quarters, we eventually recovered the bit.

The Presidio Mine wasn't the safest place to work. The unconformity that lay between the Permian brecciated dolomite and the overlying Cretaceous limestone was marked by an

almost white clay. This clay, or jaboncillo, acted as a dam to subsequent mineralization and we often found high grade orebodies right up against the jaboncillo. At the east end most of these had been worked out but lower grade ore was still available in some of the previously mined stopes. So we looked them over and sampled them and if there was enough ore to justify, we would run track and pipe and rework the stopes. This kind of operation was called a buscone, Spanish for exploration or searching.

I was walking through one of these old stopes when I was knocked out cold by a slab of jaboncillo that dropped on me. When I came to it was completely dark. The water tank in my lamp was dry. I filled the tank from the only source available. The small hole in the lamp's tank was hard to hit. Eureka! It lit. It smelled bad, but I was glad to be alive.

Hoisting from the East Shaft was with the one-ton mine cars. On the surface the cars were trammed to a bin and hand dumped. South Shaft production was in 1400 lb. cans that were loaded from a pocket below the 400 ft. level. We could hoist 250 tons of combined ore and waste on two shifts. At the shaft bottom it was a sight to watch the operation of filling the cans. Each can sat on a dolly that was moved under the chute for filling and then pushed to a selected spot. When the empty can came down it was swiftly unhooked and the full can hooked on and hoisted away. There was no communication between the hoistman and the shaft bottom. I often suspected that the man at the shaft bottom gave the hoist cable a flip that was visible to the hoistman.

South shaft ore was trammed with a trolley locomotive about a half mile to the East shaft. From there, all the ore was loaded into 825 lb. buckets that ran on a double rope aerial tram to the mill about a mile to the east.

The tramline was supported by wooden towers with a heavy carrier cable and a tractor cable to which each bucket was clamped. Although it was both unhealthy and prohibited, now and then someone would steal a ride in a bucket. There was lots of surplus worn out cable. I made good use of some to build a walkway bridge across Cibolo Creek. Used stamp stems from the bygone Shafter stamp mill as deadmen at each end of the bridge. That bridge was still there in 1990!

Vince Burnhart bought a Lafayette four door sedan. It was just great for our long haul to El Paso weekend forays and for double dating. We discovered a pair of unattached teachers in Valentine, Texas about 90 miles away. Later we found that there also a few available teachers in Presidio. We could pick them up and ride on across the Rio Grande to Ojinaga for a dinner-dance date. The perilous part was crossing the river on the camels hump wooden bridge that was secured with cable stretched over the hump. It finally washed away. In those days crossing the rickety structure was no cause for alarm.

Just across the Rio Grande was the Riverside cafe. The Riverside was presided over by El Maestro, a short rotund gentleman with tremendous musical skills whether on the piano, guitar, accordion or saxophone. He was literally a one man band. Pollo al horno with all the fixings made a great dinner. Mexican beer cost 15 cents the bottle.

Still dinner, drinks and dancing in Ojinaga usually cost us about \$5-6, so this was something we didn't do every week.

Sometimes after dinner, we would ride around the little border town. The balcony girls of Ojinaga would yell, "Nos pagan por lo que ustedes dan libre!"

One Fourth of July, Charlie Stott, general manager, told me that in addition to other duties I was to put on a party for the entire Presidio County. Had to make many trips to Ojinaga to import enough cases of beer. But with a date whose Dad was a Customs Guard, there were no problems in bringing back a trunkful of beer, tequila and other drinks. Both daughter and dad were cooperative.

Just to get things started off right that holiday, I rounded up 60 ft. of old two inch pipe that had been discarded at the mine for leaks and whatever. Also wangled a few boxes of 30% dynamite. With some willing helpers, we hauled the stuff to the east bank of Cibolo Creek where it ran along some low cliffs east of town. We fired this 200' long horizontal cannon at dawn. I don't think there was anyone in Shafter that wasn't wide awake after that tremendous blast!

Built an adobe grill about 16' long 4' wide and with a hinged sheet iron lid that could be raised or lowered. Five foot lengths of drill steel placed about two inches apart made up the grill proper. Had loads of mesquite and started the fire at four in the morning to grill two steers and two goats. Saved the butchering scraps for chili. Found an empty drum that once held the castor oil we used to lubricate rock drills.

Washed it pretty clean and placed it over a mesquite fire and made 40 gallons of chili. As there was plenty of beer, bourbon and tequila, no one complained about the food. But then, maybe it wasn't too bad!

But there were those folks the next day that had some complaints about the morning after impact of the chili. Maybe I should have cleaned that castor oil drum a bit more?

It was a great event when we switched from carbide lamps to the Mine Safety Appliance Co. electric cap lamp, the Model K. It had enormous impact as we could see much better. Productivity increased and so did the grade of ore delivered to the mill.

Every one of the one ton end dump mine cars trammed to the shaft station was sampled. The scoop of muck was put in a foot square box about 18" deep equipped with a sloping bottom and a sliding gate. There was a box for each production spot. A count was kept

on the cars from each spot as well. When the shift was over, the sampler raised the sliding gate of the sample box to let the sample fall on a 1/4" wire mesh screen. The minus 1/4 inch and the plus 1/4 inch material was bagged separately for separate analysis.

When the assay results reached the mine office they were recombined by multiplying the fines assay by two and adding it the coarse sample assay and dividing by three.

This seemingly odd procedure had much merit. As the mine cars were trammed, the fines tended to shake down to the bottom of the car. Thus the single scoop sample taken from the top of the car had a consistent bias of being lower in grade than the actual grade of the entire car. Experience had shown that the method described above resulted in assays close to the ball mill discharge sample-the mill heads.

Once we drove a raise from the 400 level in the west end of the mine to the 300 level. I did all the survey work and it didn't connect! We had to drive a ten foot crosscut from the 300 level to the top of the raise when it should have holed through right in the rib. I must have recalculated all my lats and deps fourteen times but could find no error. Finally I went back to the original survey of the 300 level by Charlie Stott who was now the unit manager. Embarrassingly, I found he had made a ten foot error. What to do?

The mine map was on a scale of 1"=40" and an impressive map it was. It was on cloth backed paper on a table 12 ' long with rollers at the wide sides. Thus one could move a large hand wheel and move the map north or south. All permanent entries were in ink and each level had its own color. After I found that ten foot error in the latitude calculation there was only one solution. Make a working overlay on tracing cloth for the area involved. One day I was working with the overlay when Charlie Stott walked in and asked why I was working with an overlay. I told him - his face flushed but he made no comment.

Mrs. Hughes ran the boarding house and the grub was excellent. All you could eat for \$25 per month and three meals a day. I also served as Deputy Sheriff to Bob Speed an ex Texas Ranger. Got called out now and then to help subdue a miner who had partaken too deeply, despite prohibition - the local joke.

Now and then we would listen for the notes of a horn behind the hill just west of town. Then we would head out with a bottle or two to meet the sotol importer with his potent skins filled with the oily liquid. We usually filtered out the goat hair and other contaminants before drinking the sotol. One had to go real easy with that stuff. Too much would give you a morning head that was so big you couldn't reach out and scratch your ears.

Late one night Sheriff Bob called me out to silence a guitarist that was annoying the camp in the wee hours. Bob didn't remonstrate with the serenader. He just seized the guitar and broke it over the player's head. We used the guitar to tow the player back to Bob's car where Bob threw him in the trunk and drove off to the jail.

It wasn't too long before I found out a bit about that jail with its iron floor and ceiling and bars all-round. The whole contraption was set in a small adobe building.

The company held surface and mineral rights on two sections of land. We made a topographic map of the surface and began a geologic survey. In examining an adit on the western section I could see two eyes back in the depths of the tunnel. I got ready to shoot when a small housecat ran by me. That was a big relief.

Sunday horseback rides were lots of fun. Out riding with Margie Shannon we were pelted with hail and took refuge in the adit of the cat. It rained after the hail and we spent several hours in that adit waiting for the saddles and our clothes to dry. The only slightly damp saddle blankets made us comfortable.

The company doctor was a busy man. He handled all the medical problems in the southern part of Presidio County. I used to date one doctor's daughter - Tooch. She had a pet white dog of somewhat ambiguous origin. It was acting strange one day and bit me. It turned out that the mutt had bitten several people that same day. So the poor mutt was put to rest and the remains sent to El Paso. Rabies! A supply of serum was obtained to give all the folks that had been attacked the Pasteur treatment, two shots per day in the tummy. But there wasn't enough serum for me in the first batch so I had to wait a week before treatment. The Doctor joked, I hope. He said, "Well, this is a bit late and may not take. You could turn up growling and biting any time."

Rode to Terlingua several times to visit with Jerry Faust and his bride, the former Betty Brand. Eph Daggett from Texas Mines also worked at Terlingua. A hard-nosed guy from the state of Maine by the name of Perry owned the mine and Jerry and Eph told me many stories about Perry. For one thing, Perry was tight as the bark on a tree. In the early 30's he didn't pay his men in cash but in credit at the company store. The men would often end the year owing the company. When the authorities got after him to pay cash, he began to pay in Mexican pesos but was soon admonished to pay in U.S.currency. So base pay was a buck a day when at Shafter we were getting two.

The story went, and it was subsequently proven true, that Perry had no compunctions about mining over his property lines. So when a stope was in ore he mined it all out regardless of ownership. This was hard to prove as Perry did not let anyone underground that was not one of his employees.

Jerry, Eph and Fred Fox, the Shafter assayer, and I drove down to the exit end of Santa Helena Canyon and swam over to Mexico and back. As usual, the Rio Grande was a deep muddy brown, too thick to drink and too thin to plow!

One of our fun events was to drive to Presidio and then down river to fish for the huge cat fish. We would rig a trot line with many dropper hooks baited with somewhat over ripe chicken parts. One of us would swim the river to the Mexican side and tie the line and swim back. Somehow or other our success in fishing had to be related to the quantity of beer we drank that night. In the morning we would release the line on the Mexican side and haul in our catch. We caught many great cat fish this way, some of them going over twenty pounds.

At the Presidents Ball of 1936 at the Paisano Hotel in Marfa, I ventured in with a local friend, Jack Colquitt. They wouldn't let us in until we had checked our firearms. I would tell Jack what girl I'd like to dance with. If he knew the girl Jack would tag her partner and in turn I would tag Jack. I got to meet many Marfa girls this way. Invited some to visit the mine. It wasn't too long before Ruth Smith and Happy Peters came to Shafter for a visit to the mine.

There was a good reason for the firearms. The mine had lost a shipment of silver bullion while it was being trucked to railhead at Marfa. The theft was conducted by bandits who had apparently come across the river upstream from Presidio. When we learned about the robbery, we picked up the rifles that were in the mine office and took off in all directions in a search for the thieves. They were never found. We then switched to shipping silver precipitates instead of bullion. After the theft, we all took to wearing revolvers.

Besides being deputy sheriff I had the additional responsibility of being a Presidio County Commissioner. In that way the county could get free engineering. One task was to design and construct a pile supported bridge across Alamita creek east of Presidio. The post had other advantages.

Driving the forty miles over God's pavement to Marfa was a bit too much to do to conduct a romance. So I arranged with a Marfa colleague not to renew Jesse Evelyn Peter's teaching contract. Then I offered her a teaching job in Shafter. As her choices were limited, she took the Shafter post. Courting was simplified.

Happy lived in what was appropriately called the Teacherage. Judge and Lillian Karstendiek were the principal occupants. Lill was the school principal and Judge was also a mill worker and mill sampler. As with almost all the houses in Shafter, the teacherage was a company house.

The wheelbarrow seemed like an archaic way to handle the muck in the stopes and we installed a number of scrapers operated by A4NNOJ double drum cable hoists. They worked fine but, as they were a straight line operation, it took the installation of many back bolts to clean up the broken muck in a stope. Tried putting handles on a scraper so that some manual control could be exercised. Tried this out with Oscar Rheinheimer, Mine Foreman, handling the scraper and me on the hoist. On the first try the scraper hit solid and Oscar made a beautiful dive through the air for a bumpy landing. He turned the air blue with his cussing but was only bruised. That was the end of that idea!

A quincena or 15 day period, was the basis for paying contract miners. Hence all advance had to be measured every quincena. This meant about 16 miles of walking plus rope climbing about 10-12 raises. I discovered that I could literally walk up some raises by backing into a corner and feeling steps as I moved up. I wore out a pair of Sears Roebuck \$3.75 shoes equipped with hob nails every three months. I wore myself out every measuring day. Measuring day also dictated other activities.

My new found skill in climbing raises without a ladder or rope nearly proved my undoing. I found specks of argentite in a small muck pile under an old raise. So I climbed the 40' up to the stope by backing up a corner. Crawling away from the top of the raise over an old muck pile, my lamp fell off my belt and tumbled down the raise. Pondering my fate and what action to take if any, I finally decided to sit and wait. I always told Alfaro what part of the mine I was going to work in. As I had left the office about 1 PM it was about 2 PM when I was marooned in that old stope. I knew that nothing would happen till I turned up missing. It was a good time for a nap. Then after some hours I began to yell Help every few minutes. Sure enough some hours later they found me.

I had been sitting in that old stope for six hours. Luis Salmon, who had taught me how to back up a raise, came up with a rope that made getting out easy.

When I gave up chewing tobacco and poker playing, Happy Peters agreed to marry me. But it seemed like I had to do something sinful. So I ordered a pipe and some Old Salt tobacco from Wally Frank in New York. When it arrived I went down into the big open stope of Mina Grande and proceeded to learn how to smoke a pipe. I thought I was going to choke to death.

Happy invited me to have Thanksgiving dinner with her but when we got to Alpine, found out that her brother and friends had finished off the bird. So we went out for dinner. Brother Ralph Peters was an architect and builder. He advertised himself as "A Particular Builder for Particular People." We changed a few of his signs to read "A Peculiar Builder,etc." Ralph didn't appreciate that. Ralph would build a coffin now and

then and mount it on horses in the back room of his office. He would throw all the "dead soldiers" in it and when it was full, have a ceremony to empty the coffin by dumping the empty bottles in the creek.

The only suitable time for a wedding was December 17th, the day after measuring day. We told no one of our plans and took off to Alpine to be wed in the home of Happy's sister, Gladys and Gene Odell. A ride to Ft. Davis and one night at the Paisano in Marfa was the honeymoon.

Back to Shafter and it was soon known what had happened. I spent the first night at the teacherage with my bride - for about an hour. There was a knock on the door and it seemed like everyone in Shafter came in, led by W.A.Estes and Bob Thurmond. I was hauled off to the jail and the ladies took Happy to the local pharmacy. Later I learned that Happy was painted with mercurochrome in appropriate places as was I. She was given a ride around town on a burro while I languished in the chill of the hoosegow.

Mrs. Hughes came in to see how I was getting on. I persuaded her to go my room in the bachelor's quarters and bring me a file and a hacksaw blade. I went to work on the lock and was just about to regain my freedom when the shivaree gang let me out. I was taken to Tio Fuller's bar, told to undress and was flitted with cheap perfume while Charlie Stott, the mine manager took revealing photos. After a while of that plus other mistreatment, I was allowed to dress and the gals came in with Happy. The beer flowed freely and later on there was food. We danced till 2: AM and finally got free.

Back at the teacherage we found our bed had been short sheeted and sprinkled with damp salt. It was a long time till we slept. To make matters worse, the very next day came the bill from Tio Fuller, some \$87 for all the festivities. My monthly salary was \$90. Happy got a bit more as a teacher. Our the financial future was dim. I stopped visiting Tio's cantina for my daily beer and we practiced other economies. It took us about three months and both our salaries to accumulate the \$87.

Finally it was time to pay up and I strode into Tio's cantina and on back to where Tio presided over the cash register. He said he thought I had died cause I hadn't been around. The gang lined up at the bar made the most of it - fun at my expense. I offered Tio the 87 bucks. He and the gang at the bar laughed long and hard. Tio finally told me that the company had paid that bill the day after the shivaree.

I was determined to even the score one way or another. So when Bob Thurmond married Mrs. Hughes daughter, I gave him the engraved watch my grandpa had given me when I finished high school. The happy couple drove to Marfa and took the train headed

to El Paso. I phoned the sheriff in Van Horn and told him I had been robbed of a valuable engraved watch and that the suspect, whom I described, might be on that day's train.

Before long a phone call came saying that the thief has been apprehended and would I come to Van Horn to prefer charges. Four hours later I got to Van Horn and told the sheriff what was going on. He gave me a 30 minute head start and released the prisoner in the custody of his bride. It gave me great satisfaction to learn that I had disrupted their honeymoon and gotten revenge for our shivaree.

Bob Thurmond didn't last long. A few months later he was killed while looking down the mine shaft when the descending cage knocked him into the shaft for a three hundred foot fall.

My feet were itchy. Looked for something else to do and found a post to my liking. It was an outfit called Premiere Pili Mining Company operating in Mindanao, the Philippines.

CHAPTER 3.

MINDANAO- LUZON- MOUNTAIN PROVINCE TREK - BACK TO USA

MINDANAO

Happy, her son Jan and I left San Francisco in June 1937 sailing through the Golden Gate as the cables were being spun for the bridge. We sailed past the Farrallones and on to Hawaii. The several days the Taiyo Maru docked there were spent in sight seeing Oahu. Then we were off to Yokohama. A few days later came news that Amelia Earhart was missing. We diverted course for several days searching for signs of the lost plane.

Finally the search was abandoned and the ship was underway to Japan again. Took forbidden pictures as we entered the harbor. To see a bit of Japan in those prewar days was most enjoyable. Traveled all over Tokyo, the Ginza and Meiji Shrine, Emperor's Palace, the whole tourist bit. A pleasant young student attached himself to us and served as our guide. Returning to Yokohama with him in a taxi I commented on the good design of the Japanese made vehicle. He replied' " Ah so. Japanese velly crevah. Amelicans crevah too - sometimes."

Kobe was a delightful city with the nearby jewel of Nunobiki waterfalls. We walked up the path by the falls to the very top and took great pleasure in the entrancing beauty of the many cascades. The great courtesy of the shop people and their helpfulness was charming. Our few dollars went a long way.

We moved on through the spectacular beauty of the Inland Sea with its Tori gates. Fueled in the night at Nagasaki. A steady stream of women carrying baskets of coal got the job done in about four hours. Then we sailed on to Shanghai. We were hungry for something distinctly different from the Japanese fare of the Taiyo Maru. Using some of my poor German we finally found a place that would serve us plain old pork and beans. Our stay there was cut short by a shore patrol that found passengers and hurried them back to the ship. As we moved down the Whang Poo toward the sea we heard sporadic gunfire. The Japanese were moving on China.

When we stopped at Hong Kong, we were given the news that the Taiyo Maru would not sail to Manila as scheduled. We were given reimbursement for that leg of the trip. We put up at the enormous yellow wooden structure of the Peninsula Hotel and tried to book passage for Manila. We saw much of Kowloon and the Leased Territories. Went to

visit a friend at Lin Ma Hang, a tungsten mine in the Leased Territories on the border with China. There we saw Japanese troops moving just across the line.

Wandering around Hong Kong, we visited the Peak and enjoyed the shops with their varied displays. Finally we booked passage on the President's Line President Adams. We sailed from Hong Kong on July 19, 1937 and 626 miles later we were in Manila. Boarded an inter - island steamship, the Corregidor, and passed by many islands en route to Cebu. My new boss, Robert W. Stramler, met us and installed us in the only room with a bath in Cebu's leading hotel.

The next thing to do was to meet the man was financing the exploration enterprise. Dr. Emilio Osmeña was the son of the then vice president of the Philippines which gave him an edge over similar enterprises seeking special rights to explore government lands. I was given my first assignment.

I was to go to Surigao, a province with a town of the same name, on the northern tip of Mindanao. There the company had an assay office operated by an Austrian, Julius Malina. Then via dugout canoe, or barota, equipped with an outboard motor, I sailed through the straits of Mindanao. Sailed on down the east coast and then hiked to a camp close to the ridge of the Diuata Mt. Range. I had a guide and boat operator all in one and we found the camp and its local manager Bill Kaiser.

That dugout barota with it's outrigger worked fine and the twin cylinder 5 HP pushed it right along through the Straits of Mindanao, even when the tide was running. At those times the entire Mindanao Sea dumped through the narrow Straits into the Pacific or vice versa. Whirlpools formed and could turn the barota right around if you got into one.

Cruising down the coast one rainy day that outboard quit. I managed to get it into the barota and went to work on it to find the problem. Night overtook us and in the gray rainy dawn, we could see no land. Neither could we tell North from South. Finally I managed to get the infernal outboard running again. Took a chance on which way to go and was lucky.

The place was called Nabago Gold and Silver Mines and was into pretty good grade gold ore. The operation was being expanded and I was to help Bill with the many tasks involved. We lived in a Nipa shack and a real house was to be built soon. Upitong, lauan, tangili and other enormous trees were felled and cut into boards by two men, one on the top and the other in a saw pit below. It was slow work! Mamanuas from a nearby tribe were doing this tree felling and sawing and we also used them to follow our rough Brunton survey lines to build trails.

Construction of the house was interesting. Once the supporting posts and joists were installed, the floor was laid to cover the entire area of the house. The beautiful hardwoods were alternated with a dark and then a light colored board. Each board was hand fitted to the adjoining board. The perimeter boards were placed first and then the work proceeded toward the center of the floor. When the fitting and laying was finished, the rough floor boards varied as much as 1/2" in thickness from one board to another.

Then a team went to work with the typical Japanese planes, the kind you pull instead of push. In time the floor was leveled, well sort of. Then halves of coconut husks with shell removed were bound to the polisher's feet. Using a mixture of candle wax and kerosene the floor was soon brought to a high polish. Partitions were then installed. We even had a kerosene operated refrigerator.

Most trails were a meter wide. The trail to the coast was built with an outer rim to try to retain the most rainfall that it could. We wanted the trail to be as muddy as possible so it could be used for carabao sled haulage. We built sleds of round timber with sled-like upturned runners. A carabao could haul a barrel of diesel oil all the way to camp on one of these sleds. It was a different thing with heavy crates. We lashed long poles to these and put six or eight men on each end of each pole to move the diesel engine and compressor to Nabago.

Mining got considerably easier and faster when we replaced hand steel with jackhammers and stoppers. Then there was the problem of how to get the ore to John Smeddle's East Mindanao Mining Co. operation near Placer. We had a barge built in Cebu and had it towed down to Surigao.

But we needed something to tow the barge. Dr. Osmena came to Surigao and brought a Chris Craft with him that he said would do the job. That evening it was unloaded from the inter - island steamer and we took it out for a trial spin.

There was a sudden burst of flame from the engine compartment and Doc and I took to the water. The Chris Craft burned and sank. Then we purchased a slow moving launch with a one lung Buda Diesel engine, a real work horse.

Next, we had to build a truck road from Nabago to the coast and a dock for loading the barge. We felled big trees to make bridges and used rock filled cribbing for the dock. It worked fine and we were soon a producing gold mine shipping a barge load to East Mindanao every few days. The barge could only handle about 50 tons per trip, but we were accomplishing something. The ore grade was close to two ounces per ton.

It soon became apparent what Dr. Osmena had in mind. We rushed to finish the house and soon prospective buyers visited Nabago. After the sale, Bill went to Premiere Pili on

the west side of Surigao and my assignment was on an untouched tract of land in the Diuata Mts. about halfway between the Mindanao Mother Lode Mine and East Mindanao Mining on the east coast. There I found one of my predecessors, or at least his remains. He had slept just once too often in his shack made of Anahau palm and someone had slipped a spear up through his ribs.

I always took precautions in any near permanent shack to have a three inch slab of luan under my bunk.

I stayed in Surigao to make preparations for the new exploration task. This task was under way for several days when I received a telegram from Happy. "Can I come to Surigao? Will arrive on Don Estevan at 7:00 pm today." This was shaking news! Happy's pregnancy was in about the sixth month and I knew of no proper facilities to care for her in Surigao. And we didn't even have a place to live!.

Malina the assayer was a devout Nazi. He kept a picture of Hitler hanging above his desk. I could really pull his chain when I came into his office and turned that picture to the wall. Malina was a native of Fiume that was a city that shuffled back and forth from Italy to Yugoslavia. When the Anschluss occurred, Malina said, "Ach, at last I am a real Nazi!"

When in town I stayed on the upper level of the building housing the assay office and warehouse. There were several bed rooms and a large living room with a refrigerator. No place for a pregnant woman with a seven year old boy, Jan. I got busy and contacted Ong Hing Lian. He was close to completion of a structure of three sets of cracker box sized "apartments." He said he could have one ready in a few days so I rented it. In the meanwhile we would have to make do in the office building.

The cracker box was 12 feet wide and 18 feet long with the downstairs divided into a 12 by 10 living room and a sort of kitchen. The place for the kerosene Primus cook stove was on a shelf that projected out from the kitchen window. When it rained, which was daily, there was a curtain of water between you and the stove.

A narrow staircase went up from the living room to the upstairs that was divided into two bedrooms about 9' x 12' with the staircase cutting down on the usable space. But it had a roof. Ong Hing Lian said he would build us what he called a chalet and have it ready in a few months.

That evening the family arrived, two very seasick people. The next day was for shopping to get some beds, chairs, table and the like for the apartment. Then there was the problem of groceries. We went to Ong Bon Pin's store. There almost all the canned goods were enclosed behind glass doors on the many shelves. We picked out enough things to stock up and when Ong Bon Pin totted up the total I prepared to pay. Ong Bon

Pin said "Not Pay! Sign chit. End of month you pay or sign chit for month." He went on to explain how the system worked, "Melican sailor he buy here. See, here his chit for one bottle scotch signed John Paul Jones. Biumpy he come pay!"

Back to work putting together the things needed for the exploration of the new tract - everything from food to wheelbarrows and dynamite. It took several days and then the whole shebang was trucked to Mindanao Mother Lode where we would take to the jungle and find our working area.

The town of Surigao narrowed to the north becoming a one street wide narrow spit with but a few hundred feet of width at the most. The area was called Bilang-Bilang. The single street ended at the docks and was bordered by enterprises of various sorts including our two story office. When we arrived there were no other gringas in town but in the Fall of 1937 a new store and restaurant opened.

Run by a burly Swiss and his young German wife it offered a good variety of imported food and good meals. You could even get a breakfast there with eggs that weren't overripe. The store was a good source for many supplies that I would haul to my new camp wherever that might be.

When all was together it was hauled to Mindanao Mother Lode Mines. There I stayed with Phil and Peggy Holdsworth while we readied for the trail. Loads were distributed between the twenty Visayan cargadores. In addition there were three Igorots in my crew; Tello Moclo, Benguet; Clemente Lawig, Bontoc; and Fernando Banawa, Banaue. These were tough fighting men, honest and dependable to the core. They did not know each other's dialect so conversed in English - lucky for me. They carried long fighting bolos and feared no one. I carried one of those carabao handled bolos made from a piece of drill steel and also a .38 caliber revolver. In that climate it was unholstered and just stuck in my belt. I still have that bolo.

The visible trail through the Mindanao Mother load claims soon degenerated into jungle. Following my Brunton compass directions we were continually cutting trail. The rain seemed ever present punctuated with brief steamy times of sunshine. About 4 PM, Moclo said it was time to make camp

The three Igorots got busy cutting down Anahau palms. These were about 6-8 in diameter at the base and seemed to maintain that dimension for 10-12 feet. Their huge leaves were pleated and each covered an area about 15 inches long by 18 inches wide, tapering to about 4 inches wide at the stem. Segments of the bole were split off making long slats about 2 inches wide and 10 ft. long.

Behoko vines were used to tie 2 -3 in. diameter. poles to appropriately located trees and the slats were tied down to these poles to make a floor. Lighter poles were used for rafters and stringers to which the palm leaves were tied in overlapping fashion. The 8 by 10 ft. shelter went up rapidly and soon the Igorotes had a fire going under a large cast iron pot.

The rice pot was ready in about an hour and we ate. The thick browned crust of the rice was delicious and served as a bread and pusher to eat the combination of fluffy rice and thecan of pilchards that we each opened. The breakfast menu was almost the same as lunch, the difference being that the lunch was cold rice and pilchards.

Day-long we were cutting our way through the vines and tangled undergrowth of the tropical rain forest. The leeches were everywhere and snakes of one kind or another were seen too frequently. Now and then we saw wild chickens and wild pigs and deer. The many monkeys chattered at us for invading their domain.

We might have made five miles that second day and then it was the anahau palm shed again and the rice and pilchards. When you're hungry enough, anything tastes good.

The third day in we reached a ridge with lower country off to the east shrouded in clouds. Again the anahau palm shed. Then we improved the camp a bit and used it as a base for our prospecting activity. Snakes were a nuisance and created frightening experiences as well. One evening, sitting on a homemade stool, I happened to look up and found myself staring in the eyes of an enormous Anaconda who was only about 2' from me. I fell over backwards to get away. A blast from my shotgun ended that encounter!

All my experience working in the dry regions of the west and southwest were of absolutely no use here. What we did seemed to suit the heavily forested area that was blanketed with a thick layer of soil. Outcrops were few and far between. So, each morning we would fight our way down a ridge that led up to the main ridge where we were camped. A mile or so down the ridge we would make our way down to the stream that invariably was to be found in every ravine. Then we began the upstream effort of prospecting.

Every 50 ft. or thereabouts I would take a pan full of stream sediment and pan it counting colors if there were any. Careful notes were kept of any colors or other heavy mineral found. When luck smiled on us with a good color count we kept on panning till the count went down.

The next task was to cut brush lines up to the ridge line about 300 ft. apart. Then it was the uphill task of taking a pan every 50 ft. and taking it back down to the stream to pan.

This method of sampling and panning would provide some ideas about where to look in greater detail. When a site was picked we cut a clearing below it and began to drive a cross

cut to bedrock. If we were lucky, we didn't have to go too far to find the structure that was the source of the gold we had been panning. But it was hard work. We cut timbers and framed them into mine sets and used lagging between each set to keep out the mud. The foot of each post was supported on a three foot long log to keep it from sinking. Most of the time we just dug the soil out and carried it away in wheelbarrows. When we finally got into rock we used hand steel and drilled and blasted.

Study of the structure would tell something about its strike and dip. Then it was back to the surface again cutting trenches and sampling. In one such situation we found an outcrop that contained visible sulfides. This seemed like a good structure to follow.

Claims were staked and we named the property Magallanes. This was fitting, as from our ridge top clearing on a clear day we could see the Pacific Ocean off to the east.

It was time for a more permanent camp and we built a pole structure with the first floor about 8 ft. off the ground. The anhau palm provided floor and roof and we peeled bark from the lauan for siding. A sort of office and bedrooms took up most of the main floor and we used the ground level for equipment storage and stores of rice and canned pilchards and other stuff.

We pursued the structure that looked pretty good as we also attempted to find new structures that were worth examining. The country rock was mainly a porphyritic andesite that was intruded into older beds of shale and limestone. Veins and ore bodies of the nearby producing mines occurred as replacements that merged into country rock. Alteration halos proved to be valuable indicators in the search for structures. Frequently the trails we cut disclosed structures warranting further investigation.

Surigao Consolidated was working a large ore body that was a brecciated contact zone between the limestone and an intruded mass of andesite. Mindanao Mother Lode mined veins that were 4-8 ft. wide and almost vertical. In September 1936 MML milled 5000 tons that averaged \$59 per ton. And that was when gold was priced at \$35 per ounce. East Mindanao had begun producing in August 1936 and the grade of mill heads ran between \$9 to \$12 per ton.

Labor was a problem! Perhaps the major reason for this was that it wasn't necessary to work very hard to survive. The sea was a bountiful source of a variety of fish from guineamous to pompano. The guineamous could be netted in shallow water. The net was then hung up to dry and the tiny fish were scraped off to eat in soups and stews. The larger fish required going out a ways and fishing.

Hooks were the usual means but we had to keep close watch on dynamite as it was always in demand for bulk fishing.

There were several nearby native tribes with different characteristics. The Mamanuas were tall slender people, black as the ace of spades. Some men were over 6 foot six inches tall. They were skillful loggers and trail builders. To cut down a huge lauan they would build a platform about 6-8 ft. off the ground and at a point where the taper of the bole was near the end. They would fell one of these giant trees in short order. When we built a bridge, the Mamanuas would fell trees to serve as the main structural members to span a creek 60-70 feet wide.

Less tractable neighbors were the Manobos and Bogobos. Shorter than the Mamanuas, they were brown-skinned. The Bogobos lived in platforms built high in the trees. Access was had by climbing a vine that they pulled up after them at night. Both tribes were skillful users of the "bayatik" a weapon using an arrow or a spear if they were man hunting. It would be powered by a flexed sapling and triggered with a vine across a trail. Smaller ones were used to bring down wild pig and deer. I tangled with one of those small ones and the arrow stuck in the bone at the front of my leg some four inches below the knee. It was most painful.

Boats were easily come by. One had to hollow out a log to make a barota. Equipped with a 6-8 inch bamboo outrigger, the barota was a serviceable small craft. Larger boats called vintas were based on a longer hollowed out logs than the barota. The sides were built up with boards to create a vessel that was serviceable in rough seas and capable of carrying a considerable load. The vintas were also equipped with outriggers and made fine sailing vessels. It was one of these with a swivel-mounted brass canon at the bow that welcomed Magellan when he first came to the Philippines.

A rice patch and camotes supplemented the sea food supply. Coconuts, papaya and a host of other native fruits made for a good diet. The super delicious Durian was plentiful if you could stand the smell. Why work up a sweat digging ditches for the crazy Americanos? Copra was often traded for cloth and other necessities that nature didn't provide. Propriety seemed to dictate a pair of white shorts for the men and the women used mother hubbard slip-overs. The many children were more comfortable.

Housing was simple and a home was usually a nipa shack constructed along the lines of the shelters we used in the jungle. But few nails were used. Should the fastidious taste of the owner require a door, it was easily built and swung on pinions set in the sill and casing. I was exceptionally fastidious and the bark house at Magallanes even had windows that swung open. Bugs of all kinds were everywhere all the time. A net over the bed, although it impaired ventilation, kept most of the bugs away. At meal times we burned katol, a kind of punk, to keep the bugs distant.

The kitchen my self-styled cook used, when not serving fried canned peaches for all three meals, would be a delight to any housewife. I wouldn't have objected so much if the peaches were poached and served with bourbon sauce. But the so-called cook just dumped the can into a hot skillet.

The kitchen was a sturdy table with a shallow earth-filled box on top. Three rocks with a fire between them served as a heating unit. The oven I built was a discarded five gallon tin on its side with a curved piece of galvanized roofing curved over it. The whole affair was covered with mud to hold the heat. Wires laced across the middle of the can supported the baking container. I was the sole user of this oven as my cook 'no savvy bake.' The homemade bread this oven turned out was a treat. But then the cat had kittens in the firebox and I went without benefit of bread until I had fallen into the soda cracker habit.

Rats and roaches were an insistent annoyance always trying to get more of the chow than I did. The roaches got in the soup and the rats got in my hair by playing tag along the rafters in early hours of the morning. One night when my patience was at end I let fly with both barrels of the shotgun at the red eyes of a rafter rat. I missed the rat but not the roof. Daybreak was good to see after I had spent the balance of the night trying to snatch a few winks while rain drizzled steadily through that six foot hole.

Monkeys, deer and wild pig were frequent camp visitors and all three supplied fresh meat. I can recommend the deer. Eggs were provided by a few miners who visited the barrios in the valleys. It took four of these eggs to equal one of our stateside eggs: one bad one and three for the right quantity of egg. Fruits were also obtained in the barrios. Excellent Lacatan bananas and kiapis, the fruit of the rattan, papaya and mango and now and then the delicious but awful smelling durian. Vegetables, meat and butter came in cans. Ham and bacon from Australia and New Zealand came covered with a thick layer of an impervious tar-like substance.

Base pay for the laborers was 50 centavos per day plus a ganta of rice. The ganta was measuring box about 6x6x6 inches. The Igorotes drew up to two pesos per day, almost as much as I earned as a nipper in Arizona. The exchange rate was two pesos per dollar.

When rice planting time came it was practically impossible to keep the local men on the job. Although they were glad to have some cash, they felt their real livelihood was their rice paddies.

We finally had to resort to renganchadores or hookers who worked the town like Cebu and others and hired anyone they could get. The rengachador got a flat sum for signing up a man and he sure didn't give a fig about what kind of men he hired. We got the dregs and the inevitable results. One morning I found the crew lined up in front of the office

demanding more pay. Clemente covered the crew with the double barreled shotgun while Tello and Fernando disarmed them. We garnered numerous weapons including many paltiks. These home made single-barreled pistols were made from large pocket knives or a piece of tubing with a rubber band powered firing pin.

After that we put each crew to work under an Igorote or a Moro I had hired. The fear of losing one's head seemed to work as we began to make progress.

We established a pretty good trail about six kilometers long to Mindanao Mother Lode. It was far more direct than the circuitous route we first took to the ridge of the Diuata Range. This new trail enabled me to make biweekly trips to Surigao to visit the family.

It was evident that there was no way Happy was going to return to Cebu to have our baby. So I found that the company doctor Rafael Abendan was willing to preside and give Happy the needed care. Late in November we got the word that he was called up for military duty. He would not be available for a month, the period in which we were expecting the baby. He recommended a competent midwife and together we delivered Sheldon Phillip Jr. on December 2, 1937. Both Mother and baby did well.

When in town I would take the baby and stroll down to the new Bar and Restaurant run by the Swiss. One evening the couple said they were much impressed with Sheldon Jr. As the gentleman was sterile, I was asked to father a child for them. Happy didn't go for the idea. Some months later, when we were located in Baguio, we learned that the lady delivered a healthy boy. They had found a stud somewhere.

At Mindanao Mother Lode, a shift boss named Alex Munson was found in his underground office with his skull bashed in. Efforts to find the killer failed. It seemed that Munson had been an abusive and brutal boss and the natives only tolerated such treatment for a limited time. When the funeral took place in the town of Surigao, many people from the foreign community attended out of respect for Munson's young blonde blue-eyed bride. The graveyard was on a hill on the outskirts of Surigao. Crypts were three high structures into which each corpse was inserted and sealed. In the case of Alex Munson, the crypt just wasn't adequate as his feet stuck out a foot and the crypt could not be sealed. We rushed the widow away and the next day we constructed a Munson-sized crypt.

We had to make our own amusement. Now and then we would go swimming on the beach south of Placer on the east coast. The entire beach was made up of black sand. Rented a sailing vinta once and managed to take it out to a small island west of Surigao although I knew as much about sailing as a hog knows about Christmas.

In wading ashore Happy stepped on a sea urchin. The pain must have been excruciating. I didn't know what to do. No first aid kit either. An old lady came along and immediately

knew what had happened. She kept repeating "Rhyne, rhyne, rhyne." When she pointed to my crotch it suddenly dawned on me. Uric acid would neutralize the strong alkali of the sea urchin's needle. It worked. Getting back to Surigao was even slower than the trip out, but we finally got in to Surigao, burned to a crisp in the blazing sun. It was evident that I was no sailor.

Back at Magallanes the work went on as we cut additional crosscuts to intercept the vein and takes samples. The personnel problems persisted. One evening a man came to the office and said, "Sir, you will give me leave." I asked why he wanted time off and he replied, "Sir, I will return my wife to her parents." That seemed a strange thing to do so again I asked why. "Sir, she will not make baby!" I pointed out that the possibility existed that he might be the problem and told him I would write a note to Dr. Abendan. The man said, "Oh, sir, not necessary to write note to doctor. She will not make baby. Many of us have tried!"

Strange customs indeed! One man went on leave to Surigao to marry his sweetheart saying he would return in three days with his bride. By that time there were already several women in camp. But after three days the man returned without his wife. As I was looking forward to having more ladies in the camp to be lavanderas and to cook, I asked him what happened. He said, "Right after wedding she went to house of priests and they not let her go yet."

One single girl took care of the food stores kept in a room on the ground floor. Her living quarters adjoined the store room. One night we were wakened by loud screams of terror or anger and the three Igorots and I rushed out to see what was up. The girl was struggling with a man of whom she said, "He would steal my honor!" The alleged culprit had a different tale to tell stating that, "Last night she sleep with me long time, so I try again." The girl agreed that this was true but added, "I no want he tonight!"

We had monkey for the pot now and then. I developed a great recipe for monkey. Clean the meat well and cut into half inch cubes. Season well and place in pot with about six cups of water and six cups of round stream stones. Bring to a rolling boil then reduce heat and simmer for 8 hours. Throw away the meat and eat the stones - they'll be more tender.

One day Lawig shot a monkey that had a baby clinging to its back unhurt despite the long fall to the ground. The baby was full of fight and it was difficult to restrain it without getting bit. Lawig put a padded wire around its waist and fastened a long wire to this belt. The other end was looped over a horizontal bamboo pole tied to a couple of upright posts. This arrangement gave the little monkey some freedom of movement. A week later she

turned up missing. We put some rice on a narrow necked bottle and tied the bottle to a post. They very first night the baby got hungry and reached in the bottle for rice. Her fist wouldn't go through the neck of the bottle and the hungry baby wouldn't release the rice. So we had her again.

This time we made the belt-like padded ring around her waist a bit tighter. When it came time to make the trip to Surigao via Mindanao Mother Lode, the tiny monkey rode on my arm chattering her displeasure. She would jump off my arm and drag along in the mud until worn out. I would pick her up and carry her till she awoke. When she saw where she was she again jumped off in the mud.

Chica took to Happy and was finally allowed to run free. Chica would come to Happy on call but just hated to have me around. Sheldon, Jr. often slept in a mosquito-barred crib on the porch of the chalet. Chica would raise the netting and crawl in with him. Finally Chica got so big as to be a nuisance. Then it was time to haul her out to the jungle and turn her loose at Km. 25. There were times when we thought we had kept the wrong critter!

The chalet was designed to be bug free - well almost. Each supporting post rested on a concrete base that had a 2" wide channel 1" deep around the base of the post. Filled with kerosene, it provided some deterrent. We used kerosene pressure lanterns for light until Ong Hing Lian installed a one lung diesel powered generator that usually operated from dusk till 10 PM. Soon the ants and other bugs found the power line and had four lanes of traffic going in both directions.

When in Surigao I frequently took long walks in the early hours of the morning while it was relatively cool. A favorite jaunt was to the docks at Bilang-Bilang. There would be ships loading and unloading carrying timber, copra and other products. Many vessels were Japanese whom, together with the Chinese, seemed to have a lockhold on island commerce.

The four cube-like apartments nearby were soon rented to single men from the mines who used them on the weekends. There they ensconced girls they would pick up from barrios down the road to Badas. There are lots of stories about how this community got its name. The most widely circulated tale was that the name was bestowed by an irate sailor who had a hard time ridding himself of an undesirable infection. The barrio girls were obtained by giving the father about 25 pesos. The girls would stay with their gringo boy friends until the gringo tired of her or she got pregnant. Then she would be sent back home with a new gingham dress and a few pesos.

We had limited entertainment. There was a movie house in Surigao and now and then we went. The odors were overpowering. And so were the films! I remember one screen hero who would overpower his enemies by raising his arm and exposing his opponent to armpit odor with devastating results.

One night I was awakened by a steady slap-slap-slap. As I could not sleep I had to find out what caused this repetitious sound. In a nearby nipa shack a near nude man was seated on a table by a kerosene lamp slapping at mosquitoes. Although we slept under mosquito bars religiously, it was still important to take the daily dose of quinine. A shot of Scotch to wash it down was mandatory.

Water in the camp was ever a problem. For drinking it had to be boiled at least fifteen minutes. This procedure was explained to each cook most carefully. But one cook ignored the instruction and I came down with amoebic dysentery that plagued me no end and for a long time after. For washing we had water piped into the bark structure from a nearby spring using bamboo pipes in which the segments had been perforated. Made a great shower!

We got our dynamite and caps and fuse from East Mindanao and carried it back to Magallanes by barota and over the trail. It was stored in a short adit that we equipped with double lauan doors three inches thick. These were equipped with steel bars and kept locked.

We soon discovered that our claim stakes laid out with great effort were being replaced with others. We looked for and found the culprits. Clemente Lawig asked me in a loud voice, "You want I should kill them, Sor?" Lawig had three small blue V's tattooed on his chin, a decoration or award, that signified he had taken three heads. The claim jumpers took due note and departed in a hell of a hurry

When we had driven enough crosscuts and cut trenches to give some guesstimation of the grade and quantity of ore, Dr. Osmena sold Magallanes. Although we never had the information, it appeared that the good doctor realized a fairly good price for the mining property he sold. In any event he decided to cease the operation after my one year contract. I was paid off with a three month bonus and had to look about to see what I would do next.

Luzon

It seemed too soon to return to the States. There was lots to see and do in the Islands, thus our preference was to find another job that would keep us there. So I took an inter island ship to Manila and started knocking on doors. Got a job with Balatoc Mining Company near Baguio. It was a great camp! There developed a need for an assayer. So I came out of the mine and took on the task. Working as a shift boss underground paid \$250 per month but I was paid \$275 to be assayer.

It was a large assay office. We had 12 oil fired furnaces and all the auxiliary equipment for running about 1200 samples a day from the mine and the mill. Foreman Juan Ballasteros was a blessing in operating with the 40 man crew on three shifts. Another key individual was Carlos Molina. Bullion samples from the refinery, I ran myself as I did the mill head samples and tailing samples, both solids and soluble.

Soluble losses were running too high. I convinced management that we should go to additional filtration of the tailings. The construction that followed took our house and we moved to another house up the hill close to the camp entrance.

Joe Peterson, the manager, had an interesting philosophy for doing his job. His inevitable response to any request or proposal was a resounding "No!" He well knew that he could always change his mind to a yes if the situation warranted. But if he had said yes at first, a reversal would be nigh impossible.

George Hezzlewood, the mine superintendent, had a wooden leg but that didn't slow him down a bit. He could climb raise ladders or dance a polka with the best of them. Paul Shaefer was the mine geologist. Byron Elsley was his assistant Earle Bagley was mill superintendent with Scotty Lees as his assistant.

The company store was well equipped with good supplies of gringo style food. We had a movie theater, bowling alleys and a swimming pool. Between Angeles Salvacion running the house and cooking and Sabrina Bansifra doing the laundry, it was a real easy life for Happy. Balatoc had several doctors and a good hospital.

Most anything can happen in the tropics and usually did. Once we discovered a cobra in the dining room headed in the direction of the baby's room. I chased it behind a sideboard and decapitated it with a spear when it emerged.

We were getting a collection of spears, bolos, G strings and the like and even a head ax. The Igorotes had a tradition of beheading their enemies and it continued although the Government was doing all it could to discourage the practice. We had an amah for

Sheldon Jr. When she first came she wore only the tapis, the heavy woven skirt, but was persuaded by Happy to use a blouse. What a waste!

Once we had a bad scare when the amah gave the baby a second bottle without removing the empty. We discovered this when we saw that the little boy was bleeding around the mouth. We called the doctor who came immediately. After examining the baby, the next step was to reconstruct the bottle in an attempt to determine whether the baby had swallowed any pieces. We were lucky and reassembled a complete bottle.

All our drinking water had to be boiled. Shell was a toddler and somehow managed to pull a pot of boiling water off the stove and on to his arm. He suffered a long time from the deep burns. When celebrating one Christmas with guests after the children went to sleep, we became aware of a fine white cloud of dust seeping out from under the bedroom door. Sheldon, Jr. had opened his mother's Christmas gift of a large box of bath powder and was having a great time scattering the fine powder.

Free gold was common in the veins mined at Balatoc and the loss from high grading was substantial. It was only by accident while buying an aluminum vial of vitamins that we learned the drug store had unusually strong sales for the 1/2" diameter screw-top containers that were about 2" long. When a miner offered to sell me some nuggets and poured them from such a container, I began to figure out what happened. The company had authorized me to purchase nuggets and there were plenty available. We paid far less than the gold price so nugget purchasing was profitable. But how to stop the high grading?

The miners change room was a two part structure with digging clothes on one side, then the showers and then the street clothes. Security built two concrete pedestals about 16" high for the men to stand on after their shower. From that position they had to bend over and lift a third concrete block. Out popped the vitamin vials and we had the high graders!

The main office was built alongside the road through the millsite. It housed the general manager, engineering, accounting and the like. The chief accountants office overlooked the roofs of some mill buildings. At one of our weekly staff meetings he mentioned that for some months he had been watching a crew that would come in each week or so, move across the roof, remove a section of heavy pipe and replace it with a new piece. He questioned why this pipe had to be replaced so frequently.

After he showed us the place, we knew what was going on. The pipe in question was one that carried the mixture of zinc dust and pregnant cyanide solution to the filter presses for recovering by filtration. The zinc aurocyanide mixture would precipitate out in the pipe line and did have to be cleaned about once or twice a year. But some clever

thieves had worked out their unobtrusive method of ripping off the company and made rich hauls.

I bought a Retina 35 mm. camera and got bitten by the photo bug. Tried developing a roll of 36 exposures in soup plates in the bath room and got subject to celluloid strangulation when the film got tangled up. Got a bit more sophisticated after that with a developing tank and all. Built an enlarger and was having a great time. Refugees from Germany brought in Leicas and accessories and I became a middleman. Bought 7 or 8 Leicas and a few Contax cameras as well. Sold enough of them at a sufficient profit to have our two Leicas almost free. With wide angle and telephoto lenses, it became a great hobby. With the monotonous repetition of work in the assay office, I needed a hobby. Photography was it.

Termites were ever present dining on the wood cellulose. It became obvious that our house was riddled when my foot went right through the floor. That place was an apartment close to the creek and the mill. We were given a nice house up the hill when the riverside place had to go to be taken over by mill expansion.

Also we hiked around Baguio and the nearby mountains. Once we climbed Mt. Santo Tomas during a rare snowfall. Hiked over the hill to Antamok where the manager, Lou Robinson, was an earlier vintage graduate of Texas Mines.

Just up from the assay office were some buildings where the mill workers lived. I took the trail up there one afternoon and saw three girls getting water at the common spigot. I began to chat with them. They said they were Igorotes which was obvious. But I teased them and said that they were not real Igorotes as they were wearing blouses. I took pictures as I went on chiding the girls about their blouses. Before long they shed the blouses and I took more pictures. Told the girls they could have copies if they would drop by the house. I offered them prints both with and without their blouses and they each chose the topless pictures.

MOUNTAIN PROVINCE TREK

For some time I had been intrigued by island maps. Of particular interest were the blank white areas on Luzon marked 'unexplored.' Vacation time came. I had always been eager to go North and see the Igorotes of Bontoc and the famous Banaue rice terraces. We planned a trip that would take us even further, to the north coast of Luzon by floating the Abulog River.

I decided it might be a good idea to take a .38 revolver along. I applied for a permit. A letter from the Chief of Police was necessary. It read:

OFFICE OF THE CHIEF OF POLICE

June 8, 1939

TO WHOM IT MAY CONCERN:

This is to certify that according to the records of this office Mr. S.P.Wimpfen of Balatoc Mining Company has not yet been accused nor convicted of any violation of the Law or City Ordinances of Baguio.

This certificate is issued in connection with Mr. Wimpfen's application to possess a firearm.

J.J. Keith
Chief of Police

I already had the weapon that I carried in Mindanao, but the permit would make it legal. I thought that Keith's "not yet" language was amusing.

The trek began with a bus ride on Dangwa Tranco out of Baguio. The bus climbed out of the valley past the portals of Camp Holmes. We got our first glimpse of the grandeur of the tropical mountains that form the backbone of Luzon. The road clung precariously close to the ridge of one of many wedge-shaped mountains that lay one right behind the other as far as could be seen to the east. Off to the west, under a shroud of clouds, was a broad patch of blue, the China Sea.

Sweaters were welcome in the cool dank air of the ridge tops at the more than mile high elevation. The narrow truck trail twisted and turned, writhing like a madman's dream as it passed under high cliffs and across knife-like ridges. Road gangs were seen frequently as the so-called road was under constant repair. Both men and women worked in the rock breaking and pick and shovel gangs. Seated at road edge, small girls wielded hammers to break down the bigger rock to gravel-sized material.

Each never-ending curve and turn brought new and broader vistas into view. In the bottom of a V shaped canyon and some 2000 ft. below could be seen the green rice paddies by the cogon grass shacks of the Benguet Igorots. It looked warm and comfortable down there compared to the chill of the fog and mist. To the northeast could be seen broad masses of clouds flanking the slopes of 10,000 ft. high Mt. Pulog, the highest point of Luzon.

About 10 AM was the first rest stop at Sayangan Gate where the log cabins were reminiscent of the mountains of our western states. As the dazzle of the magnificent scenery wore down, it was time to take note of fellow passengers. Igorot men clad in G-strings and little else, women young and old with their teeth well stained from years of

betel nut chewing. There were few lowlanders brave enough to travel where their heads were fair game for any Igorot that might be satisfied with not too grand a prize!

Slides were frequent. Many were labeled with a warning notice, "Look up before passing: Slide active!" Some spots of unusual beauty were also marked. One, titled "Philippines Pali" dropped straight down over 1000 ft. Through such slots where it was dangerous and difficult to maintain, the trail was one way. Thank God!

At a small settlement called Sinipsip, the rocking and rolling bus slowed to a halt. The chicken sandwiches brought from home were great. The fog kept swirling as Sinipsip was directly exposed to the storms born over the China Sea. At 1 PM we reached Kilometer 90 for a longer rest stop. Looking west the area consisted of lower hills, the home of the Lepanto Igorots. To the east in a steep sided valley lived the Kankanai branch of the Benguet Igorots. The settlement of Abatan was on the ridge that acted as a natural barrier between the two tribes.

The road from Abatan to Suyoc dropped down and down. The area was dry compared to the foggy ridge tops. Pine trees were still abundant and their fragrance was enjoyable when we weren't choking from the fumes of the worn out bus. Still the gas fumes were a poor second to the aroma of our fellow passengers.

After bouncing over a rocky road between broad rice terraces, we finally arrived at Suyoc. Schoolmate "Pots" Crosby met the bus and a pleasant day was spent with "Pots" and his wife Dolly. Went underground to see the mine.

The mining was done on a series of high grade veins, mainly cut and fill. There were a few places where the wall rock was sufficiently competent to permit shrink stoping. "Spider" Heinrichs, mine manager, provided transportation back to Km. 90. It was a long wait for the bus to Bontoc, but it finally arrived. We persuaded the driver to give us front seats and we were off to Bontoc. The Bontoc Trail climbed steadily after leaving Km. 90.

Suyoc was close to Lepanto Consolidated. Lepanto was a copper producer that was vastly expanded under the Japanese occupation. Despite that aggressive mining policy, the Japanese succeeded in developing more ore. Now the discovery of a deeper, larger lower grade porphyry ore body promises a long term future for this old mine.

The ancient bus had an unpleasant tendency to skid on the slippery road, slick from the constant fog and mists. Winding around curves and sliding along the bus climbed in second gear to a place called Cot Cot Aso on the slopes of Mt. Data. It was wet and cold. The smoke rising from the log cabins melded with the fog to lose its identity. through breaks in the clouds the emerald green rice terraces could be seen in the deep valleys.

What a struggle it must have been to build those terraced fields so that generations of Igorots might have a full rice bowl.

Beyond Cot Cot Aso the road went close to Mt. Data, although to call it a road was somewhat of an exaggeration. For one section more than 400 ft. long it was sort of half a tunnel, blasted out of a cliff face. A steady rain began to fall and the driver had his hands full keeping the unwieldy bus on the narrow slippery trail.

Many waterfalls seemed to spring from the mountainside replenished by the new fallen rain.

The trail began to decline as we came to more terraced rice fields. Descending into the valley of the Chico River the bus stopped frequently to pick up "encuentros." Old women crawled in with their baskets, most of them coming directly from their labor in the fields. The ladies, young and old, dispensed with blouses and seemed comfortable in the chill wearing only their tapis. All the men carried the customary bolo and a few were equipped with spears.

A few young tattooed lads got on the bus showing their government orders to report to an army training camp. They asked for free transport. A loud argument followed and in the end the lads got off and trudged along in the rain.

At Sabangan the Mountain Trail forked with a route toward Ilocos Sur through Cervantes and the other leading to Bontoc. There we crossed a tributary of the Chico that flows north to join the Cagayan River.

Here the Mountain Trail left the heights and wandered through rice fields on to Bontoc, capital of the Mountain Province. We passed many Bontoc men clad only in G-string and hat unlike their Baguio brothers who are required to wear shirts. The women, comely and otherwise, wear only the tapis or skirt as their sole attire. In the dusk we passed a roadside spring where three girls were bathing. Entirely nude, they showed no sign of self consciousness nor embarrassment at being observed in milady's bath.

The driver let us off at the Mountain View Hotel, Bontoc's finest if only hotel. It was good to feel the ground under foot. As the bus rattled off a ragged gang of dirty young Bontoc boys seized our Knapsacks and duffle bag and hauled them up the stairs and into the hotel. They refused cigarettes as pay. They had to have centavos and got them.

Early the next day after a hasty breakfast, it was time to wait for the bus. Time is unimportant to the mountain tribes. Most Igorots do not know their age as few records have been kept until recently. Equally foreign to the Igorot are paper and soap. More often than not paper is used as a towel and the soap is eaten with relish.

At last the tardy bus came jerking along. Then it was learned that it had to wander around Bontoc to pick up another Americana. It was strange to find the frequent use of Spanish terms although the US was owner of the islands since 1898 when they were purchased from Spain. Finally the driver located the missionary woman who was returning to Balbalasang. When her parcels were loaded we were off jerking and jouncing down the valley of the Chico.

There were frequent stops with a few G-string clad men and tapis clad women getting on and off. Groups of men and women on their way to work on the terraces were walking on the road. Most of the women carried baskets on their heads and although their hips and breasts swayed the baskets stayed steady. Their scant attire revealed their excellent posture, form and bearing. The lithe muscled men wore head axes in their G-strings while some carried a spear on their shoulder.

We crossed the Chico River on a newly constructed one way suspension bridge. Below us and across the river were some clever devices to protect the paddies from the ever hungry rice birds. Wires and strings were hung with pieces of tin and paper streamers and stretched across the fields hanging from slender flexible poles along the river bank. These were connected to master ropes suspended across the river. From this was hung a bucket barely touching the water. It would fill and be carried downstream to a point where the spring poles would jerk it back to its starting point. This arrangement created such noise and movement as to frighten off even the hungriest rice birds. The system was called "bugao" by the Bontoc.

Many women crossed the bridge carrying baskets of "aba" a tuberous plant used to feed the hordes of pigs of every Bontoc village. It made quite a procession with 12 or more women with baskets on their heads followed by as many men carrying spears and bolos. The women had been working all day while the men stood guard. Formerly women theft was frequent and many bloody battles and head hunts resulted. By 1938 the guarding of the women was largely custom although occasional thefts still occurred.

On the Samoki side of the Chico we watched a group of G-string clad boys dance and beat the gangsa for both practice and amusement. From earliest childhood both boys and girls are instructed in the various tribal dances and rituals so that ancient customs might be carried on from generation to generation.

One bright-eyed lad offered his services as guide through the village of Samoki. As he led us across the rice paddies we were followed by the entire gang of boys.

The Bontoc village is a highly organized system based on tribal traditions whose origins have been long since forgotten. There are four distinct types of houses in the

village, each for a specific purpose. A low walled thatched roof square house is the home proper for the married Bontoc. The walls do not extend to the roof but the roof is supported by four large corner posts protected by rat guards. The high peaked roof is used as a granary.

Each house has a large coffin like box that is entered through a small side door. This is the sleeping compartment. The one I saw measured 3 1/2' high, 8' long, and 4' wide. The small access door would admit only one person at a time. This protective box had a thick bottom slab and its sides were not as thick. Once a man and his family were in the sleeping compartment they were well protected from either spear thrust or other assault.

Looking further into this 15 ' square house, we see that there is a wooden table with an earth filled top in the center. Three rocks laid in a triangle form the stove. Everything within the four walls is black with soot and smells to high heaven of everything ever cooked there. Raw meat is often hung from the rat proofed rafters to cure.

In this unpretentious dwelling the family lives as a unit until the girl children attain the ripe age of twelve. Then the girls spend their evenings and sleeping hours in the "Olag" or trial marriage house. Here they offer their favors to acceptable males until they become pregnant. Then, according to custom, when the expectant father is identified with some degree of certainty, the happy couple is married and sets up a new family home. To satisfy the hormonal urges of the young males, every Olag usually has one or more girls that have a demonstrated inability to conceive, but enjoy trying.

The boys leave the family home about the same age as the girls to sleep in the "Ato," or men's house. They listen to the elders talk over important matter of the day and become well versed in tribal traditions. They learn how to play the nose flute and the regular flutes made of bamboo, and the tunes that are handed down the generations. This training continues until inclination leads them to the "olag" of their choice in search of either action or a wife. Should the youth be named the father, a new family unit is formed.

That night after an epicurean feast (canned pork and beans) in the three-table dining room of the Mountain View Hotel, we secured a guide and went to visit the village. The general features were similar to those of Samoki. There were boys laughing and singing to the inhabitants of the various Olags. The high point of the evening was meeting an old man at an Ato who had been to the World's Fair in Chicago and the father of Dr. Clapp, perhaps the best educated and most widely known Igorot.

Early the next morning the crowded bus took off for Banaue. Clouds hung low in the valley and it was cool. Two bearded priests were among the passengers. One left the bus

where the "road" intercepted the trail to Barlig. There he mounted a diminutive pony and had to bend his knees to keep his feet from dragging. It might have been less amusing if the future could have been anticipated.

The trail left the canyon bottom with its rows and rows of rice terraces and began to climb. The bus groaned and creaked as it was forced forward up unusually steep grades. Above the terraces we entered a grove of pine trees. From the summit we could see the steeper, higher mountains that lay ahead of us. Then down we went in low gear as always to the valley bottom and then up the other side.

Here we came upon the first active slide. It wasn't a bad one and the old bus pushed through the mud. From there on many Igorot road workers got on the bus and soon there were more road workers than passengers. They crowded in and somehow found room for their picks and shovels. They were a sight! All were G-string clad. Most wore the typical Bontoc earrings and the tightly woven Bontoc hats and palm leaf raincoats. As they continually spat long streams of red betel nut juice we were mindful of our good fortune in having front seats.

The need for these workers was soon apparent. The slides began to increase as we lumbered along and laboriously climbed to the cloud covered pass near Mt. Polis. Here was another gate. I never knew why the Mountain Trail had these gates but it was a control of sorts over who passed a given point. At this high and chilly gate we paused to catch our breath before sliding and skidding into the valley and its rice terraces.

About 8 km. out of Banaue the slides got the upper hand. While the bus awaited the digging out of the road we went ahead with canteen and camera. A picturesque old man seated by the roadside tried to explain something with sign language. But his dialect and demonstrations were unintelligible. Took his picture and found out later that we had been talking with Pip-pitong, chief of the Kiangan Igorots.

The mist was rolling over the terraces now and the full extent of these terraces could be seen. Infinite labor has changed the rough natural face of the steep mountains to meet the Igorots' needs. In some places the step-like terraces reached almost to the summits of the ridges. An intricate canal system distributed near equal amounts of water to all parts of the terraces.

Walking slowly we marveled at these great works built by hand beginning some 5,000 years ago. The Ifugao tribe that lived in and controlled the area has not changed its mode of living. Its' past was impressive as shown by the structural accomplishments.

The Ifugaos are also excellent wood carvers. From an elderly lady working in a camote patch we bought a cane for 30 centavos, or 15 cents in US currency. Its handle

was neatly carved into two figures embracing. A third figure sat on the head of one of the lower figures and his feet on the head of the other. The seated figure probably represents Lumawig, the Igorot deity who in this group was blessing the union of man and woman.

At still another gate where we stopped briefly we were given a lovely orchid in exchange for a box of matches, a highly treasured item along the Mountain Trail. Matches serve as payment for all kinds of goods and are esteemed gifts.

The bus finally came along and after a few more of the seemingly never ending bends we arrived. We had a fine view of the rice terraces and the scattered islands of houses amid the fields. The terraces spanned almost the entire distance from valley bottom to the ridge tops. We ate sparingly of provisions brought along. Then we had time to rest and marvel at the view.

It was a fine feeling to sit in the shadows and soak up the mystery of the ancient terraces built of stone, tears and blood. My thoughts wandered to those who lived here a thousand years past. Man and wife working on an upper level terrace extending an old one or building a new terrace that future generations of Ifugaos might eat.

No warning cry, but springing swiftly from the tall cogon grass, head ax in hand, a hostile Igorot lops off the head of the man. The body slumps to the ground and the spouting blood runs freely on the terrace giving new life to the land. The invader seizes the woman, his prize by conquest. Her husbands head is his trophy. His fellow warriors at home will welcome him and do him honor for the new head that tops the pole at the Ato. Still another blue V will be tattooed on his cheek.

More Igorots pick up the work and the quarrel. The terrace grows slowly. Seedlings are planted in the squishy mud as women bend their backs in unison with the soft boom of the drum. The yellow green shafts grow and soon there is a wavy sea of ripened rice ready for the gathering.

The unhusked rice, or pelay, is stored in the bin shaped granaries after drying. The granary sits on four stout upright logs with highly polished surfaces to dissuade ravaging rats. The granary is a bin-shaped cube-like structure with its bottom area less than that of the top. Its roof is a peaked thatched affair with very broad eaves. This communal granary is the life of the community.

Armed men loll around as always, an ever present warning to any enemies who might plan a rice seizing raid. There were many battles over a rice crop and each time blood was spilled to replenish the earth.

The white man has come-the terraces still grow but now in peace. Among the thatched roof granaries are those with roofs of galvanized sheet iron. The prohibited

practice of head hunting occurs but seldom. Yet the men go ever armed and no stranger is welcome in the Ifugao home.

The return trip to Bontoc was a weary succession of mist, fog and rain. We slid and skidded in the mud and gasped as the bus barely missed the road's edge. It was cold and wet. No rest was possible for one had to hold on tightly to keep from being jolted out of the bouncing bus. It was a relief to arrive at the Mountain View Hotel and its spartan accommodations that cost a peso a night per person.

The next day we were off to Lubuagan on yet another rickety bus. The climb and descend sequences seemed never ending but finally we arrived and unloaded our backpacks to spend the night in the Lubuagan Rest House. It was a lovely setting overlooking rice terraces. We paid up the peso per person charge for the room and crawled under the mosquito bars to dream of the marvels we had seen.

We planned to continue north on foot to reach Kabugao and get horses to go to the Abulug river and float down to the north coast. But we soon learned that horses were not available due to a plague of rinderpest. Our plans changed and we headed down a trail to Pinukpuk where we planned to overnight. We were soaked from head to toe within minutes of leaving Lubuagan, but we kept on moving.

One woman that we met on the trail looked at Happy and ran her finger down Happy's forearm to see if the color would rub off. One man with her told us it was the first time she had seen a white woman. Missionaries were seen frequently but a white woman was rare indeed.

Down the jungle trail we came to a stream about 25 ft. wide that looked too deep and swift to ford. While considering the problem a boy came along leading a carabao. He offered to take us across and one at a time we mounted the broad backed animal and were taken across the stream. On down to Pinukpuk, we found the best English was used by the school teacher and his wife. They generously invited us to share their home for the night. There was peanut soup and some rice for dinner and it tasted good and satisfying.

That evening we learned from our hosts that a canyao was to be held to celebrate a wedding. We went along and found the entire community assembled around a huge bonfire. There were drums and gangsas, the drum being a huge hollow log with several holes in it. We were invited to sit near the village elders.

A ceremonial drink held in very high regard, the Bilibud was offered to Happy. She declined saying it was too great an honor for a mere woman and it was then offered to me. I had no choice but to gag the stuff down. There are no adequate words to express the

powerful odors that pervade any group of Igorots and the essence of these smells seemed to be distilled into the powerful Bilibud.

Then a carabao was led into the clearing around the fire and huge chunks of meat were chopped from the live animal, stuck on sticks and roasted. It was gruesome and made no less so when we learned that it was the same animal that had ferried us that afternoon. We gagged and chewed a bit before retreating to the edge of the group and heaving the meat into the bush. Shortly after we excused ourselves and retreated to the schoolhouse for the night.

Again no horses were available. We finally negotiated for a barota, a long dugout canoe, and the services of two boatmen to take us to the Cagayan River and north to Aparri. It was a scary trip with many rapids and wild Tamarao on the banks and crocs in the water. Nothing eventful happened and finally, bone weary, we arrived at Aparri found its lone hotel and we rested for a few days.

Then we got aboard a Dangwa Tranco bus and skirted the north coast to Banua where the government ran another rest house. It was a delightful setting on the northernmost point of Luzon. It had full service meaning meals and lodging. The daily per person rate was only 5 pesos (\$2.50). After several days we were ready to proceed and decided to pay up and move on. Our money was rejected and our host insisted all was free as we were the first gringos to honor the rest house.

On down the coast of Ilocos Norte, we travelled with chickens, pigs and Lord knows what else. There were frequent roadside stops for Tuba a wine fermented from coconut juice and balut at 2 for 5 centavos. Balut is a delicacy. It is the embryo chicken pickled in the shell. It was good form to grab the embryo by the feet, snap off the beak and then swallow all but the feet. It is surprising what you will consume if hungry enough.

Overnight at Vigan we were the feast for a host of bedbugs. Bedsprings are rare in the Islands, but the cots make of behoko fiber are most comfortable. The weave is similar to that of the cane bottomed chairs once found in US soda fountains. The air can circulate from below but the fiber seems to harbor bedbugs and other critters.

Our bus took us down to San Fernando and up the Damortis Road to Baguio. It was good to be home but the glories of the Mountain Province will never be forgotten.

There was lots of film to be developed and printed. Then too we began to collect many Igorot items from hats to G Strings, tapis, spears, bolos and a shield and headaxe. The weird haunting sound made by old women with their devil sticks as they trudged the trail carrying baskets of camotes will be ever remembered. The smells have long been forgotten.

Sunday often found us taking a company bus to Baguio for a Chinese dinner, browsing through the bazaars or seeing a movie. Took the kids to see Snow White and the Seven Dwarfs there in the Baguio theater.

The Pines Hotel was an institution. Drinks were served by bringing you the bottle of your choice. When you were through you told the waiter how many drinks you had, and then you signed a chit accordingly.

When the management tried to use small flagons to effect better control, there was a howl of protest and they went back to the bottle. It was tradition at the Pines Hotel to serve hot pork and beans with the drinks on Sunday afternoons. I was in Baguio frequently. Happy taught at Brent School and I started a Camera Club there for the kids. I tried to stay one jump ahead of them.

Lin Yutang, the Chinese author, was in the Pines lobby one evening. I took his picture lighting his pipe with a match. He liked it so well that I supplied him with 50 copies for use on his Christmas cards. The Camera Club finished its activities before Happy got through with her work so I whiled away the time in the Pines lobby.

Got talking to one interesting couple who expressed an interest in Balatoc. So I invited them to visit and have dinner with us. It was only later that I learned our guest to be was the US Ambassador to Thailand. So for dinner, we also invited the Petersons and all went off well. Our maids were wonders. All we had to do was tell them how many would be coming for dinner and they took care of everything else. Silver and china were borrowed as needed and the meal was planned and carried out to perfection.

One evening I had the temerity to try my hand at making fudge. It didn't turn out that great but the kids liked it. Angeles was pouting the next day and that evening after dinner she served four different kinds of candy all far superior to my feeble attempt.

We had many parties and enjoyed our friends; Charles and Marcia Berry, Carroll and Dorothe Livingston, Scotty Lees, Scotty and Mrs. Thompson, Paul and Gladys Schafer plus a multitude of others. Many came from the nearby mining camps of Benguet Consolidated, Antamok Mining, Baguio Gold, Three Rivers Mining and others. Curly Livingston had a son about the age of Sheldon Jr. and that was a good reason for frequent visits.

In those pre-war years the Philippines was a great place to live. But there was a change coming. Evidence of Japanese interest in the islands was increasing. A raid on a Japanese bazaar in Baguio turned up many cases of Japanese weapons. One of the top men in the Balatoc mechanical department was Inayoshi. Our mutual interest in photography brought us together. One evening at his home I followed 'Nayos' into another

room where he had gone to get something. Inadvertently, as he opened a chest, I got a glimpse of his Japanese naval officers uniform complete with sword.

There was enough evidence that I wrote my congressman only to receive a pooh-pooh reply. Major Hood, Commander of Camp John Hay said "No problem. If they come we'll wipe them out with a few machine guns covering the Damortis Road." At Balatoc, department heads were told to order sufficient supplies to carry us over two years just in the event that shipping might be interrupted. We had 16 furnaces that used carbofrax muffles. I always kept one complete extra set on hand, but placed an order for 32 more muffles. Somewhere along the line my order was doubled and in due time we received 64 muffles! Other departments had the same experience and our warehouse got overstocked.

There were some interesting job offers floating around. One I was tempted to take was to work on underground construction in Hong Kong. My salary at Balatoc was \$275 US per month and the Hong Kong job offered \$1,000 per month. Happy vetoed the idea. Then we were ordered to send our families home. This was in the Spring of 1941! That order didn't fly in the Wimpfen family. It was a case of "If I go, you go!" I resigned with an effective date related to when we could obtain passage back to the States.

In the meanwhile I looked for other employment and found something really interesting with Soriano. His interests included New Saza Mines Ltd. in Tanganyika Territory in Africa. It was on the Serengeti Plains, a well known wild life area. The gold occurred in narrow high grade veins and averaged over 1 ounce per ton. Andres Soriano wanted me to go from Manila directly to Dar es Salam and then overland to the mine near Lake Rukwa. But by that time we had secured passage on the SS. Besholt a Norwegian ship by taking the owner's suite. Soriano recognized my interest in a stateside visit and I agreed to depart from the US for Africa in a few months.

BACK TO THE USA

For some years I had been enrolled as a Second Lieutenant candidate in a home study program of the US Army Engineer Corps. This course required completion of a lesson every thirty days. I was faithful in completing my homework leading to a commission. When I was ready to leave for the States I went to Fort Santiago in Manila. Told them that I would be at sea for about 32 days and would be unable to mail my homework in on time. I was told that this was no problem.

We left those lovely islands with great regret. It had been home for some very happy years! As we sailed southeast from Manila Bay we passed lovely Mt Mayon, serene, symmetrical with a wisp of smoke stringing off from its summit.

At sea our last sight of land was a desert isle the skipper identified at Iwo Jima. Then it was open sea as we followed the great circle route headed for San Pedro, California. The SS Besholt was a freighter with room for just 16 passengers. A canvas lined lumber box on deck made a great swimming pool. We ate too often and too well. One passenger was Basil Rathbone, an actor of that period. Almost all the others were like us, fugitives from an uncertain future. The Norwegian skipper was a Nazi sympathizer, a Quisling.

On the last night of our voyage I stayed up to see the blinking lights on shore as we sailed down the coast of California for San Pedro. We returned to the States on October 15, 1940. Once we disembarked we had to go thru US customs. That presented no particular problem. But there was another facet of our reentry to the United States that was to effect a major change in our future.

While we were at sea the US passed the draft act. This law involved the taking of my passport that would preclude my proceeding to Tanganyika Territory. I telephoned the agent for New Saza in San Francisco and told him of the problem. Besides, I was a second Lieutenant in the Army reserve. The agent suggested that I come to San Francisco and we could discuss the matter and see where we were to go from here.

The office was interesting in that there were many photos of the mine area including what happened to vehicles when rhinos saw their reflection. Those beasts could sure destroy a pickup in a single charge. The New Saza agent said he did not think that there would be a problem. He offered to put me on the payroll as of then and I in turn would be committed to go to Africa when my passport could be recovered.

Something about that idea didn't smell right and I rejected it out of hand. On returning to my hotel I called Waddy Wheelock, mine superintendent at the Presidio Mine, and told him what had happened. Waddy told me to come on back to Shafter where I would be in charge of deep development. That sounded like a good alternative to me. I called Happy in Los Angeles and told her to wait for me as we would be going home to Texas as a family.

The next morning I flew back to LA. We purchased a used 1936 green Chevrolet 4 door and moved on east toward Texas. We rejoiced to be back in the US as we felt that the future of the Philippines was in great peril and that the Japanese were likely to move in at any time. As we drove eastwards we stopped to see the sights and savored the great beauty and awesome distances of our western states. Grand Canyon was a delight to both

eye and soul. The weather was turning cold and our blood was probably thinned by our years in the tropic. We bought new warmer clothes and got a kick out of seeing snowflakes.

I got in touch with the Army correspondence school people in San Antonio. I was shocked to learn that my commission had been canceled due to my failure to complete a lesson every 30 days. There was no appeal. I was out!

Shafter hadn't changed much in our absence. Most of the old faces were still there plus a few new ones. Found a place to live in the house behind the filling station that Bill Howell used to run. Think they had put Bill away finally. Something about shooting at his wife's feet to make her dance. The bullet marks were plainly visible on the concrete floor of the old one story adobe building.

My job was straight night shift leaving home about 5 PM and returning about 12 hours later. It was grueling but interesting. The east end of the mine had been opened up to the 950' level and provided most of the ore for the 300 ton per day mill. Mill heads had dropped to about 12 ounces and appeared to be headed lower. The 950 level was reached by an incline from the 900 level and the incline was being sunk to the 1000 ' level. Water was a problem. It was pumped up to an open crevasse on the 900 level. Fluorescin dye showed that it was just recirculating back to the 950 level. Ventilation was also a problem but a 10" churn drill hole from the surface to the 950" level was a great help.

I was getting very weary of the long night-time shafts and began to look for something else to do. Mining and Metallurgy carried an ad for a mining engineer to serve as assistant superintendent at a developing gold mine in Oregon. That sounded interesting and I applied and got the job. When I told Waddy Wheelock I was leaving he told me to hang on as the company was about to promote me to mine superintendent. But I felt that it was too late and stuck by my commitment to the Benton Mine out of Grants Pass, Oregon.

CHAPTER 4.

OREGON - BRYAN - POTOSI - PULACAYO

OREGON

We packed up and with the two boys headed for the northwest via New Mexico and Colorado. We camped out along the way. It was the summer of 1941 and the countryside was gorgeous. Crossed Molas Pass and spent the night along Molas lake. Fresh trout for breakfast was a real treat. Went down the million dollar highway north of Silverton as we headed to Grand Junction. Drove west to Salt Lake City then north to Idaho. Camped out near Drinkwater Pass the first night in Oregon. On to Bend and then south to Crater Lake.

As we headed toward Grants Pass, it came as a sudden surprise to find that the brakes had failed. It was almost all downhill to Grants Pass and we proceeded cautiously in low gear. After the master cylinder was replaced, we waited till morning to head for the Benton Mine.

The road out of Grants Pass soon degenerated into a truck trail when it left the Rogue River Valley. We traveled the 45 miles to the Benton Mine on Whiskey Creek about a mile north of where it joins the Rogue River. The Benton Mine owned by the Lewis Investment Co. in Portland was an interesting property.

Exploration was proceeding along with development work. A small cyanide plant processed about 40 tons per day of the average grade ore of about 1/3 of an ounce of gold. Elton Youngberg was the manager and I was his assistant. Bud Dezell was mine superintendent, George Gale mill superintendent, and Scott Valentine accountant. Clem Flickinger was a general foreman. Clem contracted for mine timbers and took care of a multitude of things that kept the camp going.

The camp nestled at the bottom of the steep Whiskey Creek valley. An upstream dam built of logs and with a pivoted gate to handle flood water supplied both the mill and domestic water needs. The creek also kept us well supplied with trout. Our backyard was narrow as were all yards in that constricted valley. The nice thing about it was that one had to walk only about fifteen feet to catch a fine trout breakfast.

Little Sheldon Jr. got a few firecrackers somehow and managed to burn a finger with the matches even though he never succeeded in setting off a fire cracker. When asked how he had injured his finger he said " A fish bit it!"

The camp houses were of various designs, shapes form and colors. Designs had to be approved by management that provided all building materials, but you provided the labor. It was a nice working arrangement and gave one latitude in building a home.

Whiskey Creek had been placer mined for years for the first four miles from its confluence with the Rogue. Indian Joe who lived at the confluence was a "sniper" as were many others in the area, including the Sanderson brothers who worked part time at the mine. Snipers washed the sand and gravel on the many bars and banks exposed along the Rogue. Their bank accounts replenished with each spring flood. You always knew when you were getting close to a snipers camp as the aroma of onions and salmon was potent.

That mining district was characterized by rugged terrain. The elevation at the mouth of Whisky Creek was about 500 ft. and nearby Mt.Reuben was 4000 ft. The array of igneous and metamorphic rocks, plus a few sedimentary formations were host to the quartz diorite intrusive with its quartz veins that made up the Benton Mine deposits.

Josephine County in the Siskiyou National forest has many gold mines and prospects but the Benton Mine is possibly the most developed. About 64,000 tons were mined and milled in the 1935 to 1942 period. The work we were doing was all aimed at developing sufficient ore to justify a production level of 300 tons per day or thereabouts.

But on December 7th, 1941 Scott Valentine and I were sitting in our 1940 Buick listening to a church service that was interrupted with the news of the Japanese attack on Pearl Harbor. What a shock!

Every effort was made to keep the mine running. We stocked up on zinc dust, but a shortage of canvas for filter cloth was our undoing. Anyhow, the Government passed Order L208 shutting down all gold mines. The theory was that the miners would then go to the copper mines thus taking care of the shortage of copper miners. It did not work!

There was an organization called the National Roster of Scientific and Specialized Personnel. I registered with it to see what might be offered. In the meantime, the Army Corp of Engineers wrote to forgive my homework lapse and offered a captaincy in the Corps. But I was still miffed and turned it down. The National Roster came through with several offers. One was on the Colorado Plateau involving a search for an unidentified mineral. Years later I learned that this was the search for uranium. Another offer was to Bolivia to work in the tin mines at Potosi. A house and family transportation was included.

The salary was \$275 per month. The departure date from the States was uncertain. But I accepted anyhow.

BRYAN, TEXAS

We hadn't been home for a while so took off for Bryan, Texas. Happy's Mom was there to take care of her mother, Mrs. Henry. I found some short term employment at College Station. The job was to construct an airfield and a sewage treatment plant. It was outside work and I enjoyed it. The projects were under the jurisdiction of the engineering department of Texas A & M.

The airport was primarily an earth moving job. We had a few D8 bulldozers, some graders and bunch of small Euclid trucks. It was a WPA job that meant lots of hand labor. We loaded the trucks by moving the grader over a ramp and grizzly and the muck fell into the truck below the grizzly.

One man on the job always wore a fine silk shirt. That seemed incongruous with pick and shovel work. I asked him why he wore such an expensive shirt on a pick and shovel job. He replied, "Boss, where I buys my shirts, they all the same price-25 cents a week!"

The WPA workers were not the most productive. It was frequently said we had to have two men for every job. One worked while the other took a crap.

Finally the time came to leave for Bolivia. Happy drove me to Brownsville where I boarded a Grace Line DC3 headed south. The first night we spent at a little fishing village on the west coast of Mexico - Acapulco. Then at daybreak we were off again to spend the night in Tegucigalpa. We always had breakfast at the overnight stop, with a sandwich for lunch in flight and then dinner at the next overnight stop. We flew low and the scenery was great.

The next night was in Panama where we had an opportunity to see the city. Stayed at the famous old Hotel Tivoli that had prospered since its construction when the canal was being dug. Another passenger and I tried to take a walk in the city. We were harassed by the many prostitutes and gave up the walk.

Then off to Cali, Columbia for a pleasant evening in that delightful city. On to Lima, Peru where we enjoyed the many horse drawn carriages and the freshly bottled beer. The next night we spent in Arequipa, Peru at a legendary pension the Quinta Bates, run by Tia Bates. Tia was probably known by every gringo that had passed by this corner of the world. She was the widow of a mining engineer. She elected to stay in Peru and made a life for herself.

POTOSI, BOLIVIA

Next morning we took off. The Pilot threaded his way up dry desert canyons just as crooked as a dog's hind leg. We landed at Los Altos the La Paz airport. We took off again shortly to land at Oruro, Bolivia, a lonely airport on a high Andean plain. There wasn't a soul at the airport when I was off loaded and watched the DC3 disappear to the south. But it wasn't long till a man came along from the Price Waterhouse Oruro office. He gave me a lift to town and put me up for the night.

The next morning I walked to the Mauricio Hochschild office to find out that I had not been met due to a breakdown in communications. I was assigned to the Compania Minera Unificada del Cerro Rico de Potosi or CMUCP for short. The trip to Potosi was by ferrocarril and provided a wonderful opportunity to see the countryside. Arriving at Potosi, I was surprised to see tanks located on the city's central plaza. It seems that Potosi had made gestures toward independence and the central government was not about to see that happen.

I was assigned a room in the single men's quarters, Rancho Pailaviri. This structure was once a stable when originally built circa 1600. It nestled into the side of a hill. It was an open square with the rooms opening into the square. The outside windows were glassed and barred. It reminded me of the similar quarters at Shafter, although those were originally built to house single men.

The sole entry to Rancho Pailaviri were two heavy large double doors big enough for horses to enter. We used a small door cut into one of the large doors. At the northeast corner, several stalls had been put together to make a dining room that adjoined the kitchen. Pressure cookers were a necessity at the altitude of 14,000' where water boiled at about 184° F. There was a big old cast iron stove in the kitchen. It was fueled with yareta, a fungal like growth that could be harvested on the high pampas or ucha, dried llama dung. Neither was too good a fuel but could be coaxed to burn. All it really lacked was oxygen!

It was difficult to teach the local Quechua girls to cook and especially to use pressure cookers. One day there was an enormous bang in the kitchen as a pressure cooker exploded. It broke the cast iron stove top and shot the pressure cooker lid through the roof.

Meals were pretty gruesome! But we did survive and almost all of us lost weight. It was a great treat to be invited to eat at the married staff members' homes. Then too, we often took turns in preparing something special. Charlie Basso once spent all day fixing spaghetti sauce and we had a great meal. Another good place to eat was at Alicia's in

down-town Potosi. Alicia was the Chilena madam of the local bordello and supplied good meals along with other services to gratify gringo appetites. Myron Gretler, one of the mine geologists, became enamored of Alicia and left the Rancho and moved in with Alicia.

Lloyd Daume was the manager and as far as I know did a good job under extremely difficult conditions. There were labor problems and lots of just plain irritating situations. We used trolley locomotives on some levels. A favorite stunt of the miners was to leave a loco with the controller right under an acid mine water drip. The copper contacts would be eaten away in a single night. That would interrupt ore hoisting and reduce haulage rates till we could have the unit repaired. Sometimes we thought such events were instigated by Nazi sympathizers.

We shift bosses were hassled as well. Once I was blocked from leaving my doghole office by a bunch of miners clamoring for something or other. I took all I could stand of that and finally grabbed a piece of starter steel and swung it vigorously as I walked through the gang. That was the end of that problem!

Rancho Pailaviri was sort of set back into the hillside, but the space around the building itself was about 25 feet wide at the back and on both sides. The building sat close to the road from Potosi to the mine. The rough ground in the draw across the road was pockmarked by old dumps and open mine shafts.

The Cerro itself was riddled with old mine openings. Story has it that there were over 3000 bocaminas. In the old days when it was a silver camp, the miners vied with one another to get to the ore. They burned chile powder, set off explosive charges and had many brawls and battles to acquire and retain whatever mining right they may have had . It was just one big free for all.

Old mine dumps were everywhere! Young Henry Rothschild, a recent emigre from Cologne, was in charge of the "kaachas." These were operations on old dumps, where maybe a man and his wife and children would work. The old dump would be worked over, piece by piece. As the man would fish out a piece of rock, his wife and kids would break it with a hammer and sort out the higher grade mineral. Henry would travel the Cerro each day astride his mule and leading a few burros. At each kaacha he would bargain for the kilo or so of concentrated cassiterite that the gang had accumulated.

Perhaps this was good training because years later, Henry became the president of Phillip Brothers, one of the world's largest ore buyers and mineral supply firms.

Each day we walked up the hill to enter the Real Socavon or the royal entry, to go into the mine. On the portal carved into the stone entry was the seal of Spain. We wore locally woven baggy britches and shirts made of wool. The wool was resistant to the acid

mine waters. Rubber boots and a hard hat completed our costume. With carbide lamp and hand-pick we went to work in whatever area of the mine we were assigned.

The Cerro Rico of Potosi, once called the richest hill on earth, had been mined by the Spaniards for centuries. The Real Socavon carried the date 1640 on its stone portal made of poteo. Poteo was a local name given to the tufa blocks quarried underground that were used for lining drifts and ore passes. Mining by the Spaniard began about 1545 and 1592 was the peak year of silver production.

The Spanish enslaved the Indians and kept them underground where they were chained up each night. There was a sala de ahorca where incorrigible Indians were hung. Actually their lives weren't much better when slavery came to an end.

In 1942 the average male miner earned in Bolivian pesos the equivalent of 60 cents in US currency. Women working underground get about 40 cents per day. After meeting their daily needs for coca, there wasn't much left for food or anything else. But the coca not only doped up the people, it seemed to dull their hunger pangs. As for us gringos, it seemed our main diet was boiled beef and vegetables and the local bread that was pretty good. All the water had to be boiled and filtered to make it potable.

We went to work in our mine duds. At shift's end we emerged hot and sweaty into the chill air of the high Andes to walk down to the Rancho for a hot shower. The first man out usually built a wood fire under the copper hot water heater. The fire was replenished steadily and after some waiting for a new supply of hot water we all eventually got clean and ready for dinner, such as it was. Reading, listening to short wave radio, and Alicia's was the only form of entertainment we had.

The underground quarry was kept operating as we needed the stone. As a cut and fill stope was brought up from a level, we used blocks of stone to carry up the ore passes and manways. An ore pass was started out with 7 blocks and, as the development muck was used to backfill, the dimension of the ore passes were reduced to a 5 block circle. Each block was about 6 inches thick and had a cross section of about 6 x 6 and a length of about 10" with the inner and outer faces curved and the ends tapered to fit in order to make a circle.

One day we broke into an ancient room that turned out to be the sala de ahorca that we had heard rumors of. Chains hung from eye bolts in the back and there were many skeletons.

Tin was in high demand for the war effort. Although the strong walls and competent ore were ideal for shrink stoping, the stopes were drawn down prematurely and miners worked off small platforms resting on stulls. One misstep and a man could fall

several hundred feet. Some did fall and their bodies were badly broken as they bounced from wall to wall of the steeply dipping slopes. It was a hairy experience to climb a swinging cable ladder up to a working platform. There were wide open spaces below and on either side as far as you could see in the dim light of a carbide lamp.

One morning, at Rancho Pailaviri, we woke to the close on sounds of exploding dynamite. Crude bombs were tossed on the roof from the bank behind the rancho. We all grabbed what guns we had, closed and bolted windows and doors, and took up positions where we could fire through the ill fitting shutters. There was a pitched battle as the attack went on. They had guns too, so we were firing in self defense. Lloyd Daume came along and pulled up to the front door and jumped out as we held the door open for him to come in. Seconds later the culvert just up the road from the Rancho blew up. If Lloyd hadn't stopped at the Rancho, he would have been blown up.

We heard a big explosion and found out later that one of the large mine compressors had been sabotaged. Finally the attackers drifted away helping their wounded. We went out cautiously and found that some of the attackers weren't going to bother anyone ever again. We dragged them to nearby mine shafts, dumped them in and shoveled some material on top. Voila! No evidence!

The ore grade was about 1.5 to 2.0 % tin and to make matters worse, mill recovery hovered around 50%. CMUCP as a mining company just couldn't make any money. The Mauricio Hochschild organization took a percentage on all supplies going to the mine and then took another percentage on the tin output. And all that was on top of a management contract! Don Mauricio was getting extremely wealthy!

Labor problems added to the difficulties. The men were underpaid and had to pay inflated prices at the pulperias or department stores owned by Hochschild.

The exchange rate was about 40 Bolivianos per dollar and a skilled drill runner would earn about 50 Bolivianos per day. Most of the drifting was done with Mexican set ups, a jackhammer hung to a piece of drill steel by a piece of chain. Stopers were uses in the "shrink" stopes. I set up a new section in the mine but theft of water valves, drills etc. was so rampant, I found we could do better using hand steel and double jacks. I used to frequent the feria dominical to buy back needed mining equipment. It was startling to see jackhammers, wheelbarrows, water valves, drill steel and Stilson wrenches for sale that everyone knew was stolen goods.

Later my beat was the lower level of the mine-the 575 meter level, called Julia. The main shaft pocket was one level up so all our 575 meter development muck had to be hoisted through an interior shaft and then trammed to the pocket at the main shaft. It was

about this arrangement that I got crosswise with Roland Erickson the mine superintendent. Prior to using this interior raise between the 525 and the 575 meter levels, main shaft ore hoisting had to be interrupted to hoist the 575 level development muck. I proposed installing wire rope guides in the raise and hoisting mine cars for tramping to the 525 meter level waste pocket. Erickson said it was a stupid idea. Then a few weeks later he issued instructions to make such an installation setting out the plan as his idea. I called him on this and we had words.

Ore hoisting from a pocket on the 475 meter level was not interrupted for man hoisting or lowering. We climbed ladders up to the 275 meter level and from there on walked up the steeply inclined ramp that encircled the older portions of the shaft. It was a tough climb!

We would walk out through the Real Socavon and then down to Rancho Pailaviri, the single men's quarters for a shower and change. I contracted a severe cold that went over to mumps and then yellow jaundice. Finally I was hospitalized where the Catholic nuns did their best. I was one sick guy. I remember one night when the doctor was checking on me and heard him say, "No va durrar hasta la manana." I thought to myself, "You are one wrong sucker!" Finally, after three weeks, I got out of the hospital and weighed in at 146#. I had lost 30 # with the illness.

I was sent down to a lower elevation to Cochabamba to regain my health. I ate well and rested much in a private pension. It even had a warm water swimming pool with a dividing wall to separate the sexes. After three weeks there I was ready to go back to work.

The trip involved bus to Oruro and then ferrocarile back to Potosi. It was customary procedure when boiler fuel ran low, for the train to stop. The passengers would get off and go hunting yareta and ucha to provide enough fuel to keep going. There was a potent incentive for this effort as without the fuel the train would just be stuck on the track.

Yareta was a woody fungus-like growth that could be several feet in diameter and a foot or a foot and a half high. Yareta would grow like a segment of a sphere. It could be pried up and made an excellent fuel. Ucha or llama dung was everywhere, but it took much bending to get an armload.

On one trip from Oruro to Potosi we ran into a snowfall that covered the ground with about sixteen inches. The train got stuck in a snow bank and there we were. The pot bellied stove in the sleeping car ran out of fuel and we sure couldn't find yareta or ucha with all that snow. To keep from freezing we broke out a fire ax and judiciously began to tear up the innards of the car to fire the furnace. We were desperate! The snow soon evaporated and we were on our way after only a day's delay.

The company decided that my services would be better utilized in updating the triangulation network. This was in preparation for some new shafts that would require accurate surveys. The shaft work was to be carried on from several levels simultaneously. The task was urgent to supply more tin for the war effort.

There was a Wild theodolite in its smooth aluminum casque. It was a beautiful instrument and a pleasure to use. There had been a previous triangulation survey most precisely done. The problem was that the survey points were no longer in place. The previous surveyor did a good job but used brass rods for each station. Even though set flush with the rock surface, the local Quechua Indians found them and pulled them out for the brass. So the entire job had to be redone. The top of the Cerro Rico de Potosi, at 17,000 ft., would again be the center of the network. Also I planned to set the new survey points as close as possible to the original brass ones.

Drill steel was plentiful and not in high demand, so I decided to use it for every survey point. All stations were to be set in solid rock and referenced by at least two lines with their intersection on the station. Random angles were used for the reference points and they too were set flush with the rock surface. I had to be sure that they would not be extracted. So all steel for survey points were two feet long, split for four inches at the bottom and fitted with a three inch wedge. After driving them in the hand steel drilled holes in the rock they were further protected with grout poured around them. Then they were covered with gravel so that it would require the survey notes or a strong magnet to locate them.

Such precautions may seem strange. But anyone that had the experience of making a long survey for a triangulation base line using wooden stakes only to find them all gone the next morning would also be compelled to take heroic measures. Drilling all those holes and setting the drill steel stakes was a slow process, but it was worthwhile. In 1975 the net I surveyed was still in use.

We established a baseline 3000 feet long in a valley near the foot of the Cerro Rico. The entire length of the baseline was visible from the peak. The baseline was some 3000 feet lower than the summit at 17,000 ft. To make it easier to locate a station we made wooden tripods with a flag waving at the top. These were picked up each day or would have vanished in the night.

It was a long climb from Rancho Pailaviri at 14,000 ft. to the summit of the Cerro Rico at 17,000 ft. But the view from the summit was tremendous and all of the other stations in the net could be seen. Survey work had to begin early each day as it wasn't long after

sunup till the heat waves made sightings inaccurate. Each angle was turned 16 times as we sought for second order triangulation survey accuracy.

Each morning we had to get up at about 3:30 AM and get underway toward the summit by 4:00 AM. It took about an hour on our riding mules to get to the top and get set up. We were forced to stop by about 9:00 AM. If it was too windy, we had to quit. The men at each station had binoculars to see any signals we might send. But the best way of coordinating was to stick with an agreed upon plan for each day as to when we would stop holding on a station. The radio communications systems available today would have simplified the task.

Calculations took up the balance of the day. Once the triangulation net was complete, I was anxious to go underground again.

I was always looking the country over for signs of deposits that could be denounced or claimed. A Bolivian llama herder told me about a lead deposit he had discovered that was close to a meter wide and a 1000 meters long. I just had to see it and sample it. It was a two day horseback ride away, but I went with the herder to see the vein. He didn't speak much Spanish and my Quechua was equally weak.

We found the vein of galena and took about 25 two-pound samples. Then back to Potosi. The first sample I assayed was a composite made up of about two ounces from each of the 25 sample sacks. I could hardly wait to see what the silver content was. Assaying an assay ton of 29.166 grams, I ended up with a large lead button. I slagged the conical button and hammered it into a cube for cupellation. Into the furnace under an oxidizing flame that would convert the lead to lead oxide, hopefully leaving behind a huge silver button. I watched anxiously as the cupellation process went on. The button shrunk and shrunk as the lead oxidized. Then there was nothing! My dream of another tin peak rich in silver had vanished..

There are, in my opinion, more mines to be found in that part of the world. Exploration and a thorough geologic base is certain to result in new finds. When the Spaniards first stumbled on Potosi, there was some mining going on for the silver in the rich veins.

The Spaniards were intrigued by the fiery eyes that appeared at night in many of the passes and on windy ridges. These were the fires of the wind-blown furnaces or guayras that the Indians made to smelt the ores. Typically these were made of stones set in clay and with vent holes at the bottom for the wind to enter. They were often portable clay furnaces. The pots were filled with a mixture of ore, limestone and fuel and placed in windy passes to be smelted. This was a crude process but much silver was produced in that manner in various parts of the world.

Many of the ores thus smelted were a mixture of silver and lead and this product found considerable use for shawl pins and other ornaments. When purer silver was desired, the lead-silver mixture was placed in a small muffle or crucible and purified with air from bellows or blowpipes. Later amalgamation became the predominant technology.

The Spaniards really got busy and exploited the numerous silver rich veins. As the Spaniards increased their operations, Potosi grew and reached a maximum population of about 65,000 in the sixteenth century and was the largest city in the Americas. Its streets were narrow so that a sole Spaniard with his sword could fend off an attack.

Perhaps the most interesting of the many old buildings in Potosi is the Moneda. As silver production increased, it was felt necessary to have one. The Spaniard built huge furnaces that were actually reverberatory furnaces and the silver was cast into bars.

To build the Moneda took tremendous effort. Huge timbers were brought in from the lower flanks of the east slope of the Andes. One of the largest of these was mounted vertically to drive the rolls that reduced the silver bars to thicknesses adequate for coinage. This monster timber was suspended on a huge wooden bearing on the second floor. On the ground floor, there were a number of horizontal cross pieces that ten men at a time could push against. Thus the power of more than forty men at a time could rotate the vertical shaft that drove the rolls on the second floor.

When a silver bar was reduced to about 1/8 inch thick, it would be placed on a die and struck with a maul bearing the obverse image. Pieces of eight and other coins were thus pounded out. One report by an early Governor of Upper Peru, as Bolivia was known at that time, stated in his annual report to the King in Madrid, " Sire, this year we have produced enough silver to build a bridge from Potosi to Madrid!" Potosi produced the wealth that enabled mounting the famed Spanish Armada.

PULACAYO, BOLIVIA

They needed men at Pulacayo and I was transferred to that mine managed by Jack Ward. Fred MacIntosh was the mine superintendent assisted by my old friend Dick Clarke from Suyoc in the Philippines. Pulacayo was operated by the Cie. Minera Huanchaca.

Fred took me on my first trip through the mine. It was a hot hole and well deserved its reputation as the hottest mine in the Americas. Fred didn't spare me a bit, but I was completely recovered from my bout with jaundice and was able to handle the distance, climbing and heat without a problem.

Many conditions were better than at Potosi. Here we walked a short distance to the main portal in our everyday clothes and went to a change room about 600' in where our baggy

woolens were washed and dried each night. So we always had fresh working clothes for each shift. Here too we carried carbide lamps. The mine was very gassy. I never found out just what the gasses were but there was "hamakaitchi" and "samakaitchi" with the latter being most deadly.

There was a major ventilation installation but some places were so bad that to hold your lamp down at arms length would put it out. We traveled each shift with a small boy as companion. He carried a long rope around his waist. If we came to a suspicious spot, the boy would go in first. If the situation was bad, I could always pull him back to safety. We used a 'pull on the rope' signal system. If the lad failed to signal, he would get hauled back out.

The entire mine was in the core of an old volcano. Narrow, near-vertical veins were the producers of the rich silver, lead, zinc and copper ore. Almost all the stopes were mined by cut and fill methods as the rhyolite-like country rock wasn't very competent. In addition to the heat and gas we had to contend with lots of hot water on the lower levels. Drifts were advanced by drilling behind a shield to protect the miners from the spurting water that was often 145°F. We had stopes that were 115°F with both wet and dry bulb. These were just too hot to work, but we could manage places that were up to 110°F. Men worked for about half an hour and then went out to the shaft for a breath of cooler air.

Also, at each shaft station there was a shack housing a Quechua woman who brewed tea and offered the miners hot tea with plenty of sugar and bread. As the men seemed to spend most of their meager income on coca, this system provided some assurance that they had something to eat. The shack was so constructed that the lady that brewed the tea could lock herself in. The serving space was small enough that she was safe from amorous entries, although several attempts were made..

The single men's quarters for the extranjeros were pretty good as they were built for the purpose unlike the converted mule barn of Rancho Pailaviri. Jack Ward had an Argentine secretary who mismanaged the eating arrangements for the single men and kept upping the cost as well. We were convinced that she was augmenting her income by gouging us foreigners.

When the food continued to get worse and costs kept rising, Mose Mielke and I went and talked to Jack Ward. We proposed that Mose and I take over the single men's feeding arrangements and Jack approved. It was sort of fun. We planned the meals, did the purchasing and oversaw the food preparation. Costs went down and the food was much improved. It got so good that the married folks began coming over to eat with us. Wine was included with many menus.

Cattle were trailed over from the Argentine. The Bolivian way of butchering was to chop the carcass into chunks. They did save the filete or tenderloin for us, but we wanted some steaks. The only way to get them was to do some butchering on our own. We did this and produced some excellent, if slightly tough steaks. It was a great change from the customary chow.

Getting eggs was a problem. We were supplied by Quechua Indians from the countryside. But they refused to sell us all their eggs! "But, Senor, then I would have nothing left to sell at the market!" These ladies had some interesting quirks. If they were squatting on the ground with their multiple skirts, pailleras, spread around them and merely taking a pee, they would smile and talk. If they were more deeply involved in excreting, their heads would be lowered and they would be completely unresponsive.

There was pulperia or company store at Pulacayo. There we purchased all our canned goods and some fresh vegetables. Huge burlap bags of coca were what the natives spent most of their money on. Mothers gave young children coca tea to still hunger pangs. We used runners to cover the power line from Yura to the mine and they chewed coca to keep them moving. They looked for any damage on the line.

Yura was the site of a small hydroelectric plant that provided most of our electrical energy. Every year the accumulated sand and gravel trapped by the dam had to be cleaned out. When I was assigned this task, I took a crew from Pulacayo down to the Yura River to do the job. We had a small guest house there that I took over during the job. The job was a brute-strength-and-awkwardness affair. Our equipment was basic - shovels and wheelbarrows.

The Yura Indians were an interesting lot. They had a church and the priest performed wearing an old cuirass of Spanish armor. They had a reverse Sadie Hawkins day that I was fortunate to see during my visit to clean the dam. After a ceremony in the church the girls took off and the men chased them. If he could catch a girl and take her, she became his bride. But they didn't always stick to the rules as I watched one stout fellow take one girl and then another and then go chasing after a third. It must have been quite a feat as the women usually wore so many pailleras. But perhaps for that special day they may have dressed in more approachable fashion. Needless to say, there wasn't a great deal accomplished the next day on cleaning out the dam.

Stateside squared timbers were in short supply so we reclaimed large timbers from old working places. I took a crew of men into an old exploratory drift and marked the timbers with my carbide lamp so they knew which ones to pry loose. The men paused in their work about 10:00 AM explaining "Tiempo para pichear!" So each of the three men urinated on

their hands and wiped them on their shirts before stuffing a wad of coca into their mouths. Their cheeks were pouched out by the size of their coca wads.

That afternoon those three men failed to appear at checkout time. I went looking for them and found them sitting on a few of the stacked 8x8"s they had recovered. I spoke-got no answer - so pushed on one man's shoulder. All three toppled over - dead as doornails. It seems that in using pop shots of dynamite to loosen some of the timbers that they had released a pocket of samakaitchi gas and it did them in. It was a job to get their bodies out that night and took a crew of nine men. The widows were paid off with 400 Bolivianos or about \$70-\$100 on the black market.

Mine assay data was kept in decimarks, a carryover from the days when the French operated the mine. They were the first operators and built the camp and a recreational hot spring bath some kilometers away. The story goes that the French operators got somewhat lonely. Further they wanted their ladies to have some pubic hair. So they recruited a bunch of French lovelies to come to Bolivia. They also imported lots of champagne according to the old records we found around the place.

It did not always work out that the French girls reached the mine. One ship load of women were disembarked near Puerto Suarez on the Paraguay River to be marched over land to Potosi. In this way the ship avoided the long and perilous journey around the Horn. But the jungle journey was tough and when the women got to Santa Cruz they rebelled and settled there. To this day, the people of Santa Cruz and Cochabamba to the west are better looking than the folks in the rest of Bolivia.

The French operators were interested solely in the silver content of the ore and processed only the higher grade ore. The lower grade ore and the development muck was used to backfill the shrinkage stopes. Some of those old fills were pretty good grade, many 18 oz. and even better. Locally the miners called them "taqueo." This name may have derived from taquear- to knock- as there seemed to be a constant knocking in those stopes as debris fell from the back.

We set out to mine some of them. It was dangerous work and we mined cut and fill using lots of stulls and headboards while mining. In addition to the problems of mining the compacted muck, over the years the wall rock had begun to slab. Thus it was higher cost mining than mining virgin ground, but the grades were better than the average from the new stopes.

With the various gasses and heat, the ventilation problems were severe. Carbide lamps were mandatory as there were places where the gas was so heavy that to hold your lamp below waist level would extinguish it. Huge exhaust fans moved the air out of the mine

and finally to a single drift that opened on a hillside distant from the principal entry. So much muck and stuff collected in the exhaust drift that it was slimy with a foot or two of mud.

This drift had to be cleaned out periodically. It was a stinking hot place and we used women to do the clean up as it seemed they could stand the heat better. I had to inspect this cleanup operation and that in itself was a chore. The squat Indian ladies wore nothing but a breech clout as they mucked out the mud. I was never sure whether the appalling stench was of the mud or the women.

Each stope had a manway at each end. Once, while emerging from the raise at the top of one of these manways a slab sloughed out of the old fill and pinned me to the top of the ladder. It took a bit of doing to get the slab off my back. It left its mark with deep scratches on my back and took out some ladder rungs as it ploughed down to the level below.

Now and then we would visit the hot baths built by the French. We had to cross a plain on the altiplano where we saw many avestruches, the local ostriches. As we neared the hot springs located in some low hills, the viscachas took off. They are a small rodent reddish in color that inhabit rocky places at high altitudes. They are about a foot long and 5-7 inches high. Together with the avestruches they are part of the food chain for the Quechua Indians. The Viscacha tastes pretty good but avestruche is tough and stringy.

Traveling the countryside in Bolivia was ever interesting. Now and then we would come across an apacheta or pile of rocks. The legend was that to appease their ancestors each passerby would have to add a rock to the pile. Without doubt these apachetas had been accumulating for centuries as some of the rock piles were ten or twelve feet high and twenty five feet in diameter.

Wildlife seemed scarce, but now and then we would see a herd of vicuna or a guanaco or two. Mountain lions were pretty scarce and it was a great event to sight one. Avestruches were not seen frequently but their eggs would be found now and then. They were about 4 or 5 inches in diameter. We made an omelet of one and found it a bit strong for our tastes, but then it may have been slightly overage.

Kurt Plaut and I decided we would use a two weeks vacation period in hiking around in the Yungas, the lower country on the eastern side of the Andes. Such a venture required back packs, but none were to be had in Pulacayo. So we got some large canvas bags made and used two leather straps to go around them with two more leather straps to serve as shoulder straps. They weren't the most comfortable type of back pack, but they would be adequate if painful.

We took the train to La Paz and then rode the top of the load of a cargo truck heading east. It was cold and windy on that top of the load ride especially as we crossed the continental divide near Illimani's near 20,000' peak. From there on ,the rough unpaved road went down and down. Not far from Coroico we left our transport to hike a short ways down a side road to the home of my companion's parents. We stayed there a few days near the bottom of the steep valley and then resumed our planned trip.

In this flank of the Andes country the ridges lay east-west and the stream drainage is to the east. The relief is substantial with the valleys at 3,000 to 4,000 ft. elevation and the intervening ridges going us to 8,000 to 9,000 ft. The climbing out of a valley is arduous as are the steep descents. Crossing the rivers was dangerous too as we could have been swept away. We carried a long rope and one of us would cross a stream with the hope that if we fell, the partner would be able to retrieve us from the torrent.

When a first crossing was made, the rope would be tied to a tree and the other of us would cling to the rope as he crossed. We were lucky, but took a lot of time and care with each crossing. Sometimes we would have to travel upstream a ways before we would find a place where we would attempt a crossing.

We carried food with us but now and then we would find something edible along the way. Some sour oranges supplemented our meager meals. We were headed for Chulumani where there was another road back to La Paz. It was only 30 miles from Coroico airline, but we must have traveled twice that distance on our cross country trip. We finally arrived at Chulumani where there was a nice rest house. We feared that the management would turn us away as we were pretty raunchy looking. But they let us stay. After a few days we were rested up and took another truck top ride to La Paz and then by train back to Uyuni. We were lucky there and rode back to the mine at Pulacayo on the company autocarile, an automobile equipped with railroad wheels. The autocarile was much faster than the road trip.

In La Paz at New Years Eve 1942 I went to a party at the British Embassy. Champagne flowed like Pisco. At that altitude all it took was one drink of water the next day and the buzz continued. Then came the slow trainride back to Uyuni on the Ferrocarrile Antofagasta a Bolivia.

My trip to La Paz was unsuccessful. There just didn't seem to be any way to get my family to Bolivia. Yet there seemed to be exceptions. Dick Clarke was able to bring Helen down. Maybe my problem was that I wanted to move four family members at a time. Anyhow, my 18 months was almost up. The company had a system whereby 1/18th of the total travel expense to bring one to Bolivia and return you to the States was withheld

each month. Then, upon completion of half the three year contract, the lump sum would be returned to you. When I had been in Bolivia just 17 months Happy was hospitalized with a nervous breakdown. The company let me go a month early due to this unusual circumstance.

I took the train to Antofagasta and rustled for a job on a US bound ship as this was where nitrate was loaded. I wangled a visit to Maria Helena and Pedro Valdivia, two of the world's largest nitrate mines. Finally our ship was off. I worked as an ordinary seaman and was glad to have the opportunity to get home at little expense.

The freighter was equipped with gun tubs and mounted AA and machine guns for protection. A 24 watch was kept for submarines. When a periscope was eventually spotted, it was already too late. The torpedo's wake could be seen as we watched and held our breath. Fortunately the single torpedo fired was a near miss.

CHAPTER 5.

BRYAN AGAIN - US MARINE CORPS - NEW YORK

BRYAN AGAIN

I finally got home to Bryan, Texas and saw Karen, my delightful new daughter, for the first time. When Happy recovered, I rustled a job at Texas A & M in nearby College Station and signed on as Associate Professor of Civil Engineering under C. E. Sandstedt, the department head. I taught ASTP-Army Special Training Program courses which were swift paced instruction to U.S. Army Corps of Engineer students. Route Surveying, Hydraulics, Thermodynamics were my subjects. I had to study hard to keep one jump ahead of the students. There was such an urgency to get these young men in the field that it seemed like I was writing on the blackboard with one hand while erasing with the other.

We bought a small house just south of the stadium where I could walk to work. Before long my family's health was restored and I became anxious to get in the armed forces. It wasn't easy to get loose from the college as they needed teachers to train officers. But finally the authorities agreed to let me go.

US MARINE CORPS

I went to Houston and applied to get in the CB's, the Navy Construction Battalion. Six weeks passed and nothing happened. I was running out of patience. I went to Dallas and enlisted in the Marine Corps but I didn't qualify as an enlisted man so the Corps sent me to Quantico enrolled in Aviation Ground Officers School as a second lieutenant. My commission was signed by James Forrestal.

We were commanded by a Captain Swanson whose wife was the famed Gloria Swanson. She visited the base from time to time.

It was a rough go, physically and mentally. I think that the basic training at Quantico must have been built around the worst aspects of the training at Parris Island and Camp Pendleton. It was grueling! The few days of warm-up consisted of running us around the area in front of the barracks till we dropped. We learned immediately to hate the drill instructor. Orders to jump were followed by severe brow beating because we came down without waiting for instruction.

One day, while at Quantico, I received a most official looking envelope. It was my commission as a Lieutenant, JG in the Seabees signed by James Forrestal! I discussed this dilemma with Captain Swanson who said I had a choice. I elected to stay in the Marine Corps. Thus I had been commissioned in three of the armed forces!

There were 72 in our class. We all lost weight rapidly although we ate like horses. There was an area along the power line that consisted of a series of hills like a roller coaster. Running up and down this route with a full pack at 90° F took the starch out of all of us. There were a few dropouts that just could not handle the load. We lost one by drowning when disembarking from a landing craft with full pack. He stepped into a deep hole and was gone before we could get him ashore. Another got killed when he looked down a mortar barrel too soon after it misfired.

One hellish night was a full pack march through the Chopawampic swamp that was full of downed timber that had to be crawled over. Another gruesome experience was a simulated landing down the bay. We were loaded on LSTs and moved out down the Chesapeake Bay. Ever hungry, I found a shortcut from the head to the deck. Next morning, in fog and mist, I went up the shortcut manway but took a wrong turn on the deck and crawled over the side. The big splash was a surprise. I looked for a hand hold on the ship. The tide was running fast and the LST anchored. In desperation I finally started yelling "Man overboard!" Before long a doughnut shaped life preserver came down. I swam to it but it had no line and I started drifting away. Another was thrown with a line and I swam to it.

No sooner than I was hauled on deck I had to appear before the ship's commander to learn how lucky I was. If the event took place in combat I would have been left for the sharks.

We made the landing streaming off the lowered door of the LST into water that was 4' to 6' deep and scrambled ashore. There was lots of noise as the "enemy" was firing over our heads as we made for the beach. Then it was creeping and crawling with our M1s cradled in our arms. I went right through a patch of poison oak as we moved forward to seize Takashita Hill.

The next day began my misery with the poison oak. I had shots and salve to put on it and the doctor wanted me to pull out of my class and then join the next one after I had recovered. My forearms were raw and bloody, but I stayed with my class and finally finished. Out of 72 that started, we had 66 completions.

I had a brief visit home and then off to Miramar near San Diego where there was more training as we waited for whatever ship would take us to the South Pacific. Several weeks passed before we were assigned to a refitted banana boat. The holds were equipped with hanging cots that were stacked one over the other four high. It was a scramble to get in your cot and then it was only about 18" above you to the next cot. The holds were hot and uncomfortable and rendered more so by the many seasick marines. It was a treat to be able

to go on deck. It was a rough trip under crowded conditions but we finally disembarked in Hawaii.

We stayed at Ewa on Oahu for three weeks waiting transport to the South Pacific. In the meantime there were opportunities to see the islands on training flights and by surface transport.

Finally we were on our way again to land at Majuro in Kwajalein for a few days and then on to Eneweitok atoll and on to a small triangular island on the northeast side of the atoll - Engebi. I was posted as construction officer for SDB 152, a dive bomber squadron. That was one of four squadrons in Marine Air Group IV. It wasn't all that exciting at first. We had a visit from Henry Fonda, who was a pilot in another outfit. I had several flights in our planes, mostly riding in the hold that held the bombs or torpedoes. On one flight when I was lucky enough to occupy the copilot's seat we made an unscheduled landing in the lagoon just after takeoff. It was quick work to eject the life raft and it had to be. That plane went down like it was made of lead. We paddled around a bit until a speed boat from the main base of Eneweitok came and rescued us.

Along came a reorganization and the 4th Wing command was split into tactical and support outfits. Col. Dan Torrey headed up the tactical or fighter section and Col. Volter headed up the support function as Air Base Commander. I was his executive officer. Things began to get interesting. We were scheduled to move to a Japanese airfield called Machinato on the main island of Okinawa. The Marines had swept through the area and the Army was to do the mopping up.

Planning began by using Okinawa maps and other data to lay out squadron positions for the wing of several thousand men and about 64 planes. My staff sergeant was B.J. Doyle and after all these years we still keep in touch. Somehow or other we were supplied with literature on Okinawa. We were also given orders. One was that we should only move Badger sea water distillation units forward as fresh water was likely to be scarce. But I had gotten hold of a book on the geology of Okinawa that reported high volume fresh water springs at the base of the cliffs at several areas along the coast. It seems that these springs were only exposed at low tide.

Based on that information I loaded several Permutit ion exchange units along with the Badger steam distillation units. Planning went on. To see how an airfield was uncovered I was required to take a trip by submarine to Iwo Jima. I was off loaded in a rubber raft and rowed ashore to be taken in tow by a Marine squad that took me to their CO's base. I was told that their schedule was off for uncovering the airstrip but they needed lieutenants to

clean out caves of entrenched Japs. So that's what I did for the four days that passed till the sub picked me up and returned me to Engebi.

Cleaning out the caves was a brutal operation. We would roll several drums of AV gas to the cave portal and drain the gasoline into the cave. A phosphorus hand grenade tossed into the cave would cause an explosion. If any Japs emerged, we were ready for them. It was during that period that the flag was raised on the peak at the south end of the island.

Back to Engebi on the sub. More planning and packing up as we got ready to move. I went with a friend on a PB4Y2 flying boat over Ponape and several other islands. When we landed on a lagoon on one of the islands where the locals said the Japs had been there the day before. Close call! Flew back over Ulithi watching atolls appear from far away on the radar screen. The friend was Billy Brinkman Jr. whose father was the crusty chief accountant at Shafter.

Finally we were ready. Gear went by ship. What we couldn't load we buried in pits dug deep in the sand. The fighter squadron were to fly up to Machinato by stages. Col.Torrey and Col.Volter plus some staff and a patrol of eight men that were to help me lay out the field went on the Colonel's DC3 to Saipan. B. J. Doyle, Master Sergeant, was the most valuable player in this team. Then on up to Okinawa we ran into a storm that forced us down to the deck. It seemed that the waves were licking at our wing tips. But we made it allright and finally landed at Yontan on Okinawa.

There we learned that Machinato was not uncovered so we were assigned to a field on Ie Shima, a small island off to the west of Okinawa. Ie Shima had a prominent single peak located at about its center. It was this peak that caused us to identify Ie Shima as the witch's tit.

It had a small beach in the middle of its south side and the rest of the coast was cliffs. The Marines had made a landing, swept on to the north coast and divided their forces there to go back down both the east and west coasts, rejoined at the beach and departed. The Army then moved in to mop up. It seemed that there was a lot of mopping up to do as the Japs had retreated and hid out from the Marines.

We landed at the small strip and then conferred with the island commander. We learned that the Japs had booby trapped the island with lots of mines and bombs. To do our job of layout we had to clear the mines so we borrowed three detectors from the Army and moved in on the area assigned to the Fourth Wing squadrons. It was an unhealthy task as the Japs were entrenched and fired on us frequently. Some were hidden out in caves in the limestone that was the principal formation of the island.

Ernie Pyle was on site and the Japs got him. Two of my eight man crew were killed by mines. Another had his knee shattered by a Jap bullet when he went into a cave looking for souvenirs.

I made a plane table of sorts out of a piece of planking and a tripod of three slats bolted together. A ruler with a couple of needles stuck in it was my alidade. I built a rod out a bamboo pole that I marked off in feet and inches, only to remember that I had no stadia. So we measured distances by pacing.

It was crude but effective and with it we laid out the revetments for the planes, shop areas, living quarters, mess halls and all. Then came the job of building a command center for the airstrip. I decided that it should be underground and drew up a design. Both Col.Torrey and Col.Volter liked the idea. We made a big excavation and then did all the timber erection using materials from the many shattered buildings nearby. It was stout and could withstand anything but a direct hit. There were two entries and it looked like you were in a mine with very heavy ground. There were ten feet of cover over the installation.

Our camp was on one of the benches at the north end of the island. I built a bunk out of more of the material from the many broken up houses not far away. Used rope to serve as springs and dug a good foxhole directly underneath. With any warning I could roll off the bunk and into the foxhole. My tent mate didn't believe in such precautions and I lost him to a daisy cutter. Nearly every night Jap Franks would swoop in on us to drop bombs and spray us with machine gun fire.

I found the springs I was looking for at the foot of the cliffs, installed pumps and processed the water at the cliff top. The water point itself proved a target for the Japs. so we set up a protective machine gun emplacement and it was frequently used as the Japs attacked by boat from some nearby islands. The water from this source proved more reliable and abundant than that from the Badger stills and I became the water commissioner for the island.

It was somewhat strange to have Majors and Lt. Colonels coming to a Captain to obtain water supplies for their commands. I was given a field promotion to Major and that made my distribution decisions stick better.

From time to time we embellished our food supplies with phony orders and borrowed uniforms to get into Navy and Army stocks. That also meant borrowing an appropriate vehicle to do our scrounging with. I don't think that such procedures were exactly legal, but they did improve our diet.

Back on Engebi I had gotten an old Springfield barrel and action from the quartermaster. Equipped it with a Herter walnut stock and shortened the barrel to make it a sporter. It worked great and proved to be most accurate in shooting at the Japs.

One bright and shining day we watched as if from a grandstand an offshore naval battle in which kamikaze - divine wind- Japs crashed their flying bombs on our vessels. It was awesome to see this battle take place.

I flew to Yontan several times for supplies of one kind or another. Once returning to Ie Shima with a load of tents the landing gear refused to go down. As our fuel was running low we finally crash landed alongside of the strip. Fortunately we did not catch fire. We finally came to rest about 100' from the edge of the cliff. The remains of the plane were bulldozed over the cliffs.

We were ordered to move to the main island to an airstrip a bit to the north of Yontan and close to the East coast of Okinawa. That was an easy move and we were all installed when the battle of Buckner Bay occurred. We learned of the atom bombing of Hiroshima and Nagasaki. When some Japs came to Yontan for some preliminary negotiations, troops from all over the area were sent to Yontan for an almost never ending parade. Our own outfit must have passed the reviewing stand three times. No doubt the Japs were impressed by our troop strength.

We began to pack up for the occupation of Japan when the Red Cross gave me bad news from home and I was sent home promptly. The problems both health wise and mental were finally worked out. I was mustered out at Cherry Point, North Carolina and went job hunting. My job as associate professor at Texas A&M was secure but Happy refused to live there under the shadow of the family problems. So there was nothing to it but to seek employment elsewhere.

NEW YORK

New York City was the site of the main offices of a large number of mining companies, so I headed north. I had no civilian clothes. They had all vanished during my term with the Marine Corps. So I started my search and found to my dismay that most company executives felt that there would be a postwar depression in the US. Asarco wanted to send me to Saudi Arabia or to British Guiana. Jack Knaebel took the job in BG. I rustled Newmont and sat in their waiting room while Fred Searls interviewed. His secretary appeared a bit later and announced that the job was filled. Mr. Searls had picked Plato Malozemoff. I was unwilling to accept an overseas assignment as it was imperative that I spend time with my family.

I called on Ed Robie then editor of Mining and Metallurgy the monthly magazine of the American Institute of Mining and Metallurgical Engineers. Mr. Robie had broad contacts, but had no clues as to where any jobs were. He did say however, that if I came across anyone with writing talent that was looking for work that M&M needed an assistant editor. Something clicked and the more I thought about it the more I felt that I could do the job. Further, the contacts that I could make in such a position could enhance my future. After all, if the folks who can help you don't know that you know what you know, you might just as well not know it.

The following day I revisited Mr. Robie and told him that I thought I had found the man he was looking for. He showed interest, but when I told him who it was he put his hands on his head, leaned back in his swivel chair and laughed. I was a bit uncomfortable.

But I told Mr. Robie that I was serious and outlined the writing work I had done on the Prospector, Texas Mines weekly paper, and a number of mining reports.

Mr. Robie agreed to give me a try and told me to write an editorial on a subject of my choosing and bring it in. After casting around a bit, I picked an editorial title "False Economy" and wrote up my thoughts. The thrust of the piece was that if you underpaid mining engineers, the field would become unattractive and a shortage of engineers would be created. I took it to Mr. Robie the following day. He read my piece and said, "Let's go see Mr. Parsons." A.B. Parsons was the secretary of the AIME and author of a number of books including "The Porphyry Coppers."

Mr. Parsons was impressed and I was hired as Assistant Editor at \$4,500 per year. "False Economy in Engineering Personnel" appeared in the February 1946 issue of Mining & Metallurgy over Mr. Parsons byline. I was happy!

Now that I had a job it was time to think about getting the family together again. Happy did not like the idea of New York but agreed to give it a try. I found a three story walkup apartment in Brooklyn. She was thumbs down on that. Johnny and Marjorie Payne badly needed a place to stay and they took over my rental commitment. I kept looking and finally found a country place near Pearl River, NY. Soon the family came and we moved in to what was really a summer home as we found out when the winter winds whistled.

It was a long commute to New York! First a ten minute drive to Pearl River. Then a 35-40 minute train ride to Hackensack, New Jersey. A 15 minute ferry ride to Manhattan and a 15 minute walk to the AIME office on 39th St. I had to be at the office by 9 AM so that meant leaving home no later than 7:20. Then the evening rush to catch the ferry began about 5 PM and that usually got me home by 7 PM. The train time was spent in doing office work but other than that it was a great waste.

There was another route that I frequently used. A bus from Pearl River went to the west side bus station. It made many stops to pick up and discharge passengers and took just as long as the train route. Commuting was an undesirable part of working but was unavoidable unless one lived in the awesome congestion of the city.

The job was interesting! I took many field trips to mines and wrote up profiles on them. These trips took me all over the United States and I got to meet and know many key men in the mining industry. Also I learned to write from Ed Robie who was a skilled word smith.

The regular meeting of the AIME board of directors and many committee meetings were additional opportunities to meet industry leaders. This was vital.

Things at home weren't good. The house was definitely a summer place and the wind blew right through the place in the winter. Further the rental of \$200 per month didn't leave us much to live on. When the well pump broke down, the irascible owner Mrs. La Guardia said that replacement was my responsibility. So went to the rent control office in Poughkeepsie, NY on a winter day when the roads were covered with ice and chains were essential.

The Rent Control Office investigated the house and gave notice to La Guardia that the rental should be \$100. So she quit renting the place. We were fortunate to find an apartment in Orangeburg, NY, where army barracks had been converted to peacetime use. The rental was \$75 per month. Further there was a bus that reduced the commuting time. More importantly, we had more money for other stuff. Things were looking up when my salary was raised to \$6,000 per year.

Then, about 1947, Julian Conover, the executive secretary of the American Mining Congress in Washington, DC. called and asked me to come and see him about becoming editor of Mining Congress Journal. I wasn't particularly interested and took no action. But one day A.B. Parsons called me to his office and told me that Conover had talked to him about me. A.B. said the least I could do out of courtesy was to go to Washington and hear what Conover had to say.

Reluctantly, I went to Washington. The Mining Congress job had a lot of appeal. I would succeed Julian Feiss, who was leaving to become principal assistant to James Boyd who was to become Director of the Bureau of Mines. When Mr. Conover offered \$10,000 per year, the temptation became too great.

But we had to have a place to live. Julian sent me out with Harry Moffet to search for a place. We found a new development in Kensington, MD where Peaseway prefabs were under construction. We could only peer through windows to see what the places looked like, but we found one that looked just fine. I didn't have the \$500 down payment but Julian Conover said, "In the mining business you always have to take a chance." and advanced me the funds for the down payment on the house. I was committed!

Now there was the task of severing my happy relations with the AIME. Mr. Parsons met with AIME Board and they offered to match the Mining Congress salary. I explained that I couldn't reverse my decision and they finally accepted my position. But I was charged with finding my successor.

I knew immediately whom that should be. Shortly after the end of WWII, I began to hear from a John Beall, who was about to be discharged. He had gotten his degree in Mining Engineering from Columbia but never worked a day in the industry as he had gone directly into the Navy on graduating. He sought advice on how to get a foothold in his chosen field. John and his wife Sylvia came to see me after our exchange of several letters.

We had a number of long chats about how to proceed. I got in touch with Guy Bjorge at Homestake and told him the problem. John and Sylvia proceeded to Lead, SD where John went to work as a mucker and then became a miner. Six months later he was doing the same thing at Idaho-Maryland Mines in California and then on to Washington to work for Jack Curzon at the Chelan mine of Howe Sound. We corresponded regularly as John garnered excellent experience in his field. His letters were remarkable.

But Ed Robie and A. B. Parsons had other ideas about finding a successor. Several ads were placed and a series of interviews were held with a number of candidates including John Beall. In the end, both Ed and A.B. agreed with me that John Beall was the outstanding choice.

CHAPTER 6.

WASHINGTON, D. C. - ATOMIC ENERGY COMMISSION - COLORADO PLATEAU

WASHINGTON, D.C.

It would take a month or more to finish the house so I moved into the Washington, D.C. University Club and began work as Editor of Mining Congress Journal. This kind of work was a far cry from mine operations but it was fascinating.

There were frequent trips to mines and preparation of articles on them. More often than not I would write the story and put a mine manager or mine superintendent's name as author. I wrote the editorials and the news items and much of what else went into the magazine. I had two secretaries and two dictating machines, one in the office and one at home.

One field trip took me to Superior, AZ where I met Wes Goss, the manager . I went underground at Superior. The mine was characterized by zones of extremely heavy ground and I saw 8 by 8" timbers that has been squeezed down to close to 4 by 4." That took a lot of heat and pressure!

Chuck Pillar who took me underground at Superior suggested a visit to San Manuel where the shaft had just been collared. An old Island friend was in charge.

San Manuel had an interesting history. It was in the old Mammoth mining district where intermittent production had begun in 1881. Between 1915 and 1917 William Boyce Thompson had drilled holes that cut 0.8% Cu rock, about half of what was considered the necessary minimum to be ore at that time. In 1926 James Douglas who ran a bar in Superior bought a third interest in the claims on Red Hill. He bought another third in 1939. Later with Burns Giffin, a garage operator and car salesman the remaining interest was acquired. It was named the San Manuel Group and offered to Magma Copper for \$50,000. The offer was declined.

In 1942 the several San Manuel owners asked Henry W. Nichols, an assayer at Magma to make a report on the property. More claims were located and Magma was again offered the property and again turned it down. Nichols then went to the Reconstruction Finance Corp. and asked for a loan of \$20,000 to further explore the claims. The RFC had N.P.Peterson and B.S. Butler of the USGS to examine San Manuel.

Butler's enthusiasm incited the Bureau of Mines to clean up some old workings and take samples. In 1943 the Bureau of Mines signed an agreement with the owners and drilled five 300' holes. Several additional holes were put down in 1944 and sulfide mineralization

was found at 685'. John Gustafson, the geologist at Superior, got interested and San Manuel was purchased by Magma with a five percent interest retained by the group of owners. More claims were acquired and more drilling was done for a total of 173,692' extending the work of the Bureau of Mines. In 1950 Magma exchanged 20,000 shares for those of San Manuel's original owners at \$25 per share or half a million dollars for their faith in the project. By 1956 when production began those shares were worth \$2,500,000.

Then there were several conventions a year, one for metal mining and one for coal mining, and every other year the convention included a show-a major display of mining equipment. Show space was sold and together with increased advertising, we often made money. In order not to show a profit as the Mining Congress was an eleemosynary institution, the profits were distributed as bonus. One year I received a bonus equal to 30% of my salary.

There were state and regional mining conventions each year. It was mandatory that I attend those meeting to keep abreast of what was going on. The Idaho Mining Association held its meeting at Sun Valley, Idaho. One year, when Barney Haffner of Bunker Hill was president of the group, I held a hospitality party that went into the early hours of the morning. Guess our attempts to sing got out of hand as Barney came along and shut us down.

That same year a group of us went up the ski lift on a nearby mountain. It happened that I was at the summit with Don McLaughlin and Ira Joralemon. Ira swept his arm toward the expanse of the Sawtooth Range and said, "That's where are future mineral resources are, but it's going to take a lot of work to find them!"

After such meetings, I would usually visit nearby mines. In the Coeur d'Alene I visited Bunker Hill at Barney Haffner's invitation. At the time Bunker Hill was sinking an inclined shaft and experimenting with a continuous miner to do the job. While in the area visited Hecla as Clarence Randall said it was OK. Ralph Neyman, the Hecla mine superintendent, gave me a great tour of that famous mine.

Visited Sunshine where John Edgar took me through the productive lower horizons of that deep silver mine. That was long before the fire that shut down Sunshine in the late 1960's. Visited the Silver shaft when it was only down about 60 feet but headed to become one of the area's deepest openings.

Once I wrote a piece on the hush-hush subject of uranium mining after several sessions with Jesse Johnson, then Director of the Raw Materials Division of the Atomic Energy Commission. Jesse Johnson had just been named director to follow John Gustafson. He

could only spare time at lunch so I took pleasure in picking up the tab- at Mining Congress expense of course.

Then Jesse Johnson invited me to have lunch with him and Sumner Pike who was one of the five-man Atomic Energy Commission. Mr. Pike was a tall slim man from Maine with the unusual habit of scratching the family jewels regardless of where he was or with whom.

There was a second such invitation from Jesse Johnson during which he described in a most indirect way -a job he needed to have done. It was sort of a black box that he talked all around and never opened as the topic was classified secret. The job carried the title metallurgist and paid less than the Mining Congress did.

But I was intrigued, actually overwhelmed with curiosity. I talked it over with Julian Conover who was reluctant to let me go, but finally agreed if I would engage a successor and help him for enough time so that he could handle the job.

ATOMIC ENERGY COMMISSION

I told Jesse Johnson I would take the job with the AEC and the security clearance process began. It was an ordeal and the inquiry included the times I had been in jail. Actually there were only two such occasions. One was when they tossed me in the hoosegow during the shivaree in Shafter, Texas and the other took place in Potosi, Bolivia.

It took place a few days after I arrived in Potosi and had checked in with the Guardia Civil about getting my identity card. The Police station took down all the data and took my passport and health cards to be sent to La Paz for processing. But, as luck would have it, a few days later while walking up the hill to Rancho Pailaviri, a guardia patrol stopped me. The officer in charge asked for my tarjeta de identidad . I tried to explain why I had none but he wouldn't listen. I was hauled down to the police station and thrown in the jug along with seventeen other Quechua Indians most of whom were drunk. The single cell stunk to high heaven and that wasn't too far away at that altitude. It was bitter cold but I crawled into one of the window wells in the four foot thick walls. The opening was barred, but the cold air was not quite so contaminated. At about 5 o'clock the next morning the officer that had processed my papers a few days before came on duty. I was freed immediately with profuse apologies.

The background check also included my time in the Philippines. The FBI, or whatever outfit processed the clearances at that time was thorough. I was finally given a Q security clearance.

In the meantime, I had been up to Columbia University and contacted Jack Fox who agreed to take on the job of Mining Congress Journal Editor. When Jack came on the job,

I really had my hands full. Each day as I finished my work at the AEC, I would rush to the Mining Congress and work with Jack for several hours. But finally Jack took hold and I could devote all my thought to the AEC.

When Germany invaded Belgium in 1940, Edgar Sengier was CEO of Union Miniere de Haute Katanga, owners and operators of the Shinkolobwe mine in the Congo. He diverted a ship headed for Belgium to New York and its 1000 ton cargo of high grade uranium ore stored in oil drums went to a Staten Island, NY. warehouse. Phil Merritt, then with the Manhattan project did some excellent detective work and disclosed the fortuitous presence of the Shinkolobwe ore. The Bureau of Mines Minerals Yearbook for 1941 reflected the importation of that material. It was enough to build and test the first atom bombs including those detonated over Hiroshima and Nagasaki.

The initial work that I did was in close association with Frank McQuiston who was on loan from Newmont Mining. Frank was deeply involved in getting the South African gold mining plants to install ion exchange plants for uranium recovery. Witwatersrand reef deposits carried some 3 to 6 grams of gold per ton and also around 0.2-0.3 lbs. of uranium per ton. The uranium reported in the tailings that also carried the associated iron pyrite.

The general scheme was to float the pyrite and use it to make sulfuric acid that in turn would be used to leach the uranium from the tailings. The pregnant liquor would be subjected to ion exchange for uranium recovery. I helped Frank on plant design and equipment acquisition to get these plants operative.

My primary concern was recovery of uranium from the marine phosphorites of Florida. There were a number of analytical studies such as one voluminous report by Arthur D. Little, Inc. Another basic study had been made by Batelle. On the average the Florida Phosphates contained about 0.01 to 0.015 percent uranium. The so-called "Leached zone" that overlaid the mineable phosphate contained slightly more uranium. The leached zone was discarded in the mining process as its phosphate content was too low to be economic.

James B. Cathcart of the USGS was in charge of the task of finding out where the uranium occurred and quantifying the resource. Fortunately this effort enjoyed the full cooperation of the phosphate producing companies, owners of the resource.

The sole route for the possibility of uranium recovery had to be with the companies that made liquid phosphoric acid by leaching rock concentrates with sulfuric acid. As the uranium reported with the phosphoric acid, this had to be the route to follow- extract the uranium from the phosphoric acid.

We had a pilot plant operating using ion exchange at Pittsburgh, California. The raw material was phosphoric acid from the Anaconda Copper Mining Co. Anaconda mined marine phosphorite in Conda, ID and shipped the ore to Anaconda MT. There the phosphate rock was treated with sulfuric acid produced as a byproduct from the smelter. Then the phosphoric acid was used to treat more rock to produce triple super phosphate fertilizer.

Soon we learned that the long haul of the tank car shipments of acid from Montana to California stabilized the acid and settled out most of the impurities. To have a pilot plant that would more closely approximate actual conditions, we set up an ion exchange pilot plant at Anaconda. There it operated under conditions that would be applicable in a full scale plant.

The TVA lab at Sheffield, AL was performing the research on treating leached zone material in hopes of a three product recovery of uranium, alumina and phosphate. There was a lot of traveling to be done to stay on top of these many activities. It was exciting!

Blockson Chemical Co. at Joliet, IL was a large consumer of Florida Phosphate rock and made phosphoric acid in substantial quantities. Then, by progressive sodiation they produced a variety of sodium phosphate products. I visited there and worked with Ed Lopker, a chemical engineer and the plant manager, to see if there was any way we might recover uranium at the Blockson plant.

We tried many things that failed to show any promise. But one night in the lab I picked up a bottle of a sodium reagent and said, "Let's try this?" It was sheer luck but we found out that phosphoric acid, at a certain pH, when treated with the specific reagent, sodium hydrosulphite, would result in almost quantitative precipitation of a urano-phosphate chemical. It was almost dawn when we finished going through the plant. We found a side stream of acid that could be bypassed to a pilot plant and we calculated the facilities needed. At 8 AM we met with the Block brothers and told them of our discovery and how it could be piloted.

We figured the pilot plant cost would be about \$150,000. I said the AEC would finance the capital and operating costs and we drew up and signed a contract on the spot. Then I headed back to Washington eager to tell Jesse Johnson what happened. Jesse listened to my story and then called in Ed Spingarn, the division attorney. I repeated the account of what I had done and Ed exclaimed, "You can't do that!" Jesse said "Well, he's done it. So now make an honest man of him." Ed covered my tracks and within a few weeks we had the pilot plant running. It performed admirably! We were recovering the uranium from phosphate rock. Further, the cost to the AEC was the lowest from any source.

A lot was going on with International Minerals, US Phosphoric Products and other companies as we rushed to build additional uranium recovery plants. The program needed more manpower and I hired a few good men. On one trip through Prescott, AZ I met with Frank McGinley and his wife in a Mexican restaurant. Frank was a metallurgist working for a gold operation near Mayer Junction. He became interested and I hired him on the spot to reside in Florida and oversee the many activities there. I hired Jim Barr away from the phosphate producers organization and had him working with me in Washington.

The byproduct recovery program was going great guns and, except for the Blockson plant, all the rest were based on ion exchange. And the cost per pound for uranium was less than the cost of uranium produced from other domestic sources.

THE COLORADO PLATEAU

Domestic production of uranium was about 450 TPY. That wasn't increasing at a satisfactory rate with the program operating under Circular 5 - an ore buying arrangement. It had been decided that the business of finding, mining and processing uranium ores would be conducted by private industry. This was a wise decision as it has been well proven that government operations are fraught with far more problems than private industry. And what is more, government doesn't seem able to do the job as well.

The scheme was to maintain government ownership as set forth in the Atomic Energy Act of 1947. Incentive payment schedules would pay for work performed to encourage exploration and production. Under Circular 5 an ore containing 0.6% U₃O₈ per short ton would be paid for as follows:

Base price 12 Lb. @ \$1.50	\$18.00
Development allowance 12 lbs. @ \$0.50	6.00
Premium 8 lbs. (12-4) @ \$0.25	2.00
Additional Premium 2 Lb. (12-10) @ \$0.25	.50
Total U ₃ O ₈ Payments	\$26.50

This just wasn't doing the job. So one long holiday weekend I went to work to develop a scheme that would create the needed incentive. After some modification it was issued as Circular 5 - Revised. For the same 0.6% ore the producer would be paid as follows:

Base Price 12 lbs. @ \$3.50	\$42.00
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Development allowance 12 lb. @ \$0.50	6.00
Premium 8 lbs.(12-4) @ \$0.75	6.00
Additional premium 2 lb.(12-10) @ \$0.25	.50
 Total U ₃ O ₈ Payments	\$54.50

Circular 5 -Revised went into effect March 1, 1951. The new price provided substantial incentive and the search for new deposits burgeoned. Marion W. Boyer was General Manager of the AEC at the time.

Despite the financial incentives, domestic uranium production languished. Jesse Johnson, Director, Division of Raw Material decided to take action to find out why exploration was up, but production wasn't increasing commensurably.

I was told to take a trip out to Grand Junction in the role of evaluation engineer. I was to examine the entire domestic program and see if there were any ways it could be improved. I spent about a month making this study and visited the scattered AEC offices in Grand Junction, Denver, Salt Lake City, and New York City to assess the program.

I found out that there was little common ground between the several offices. There was not even a standard definition for ore. Efforts were not coordinated. Exploration was managed out of New York City by Phil Merritt and Bob Nininger. Results were very slow in getting to the Colorado Raw Materials Office directed by Frank MacPherson. Frank reported to George Gallagher in Washington and the various exploration offices reported to New York City. George Gallagher was responsible for contracting with the mining industry for uranium concentrates. All in all, it was an ineffective arrangement and acted to impede progress rather than forward it. And, in effect, the AEC had to pay just about what the companies asked for per pound of concentrates. George had little or no basis to demur. Average price paid by the AEC was \$18.00 per pound of U₃O₈ in concentrates.

The actual "waste" of uranium in the ore was appalling! Metallurgical recovery in the mills averaged about 75%. The White Canyon mill of VCA was particularly poor with 60% recovery of the contained uranium in ores that ran about 1 % U₃O₈. It seemed that Denny Viles could have done better!

I prepared a "White Paper" for the five man Atomic Energy Commission that was then headed by Admiral Lewis Strauss. The gist of that paper was that all the exploration, mining and processing functions including contracting for concentrates be placed under a single manager who, in turn, would be responsible to the Director of the Division of Raw Materials.

Under such an arrangement, I asserted that uranium production could be doubled to 1000 TPY within a few years.

My recommendations were approved in their entirety. Jesse Johnson told me to find a qualified individual to run the new organization. It was to be called the Grand Junction Operations Office. Thus the authority of the new setup was synonymous with the other AEC operations offices such as Oak Ridge and Santa Fe.

I talked to several qualified men in industry but didn't generate sufficient interest. I talked to Buck Grant, Fritz Kruger, Homer Mann plus a handful of other well-qualified individuals. The men I selected were well set up within their companies. Some thought that uranium was a flash in the pan and that the job wasn't sufficiently durable. Some thought that the salary was inadequate. In any event, I did not get a single individual to even come to Washington and be interviewed by Jesse Johnson. To a considerable extent my efforts to get a candidate were hampered by being barred from talking about many things that were classified SECRET.

In the Fall of 1952 I told Jesse Johnson of my failure and suggested that he would have to make a manager for the Grand Junction Operations Office out of someone already working in the system. I suggested Raff Faulkner but Raff begged off on the grounds that he had just built a new home in northern Virginia and his wife would "have his head" if he proposed going off to Colorado. Then Raff turned and pointed at me. Thus the bottom of the barrel was scraped and I got ready to take over the new job.

I met with President Truman who pointed out our different politics, but said, "That doesn't make any difference. You go out there and do the best job you can."

At the end of November 1952, Jesse and I boarded the train to go to Grand Junction. Press releases were all set to announce the formation of the Grand Junction Operations Office on December 1 and my appointment as manager. Within the hour a purchase order for a \$36,000 snow blower was placed on my desk. It was for an exploration project in the Lukachukai Mts. of New Mexico. Bill Hutchinson and Frank MacPherson insisted that the purchase was in good order for my signature. I was in business.

That evening in the basement bar of the La Court hotel there was a telephone call from Charlie Steen. Charlie and I had both gone to Texas Mines and I had helped him once getting a job with Sunoco. Charlie did well on that job until he "told off" his boss and got himself canned. Charlie told me about his find and invited me to Big Indian Wash out of Moab to see it. I said I would get there shortly.

The reorganization had its problems but there was good will and drive by all involved to do a good job and increase production. The excellent cooperation got the operations office

off to a good start. I began to make a closer study of ore reserves. I set up a group headed by Hank Wardwell with the responsibility of defining reserves by ore type plus the generation of total reserves tributary to the different mills. It soon became evident that we needed more mills. That was going to be difficult as there were only a few areas where sufficient ore was owned by a single company upon which to predicate a milling operation.

In Shiprock, NM Buffalo Kennedy for Kerr McGee had put in a private ore-buying station as a prelude to a mill. But it turned out that they did not have enough ore on their leases from the Navajos. Further, the Tribe was reluctant to lease more land to one big company. I went to Window Rock and met with Sam Akea, Chief of the Navajos, and with the tribal council. Paul Jones, who later became Chief of the Navajos, was the interpreter. The meeting went on for several days as I set forth the reasons why more leases should be granted to the company that would build a mill. It was slow going! I would say, "Good Morning" and then the interpreter seemed to take about 4-5 minutes to translate my words into Navajo.

But we got the job done. Tribal regulations were amended to allow a company building a mill to hold more land under lease than others. Kerr- McGee was making the moves toward building a mill. We encouraged it to use the ion exchange process, the first plant of that kind and they moved in that direction. When Dean McGee signed the contract in my Grand Junction office, he picked up the government issue pen saying, "I'm going to keep this pen. It will probably be the only thing we'll get out of this contract." Later I visited Dean in his office and that pen was hanging in a frame on the wall. At one time Kerr McGee held the nation's largest uranium reserves.

But it was soon evident that production of uranium concentrates could be quadrupled within a few years. I gathered all my data and went back to Washington in the spring of 1953. I told Jesse that I had been wrong when I'd reported that uranium production could be doubled in a few years. His face blanched so I jumped in and told him that production could be quadrupled if I had certain authorities. We met with . Joseph Campbell, US Controller General, and laid out the plan to him.

Not many days passed until I was given unlimited authority to hire and fire personnel. I could build any capital facility needed, such as buying stations, pilot plants, roads etc. at a cost per project not to exceed \$2,000,000. I was given unlimited authority to purchase fissionable source materials. It was all I needed!

After my first year as Manager of the Grand Junction Operations Office and for every year, I filed an annual report. This was considered strange for a government operation, but I felt that it was necessary. To get a balance sheet, a value per pound of uranium had to

be established to relate it to prices paid. I went to Oak Ridge and met with Sam Sapirie, Oak Ridge Operations Office manager. Sam, gave me a detailed tour of the plant and facilities. Then we did some figuring. Some would say it was conjuring.

Sam knew what his increased power costs were when he had to run through some previously processed Uranium hexafluoride a second time to obtain more recovery. We concluded that this incremental power cost could be related to the value of uranium hexafluoride that had never been processed. Then we worked these numbers back to the uranium in ore. Knowing these numbers gave me a very useful tool. I could then figure out what amount could be justifiably spent in exploring for additional uranium deposits.

Also, each year I tendered my resignation so that if Jesse had any qualms about the way I was doing the job, he merely had to accept. In each such letter I presented a summary of the year's accomplishments plus the major problems we confronted.

In addition to the AEC exploration organization, we had the benefit of some 1200 people in the USGS who were headquartered in the AEC compound with us. We divided up the exploration effort with the AEC tackling the work to be done in areas of proven possibilities-the regions adjacent to nearby producers-and the USGS tackling the further out areas. Much of the region was unmapped and the Survey had teams doing the work of generating topographic maps.

The Survey, once topo maps were available, did the quadrangle geology as a basis for exploration work. There were problems with Phil Merritt and Bob Nininger that were finally resolved by dividing the exploration process into two areas. I would have jurisdiction over where exploration would be conducted and the New York office would be responsible for how exploration would be conducted. It was a workable solution and almost eliminated the friction that existed between Grand Junction and New York. Further, it was in keeping with the November 30, 1952 AEC press release about the Grand Junction Operations Office that stated, "George Gallagher, assistant director for domestic production, and Philip L. Merritt, assistant director for exploration, will continue to handle planning and technical direction of Colorado Plateau activities falling within their respective fields."

The AEC exploration division consisted of about 250 people, mainly geologists. Ernie Gordon headed the group assisted by Quentin Brewer. Bob Wright was chief geologist. The work was divided among six districts. There were many exceptional men among the crew including David Lowell who later discovered the Kalamazoo orebody, a faulted section of the San Manuel ore body. Hi Wood and John Gableman were other examples.

The mining division was also staffed with outstanding individuals as was the processing division. It was fortunate that I was able to lure Elton Youngberg away from the USGS. He and his family moved from the Washington, DC area to Grand Junction. Elton took over the Mining Division and did a grand job. I was pleased that a man who had been my boss on a former job was willing to come and work with me.

The AEC plus the USGS had assembled what was probably the largest group of professionals ever engaged in the search for a single commodity. The AEC group totaled 450 individuals. My management philosophy seemed to work. I always tried to hire people that were more capable than I was: Then, when they did something, some credit would stick to me.

To obtain top quality counsel, I formed an Advisory Committee that would overlook the entire program periodically and provide the benefit of their advice. Ira Joralemon, Donald McLaughlin and Nathaniel Herz were members of this committee of about ten specialists. Everette DeGolyer, Clyde Williams, C. K. Leith, Lewis Weeks, Thorold Field, John Gustafson and Anthony Gaudin were among the other outstanding individuals who gave us the benefit of their guidance.

Metallurgical work was another area of some dispute. This work was under the direction of Dr. George Marvin and was done principally under contract. A modern metallurgical laboratory was built at Winchester, MA, near Boston. It was well equipped and staffed and some fine work was being developed. But every ore sample had to be shipped in. It seemed to me that this just wasn't the place to build a pilot plant

So it was decided to move the effort to Grand Junction where the manager GJOO could have his hand on the work. There had been the concern that the many good metallurgists working at Winchester would not want to move. Fortunately, most of the Winchester people were real pleased about moving to the Plateau. The first unit we built was to test the Resin in Pulp process. It was a small unit but could process half a ton per day. The pilot plant proved the process and the first RIP plant was built by Anaconda near Bluewater, NM.

That area was a new find. It seems that Paddy Martinez who frequently over imbibed took a nap on his way home from the spas of Bluewater and spent the night near Haystack Mt. When he woke up he saw some rocks with a strange yellow coloration. It turned out to be uranium mineralization - autunite in the Todilto limestone. Paddy's sample prompted Santa Fe to move in as the discovery was on railroad lands. The AEC established a buying station there, one of 16 that we finally had in various places to provide a prompt return to the small miners and thus accelerate development.

Anaconda and many other companies mounted exploration efforts in New Mexico. Jack Knaebel flew the area in a small plane. Once he had to obey nature's call and landed on a stretch of road on the Laguna Indian Reservation. He walked over a small hill and obeyed the call while resting one hand on a petrified log behind him. He was shocked to see that the log was impregnated with uranium minerals. This became the important Jackpile Mine. Jack once took me on a flight over the area. He urged me to take over the controls, but quickly took them back when it appeared I was going to scrape the wing tip on rock. I was more interested in the geology than in driving a plane.

The AEC monitored all the private drilling being done. On one occasion when I had some drill results in hand I could no longer keep the information to myself. I called Jesse and told him, "We've got a big new deposit in the Bluewater area!" Jesse said, "How can you say that on the basis of a single hole?" I told him that we could see the elephant's tracks, and when they were as huge as a dinner platter and deep, it just had to be big one. In that particular hole the ore grade section was thirty feet thick, and subsequent events proved it to be a huge deposit.

Once Jesse and I met at the Colorado Mining Association meeting in Denver in February. Jesse planned to drive to Grand Junction with us. We headed out at first light. When we reached Georgetown a few flakes began to fall. At Silver Plume we stopped and had chains put on. We were the last car through the gate at the foot of Loveland Pass before it was closed. Soon we had to guide on the snow stakes to find the road.

It was a slow and torturous trip over Loveland and through the valley. Then Vail Pass and it was real tough driving through eight inches of snow. We finally topped out on Vail and headed down past the For Sale sign on the west slope Vail ranch. Oh to have had some vision! That ranch that had been for sale for so long became the famed ski resort.

Roads had to be built and many bridges. Exploration was expanding. At one time we operated 15 field camps with some 500 people including wives and children located around the Colorado Plateau. Vehicles were increasing in numbers. Walker Lybarger, a contractor, maintained the fleet of 23 passenger sedans, 15 utility coupes, 6 delivery sedans, 152 jeep station wagons, 26 suburban carryalls, 51 universal jeeps, 2 panel wagons, 57 2WD pickups, 52 4WD pickups, 25 Power wagons, 4 weapons carriers, 2 snow plows, 3 semi trailers, 67 trucks, 2 truck tractors, 29 bulldozers, 3 crawler cranes, 5 power graders etc. There were 264 house trailer scattered around. The 11 airplanes were serviced by another contractor.

Equipment included several boats to get to isolated spots on rivers. One geological crew put in near Moab and lost their outboard prop way down stream. When they didn't report

in on time a group went looking for them and found them on the banks of the Colorado in a deep canyon. Food, water and sleeping bags were dropped and then we confronted the task of getting them out. A trail out of the canyon was worked out and bags of flour were dropped to guide the geologists to the rim. Ropes and other climbing equipment were air dropped to get them over the rough spots.

It was a huge operation and our operating budget was growing. Huge sums were spent in contracting for uranium. A contract was being drafted for Anaconda to process ores near Bluewater, NM. It was a tightly drawn contract and based on pilot plant work with all the data available to contractor. This arrangement enabled us both to negotiate from a position of knowledge. A price was sought that would provide a 15 % return to the operator. Dick Newlin, VP of ACM, accused me of driving too hard a bargain when he said, "Sheldon, you'd steal the pennies off a dead man's eyes!"

But Dick Newlin and I signed a \$415,000,000 contract that day for the delivery of uranium concentrates to the AEC. I invited Dick Newlin and Jack Knaebel to our home for dinner. While we were having cocktails, Rocket, our pet flying squirrel, took off from the fireplace mantel to land on Jack's shoulder. When he saw what Rocket did he said he wished he had worn his waterproof suit.

There were times of frustration and fun. Once I had driven for four or five hours and was nearing Moab when a radio message came through that Washington wanted to talk with me urgently. Nothing to do but turn around and head back toward Grand Junction.

Sheldon Jr. finished high school and went to work for the summer at Haystack Mining in New Mexico. He was slated to begin his freshman year at Colorado School of Mines that Fall. But something went awry and he elected to join the US Marine Corps instead of college. It was a great let down, but he had made his choice and there was nothing to be done.

Most diamond drilling and other types of drilling as well were done on Federal lands that had been previously withdrawn. When the AEC wanted to drill on private land it was only with a written agreement that the information obtained would be made public. Our role was to point the way so that private industry could get on with the job. When the Saturday noon posting of uranium anomalies seemed to slow the procedure was amended by dropping bags of flour right on the anomaly.

On June 12, 1953 Jesse Johnson wrote: "I am sure that in the rush of things last week I did not fully express my appreciation for the fine job you are doing. You probably have one of the most difficult assignments in the Commission, and that is certainly true from the standpoint of public relations. You are handling this difficult problem with skill, tact, and

patience, and no one could do more. You are never going to satisfy all of the ore producers but should attempt to avoid or eliminate the justifiable complaints and criticisms they may have. I remember a remark of Sumner Pike just after an increase had been made in the ore buying schedule: 'If we don't have any complaints now, I shall call for an investigation of the Raw Materials program!'"

When ore was found on withdrawn land by AEC drilling, it was leased. An ore body was never fully defined by AEC drilling, but we negotiated the leases on the basis of the partial information developed. Leases were made with experienced operators who had adequate financing. It was still tough and there were many complaints from unsuccessful would-be lessees. I even got an anonymous phone call one night accusing me of accepting bribes for leases. What a crock! But it still made me mad. There were plenty of letters full of complaints about ore prices, roads and sampling.

When the complaints about sampling plants were rampant the Colorado School of Mines contracted to survey every one of the buying stations to see if there were any faults and what could be done to correct them. S. P. Warren, "Pi" was the chief investigator. It was determined that the sampling was fair and accurate but improvements could be made at a few of the plants and the changes were made.

There were no doctors in our far flung field camps. The camps were pretty good as it was found that geologists would not stay in the field living in tents and on iron rations. So good house trailers, water wagons, radio communications were obtained and field service crews even took care of folks in-town purchases for truck delivery when they aggregated enough.

When there was a woman taken ill, I learned about it by the radio in my home that connected with all the field camps. I got busy on the telephone and chartered a Monarch Aviation flight to pick up the sick woman and bring her to the hospital in Grand Junction. I paid for the cost with AEC funds, but the auditors said I had to pay personally as there was no authority for such an event. I stood them down and my action was finally upheld. It was a minor expense compared with the alternative, a doctor in every camp.

Temple Mt. was an interesting ore occurrence. This was in the San Rafael Swell area of eastern Utah. Oil seeped from the mine faces that were in ore, as well as from the development drifts. Many small mines were accessed by shallow drilled shafts. One Sunday I visited a small mine and went down in the bucket in the drilled shaft. There was excessive vibration so I examined the head frame when I came out. It was fastened together with 40d and 60d spikes. The next morning I suggested that a Utah State Mine

Inspector pay a visit to the area, but did not tell him why. The inspector imposed changes on some operators.

In the Grand Junction Operations office we were not aware of any unusual hazards due to the existence of uranium in the ore. We knew there were radon daughter products and that there should be mine ventilation. But health and safety in mining were the responsibility of each state's Department of Mines. In time, the AEC began to make tests-urine analyses of miners. The idea was to follow up the tests in a year but the miners moved around a lot and hence the tests were not successful.

In the summer of 1954 Al Knoerr and George Lutjen of Engineering and Mining Journal came to the Colorado Plateau to prepare a feature article on uranium. In commenting on mine ventilation, they reported: "VENTILATION. Possibility of a radon hazard is recognized by mining operators and Public Health Authorities. Fortunately, however, no evidence has turned up to date indicating that radon has proved harmful to mine operators. Nevertheless, companies are requiring periodic health checkups to make sure that this hazard does not exist. Opinion of operators is virtually unanimous that if you provide enough ventilation to eliminate excessive dust concentrations and diesel exhaust, you automatically whip the radon hazard."

Uranium procurement costs were running about \$60,000,000 per year and rising with a projected 1956 cost of \$118,000,000. We had far more than quadrupled production and plants were scheduled that would increase production to 16,000 tpy.

There were all sorts of interesting things happening. Bob Hope called me at home one day with some questions and daughter Karen talked to him. Jimmy Stewart came to visit at the office. Congressman Aspinall visited frequently. Congressman Clinton P. Anderson, Chairman of the Joint Committee on Atomic Energy, visited frequently and took an active interest in what was going on. Once just after we had finished dinner at our house, daughter Karen came in from horseback riding. Senator Anderson greeted her and asked if she ever rode with an English saddle. When he learned that she hadn't he sent her a saddle from his New Mexico ranch.

A significant conflict arose over staking claims on lands covered by leases under the Mineral Leasing Act of 1920. Utah Representative Douglas Stringfellow got into this act. He had proclaimed himself a war hero among other things but was subsequently proved to be a fraud and had to resign.

After considerable effort Public Law 585, a multiple land use law, was written. That job kept me awake nights for several hectic weeks. That law was sorely need to halt the increasing problems where uranium was found in and on the surface of leased lands.

President Eisenhower visited once. When Truman lost to Ike, there were headlines in the Denver Post speculating on my departure. But my appointment by Truman showed that the job was apolitical.

The program needed a millionaire and Charlie Steen answered the bill. What's more he was eccentric and colorful and got lots of publicity with his antics. When I sat on the Mi Vida dump with Charlie in February 1953, he told me how he wanted to drill down dip from the low grade outcrops on Big Indian Wash southeast of Moab. He had a tough time raising funds but finally got hold of a used jeep and used diamond drill. He had an objective, but did not reach it because his jeep broke down. So he decided to drill right where his jeep had failed him.

He examined every bit of core and some of it was pretty black looking. Charlie and his family lived near Cisco in a shack near the railroad. One night he wandered over to the filling station where there was a fellow with a fancy new geiger counter. Charlie put his sample under the probe and drove it off scale. He said he ran home and told his wife M.L., "We're richer than a bunch of skunks." Within the next few days he staked a lot of claims Skunkavitch 1,2, 3 etc. and the Mi Vida claims as well. It wasn't long before Charlie had his shaft down 84' and was shipping ore. Neither was it very long till Charlie explained how his geological research led him to the chosen spot to put down his first drill hole. When the word got around of Steen's success we were swamped with several hundred people a day seeking knowledge on how to go about prospecting. Al Rasor and his crew did an outstanding job of giving advice and assistance. One supplicant was Vernon Pick who followed Al's advice to look where few if any had looked before. Vern went into the desolate Devil's River country south of Temple Mt. in Utah and found a fine deposit. It became the famous Delta mine that he later sold to Floyd Odlum for nearly \$10,000,000.

Vern nearly lost his life during his search. On one of his prospecting trips from Grand Junction, he stayed in the field so long that he ran out of water. But the Dirty Devil River was there and Vern sampled it to allay his thirst. He became quite ill and was barely able to stumble over to our camp where our people treated him for the poisonous water he had drunk.

After his find became well known for its rich ores, rumors were circulated that Vern's discovery was based on information he received from AEC geologists. It became necessary to have an FBI investigation. So I put one of the several agents assigned to our office on the job. Voluminous data was collected but there was nothing to point to the charges of collusion between Pick and the AEC.

At every opportunity I went underground at one mine or another. Visited Homestake's operation in Big Indian Wash when Don Delicate and Richard Stoehr were running the show. I visited any and every type operation that I could. Peter Joralemon took me through New Park's Mayflower mine near Park City, Utah. I planned, one year to attend the annual meeting of the American Mining Congress in Las Vegas. Bill Burgin was going to join us at the Salt Lake City airport for the drive from there to Las Vegas. While waiting at the airport, we learned that Bill's UAL flight had crashed with all hands lost.

The publicity attached to the rich uranium finds and the great rewards the successful prospectors received had the effect of spurring public interest. In September, October and November there were an average of 1,500 visitors to GJOO.

Each producing property had to be certified by one of our mining engineers. We were getting close to 30 applications a month. Certification was essential to learn about the ore type as a basis for determining which mill the ore should be shipped to, payment of initial production bonus and related matters.

There were instances of fraud. Nighttime movements of ore to new claims took place so an initial production bonus could be had where one was not warranted. Some shippers selectively wet their truckloads with the objective of increasing tonnage by putting the moisture weight where we did not take the moisture sample. The worst and most painful occurred when an AEC or USGS geologist advised colleagues in private industry of an area that was to be withdrawn so claims could be staked that would not be affected by the withdrawal. Jail terms and hardship for the inmates' families were the unfortunate result.

There were three FBI operatives that worked closely with GJOO on such matters and on each person being cleared for classified information. In each instance the final decision whether a clearance should be granted was my responsibility. I did not care for reading all the details of an individual's life, but it had to done.

The mail we received was overwhelming but we could answer much of it with form letters and packets of helpful data. Some of the letters were amusing. One follows :

Gentlemen:

I have just purchased a jeep, Geiger counter and pith helmet. Now all I need is the literature on Uranium prospecting. Please send me all the literature that you have available. If there is a charge- advise me.

Sincerely,

P.S. My mother-in-law recently was subjected to intense radiation

treatments. She's cured now- but- she gets a definite "ping" from my counter. Now here is what I'd like to know--how much will you offer per pound for her? I am certain that you could grind her up and make a bomb that would make Hiroshima look like a firecracker."

Somehow this story leaked and was reprinted in the Grand Junction Daily Sentinel and shortly after in a California paper.

Not much later we received another letter from the correspondent with a copy of the California paper clipping saying:

Gentlemen:

This is to inform you that my mother-in-law is no longer a potential defense weapon. When she read the enclosed article - She exploded.

Sincerely,

Other letters were not so literate and were probably more serious as well:

Atomic Energy Commission
Mining Division

Dear Sir your attention pleas. for one momnet
Franklin caught Lightning in a bottle. Edison canned his Voice and
Shiped it arond the world. Macomio talked without a Wire. Then Came
the Radio and mext the telluvisun takes your picture on the other
Side of the Globe now comes the mad Uranium Rush. Here come Power
from Unrefined Uranium Ores By Fred R.-----.

I can tap the Uranium ore on a Hill Side on mining clames tunnels
shafts stock Pile surface or space an create por here fromm and Run
machinery and send that ship a round the world with my Method just
as easy as they exstract elirisity from the air.

Thank you for your time

Bye

(signed)

P.S. I am a student out at Dukes Mineral School Hot Springnew
mexico and the univserte mining course Reno Nevado an a Rock Hound
for 50 years

I just take my apparatice and machinary Sit it ovr a piece of
Carmatite Ore Hok it up to an Electrit Clock and run it now iff i
hat it on a 10 acre square of Ore I coul run a Battle Ship around
the World an a mining clame of 20 acres would run the machinery of
the State of California.

There were hundred of letters with wild claims. They all got answered except for those that had no return address.

In 1954 I was named Outstanding Ex Student by my alma mater, the Texas College of Mines and Metallurgy, a Branch of the University of Texas. It had changed its name to Texas Western College subsequently becoming the University of Texas at El Paso. I was involved in the final name change. The name was the Texas College of Mines & Metallurgy, a Branch of the University of Texas at the time I finished there. I felt like I had been orphaned when the name was changed to Texas Western without any considerations for old grads. So I wrote the then Governor of Texas and many former grads. Fortunately the school's name got changed and UTEP has wide approval,

In my acceptance address I noted that GJOO consisted of some 1,100 people of which 300 were direct AEC employees and the remainder worked for integrated contractors. Less than 500 of this group worked in Grand Junction the rest being in exploration camps or field stations. The AEC or its contractors were drilling some 750,000 feet per year with private industry drilling about 2,000,000 feet. In June 1954 there were 795 producing mines up 10% in the last year. Production was doubling every 18 months.

One measure of the program to encourage private industry was the fact that \$4,000,358 had been disbursed as initial production bonus by September 10, 1954. Over a thousand miles of access road were built at a cost of \$5.500,000 and plans for FY1954 called for construction and improvement of 175 miles of access road at an estimated cost of \$3,000,000.

The industry then employed 10,000 people and indirectly contributed to the livelihood of 100,000 more.

The Outstanding Ex Student award was a distinct honor and I appreciated receiving it.

In addition, I served as a director of the Grand Junction Chamber of Commerce. I was invited to join the Rotary Club and other organizations and persistently turned them down. My work was so demanding that I did not have the time that I needed to spend with my family.

The GJOO always had problems with security. Almost everything seemed classified and that interfered with our work and cost lots of money. We shipped concentrates as Chemicals Not Otherwise Identified and paid premium rates. Yet everyone knew what was in those drums. I finally got the classification changed.

Even the capacity of the mills to handle ore was classified. I persuaded Mike McGrath, a private mine operator to do me a favor. Take a pair of field glasses and sit on the hillside across from the Uravan mill. Based on your observations, tell me the milling capacity of that plant. Mike came within 10% and his cooperation was a key factor in getting mill capacity declassified.

Max Welch, the GJOO security officer, and I had a strange assignment. Beneath the log cabin office that I occupied along with Bill Hutchinson, Ed Crabtree and Hazel Henderson was a series of heavily reinforced storage vaults that held drawings and documents for every AEC facility and their products including those of bombs. From time to time we were called upon to reproduce specific drawings or documents. Access to the vaults could only be obtained by both of us being together using our keys at the same time. Then we used the photographic equipment together to produce the requested material. It was sent to its destination by an armed courier who carried it in a brief case chained to his wrist.

I went to Washington frequently sometimes on my own initiative or when called. Once I was called in for a conference with the Defense Department. It was the shaggy dog story again. I had been told in prior years that it wanted all the uranium it could get. Now they were wondering when the flood could be slowed down. As measures were to be instituted that would curtail production, I felt that it was time for me to leave the AEC. It just didn't seem right for me to slow things down when I had been urgently pushing for increased output for years. So I resigned.

I didn't know it at the time but I was barred for several years from working with any metal mining company that had an interest in uranium- and they all did.

The GJOO program was eminently successful for a number of reasons;

1. A beneficent mother nature had endowed the US with significant resources.

2. Workable incentives encouraged the search for and production of uranium by private industry - the circulars.
3. Adequate market was provided by the many buying stations.
4. An extensive exploration program combined with drilling. Between 1948 and 1956 Government drilled 5,575,000 Ft.
5. A program of withdrawing lands to be drilled combined with leasing of discovered orebodies.
6. A program of geologic investigation made available to the public promptly.
7. Radiological investigations made available to public promptly.
8. Geophysical research and mapping programs.
9. Access roads - by 1960 some 1253 miles of road had been improved or built at an average cost of \$13,620 per mile.
10. Process development raised recovery to an average of more than 90% . The two 15 TPD pilot plants paid off.
11. Concentrate procurement contracts based on pilot plant results enabled reduction of cost per pound from \$12.51 to \$8.47.
12. The authority vested in the GJOO manager to acquire fissionable source materials with contract authority up to \$400,000,000, the authority to make capital investments up to \$2,000,000 and the power to hire and fire employees without a personnel ceiling.

1.1 More than any other factor that made the program successful were the people-dedicated and hard working. My deputy Ed Crabtree, Bill Hutchinson, secretary Hazel Henderson, Neilson O'Rear, Ernie Gordon, Quentin Brewer, Ralph Wilpolt, Hank Wardwell, Bob Wright, Hobart Stocking, Al Grainger, Y. W. Isachsen, Hi Wood, Phil Dodd, L.W. Carithers, John Gableman, Dan Hurley, Merle Crew, Dave Phelan, M.Scott, Jack Chester, E.L.Bauman, R.V.Seaton, E. Brager, S.Comstock, Bob Drouillard, Bob Laverty, M.L. Nielsen, Tom Boyle, Elton Youngberg, Jack Curzon, Al Rasor, Phil Simmons, Bob Toole, Ray Lindbloom, Don Hill, F. Bemis, Charlie Tonry, Bill Lenneman, Frank McGinley, Johnny Barnes, Don Everhart, Gene Allen, Paul Martin, Al Albrethsen, Conrad Peters, David Harris, Royal Gidney, Ken Burson, Jim Westbrook, Paul Sullivan, Caroline Dekleva, F. Baldwin, L.I. Jenkins, M. Watson, Joe Schumacher,

H. Danielson, Kitty McCarthy, Reba Croft, Euretha Dunn, Maxine Bennett, Anne Warmington, Max Welch, Jack Griffith, R.McCurtain, and E. Chatham just to name a few of the hundreds - all striving toward that simple objective - get more uranium.

Folks we dealt with were numerous and included Steve L.R. McNichols, Blair Burwell, Howard Balsley, Helmer Johnson, Press Walker, Bob Bernick, John Hill, Burt Reynolds, Tom Skidmore, John Schumacher, Virgil Bilyeu, Bill Hudson, Ray Sullivan, Bill Waldeck, Ed Snyder, Mitch Melich, Duff Ebley and a host of others whose names escape me.

There appeared an article on a speech by Stephen L. R. Mc Nichols in which he was reported to have said that my policies and actions were motivated by communistic tendencies. I was furious and at a loss as to how to refute his scurrilous remarks. But Steve was soon to come to Grand Junction and he damn well knew that I was mad as hell. I had a sign made reading ILLEGITIMI NON CARBORUNDUM kind of sorry Latin for---Don't Let the Bastards Wear You Down.!

When Steve came to the office, he took note of the sign and asked what it meant. I told him and he asked, "are you referring to me?" I replied, "Well, Steve, if the shoe fits, wear it!" He turned sort of red and grumbled but soon recovered. He eventually became governor of Colorado riding to the office on the uranium miner's coattails. Colorado deserved better.

There were those for whom I had formerly worked who saw fit to come and work for me. There was John G. Barry for whom I had worked in 1933 and who was President of Texas Mines when I graduated. John did a great job in training many geologists in how to find and interpret the elusive earmarks of replacement type orebodies. I had also worked for Elton Youngberg at the Benton Mine. I appreciated it greatly that those men for whom I had worked saw fit to come and work under my direction. Gene Allen was hired one evening in the Caravan Bar and many other able men were engaged under similar circumstances.

And, speaking of bars, Phil Simmons was the subject of a complaint letter from a lady in Farmington, NM who deplored the fact that a government jeep was parked in front of a local bar. But bars were just the places to go to find out what was going on in uranium exploration as I explained to the lady. I suggested to Phil that, on his next visit to Farmington, he park his jeep in front of the lady's house.

In 1952 there were 6 mills operating including the sole government mill at Monticello. In 1961 there were 27 industry owned mills processing 22,000 TPD.

It was a most interesting experience and I left it with regret.

On December 14, 1955, Jesse Johnson wrote to me as follows:

Dear Sheldon:

It was with deep regret that I received your resignation although I was prepared for it as a result of what you told me when you were here in Washington. However I still thought that you might decide to stay as you would not be at a loss for attractive offers in the future.

I can appreciate the reasons for your leaving as government salaries do not compare with those for comparable positions in private industry. Also, you look forward to expanding opportunities in the company with which you are to be associated and I am sure that working with Frank Case will be most pleasant.

As Manager of the Grand Junction Operations Office you have had a difficult job and you have handled it well. During the period since you organized the Office as its first Manager, production and problems have multiplied. Great credit goes to you for successfully handling the many problems and building an efficient organization to meet the requirements of our rapidly expanding uranium program. You have worked long hours with tremendous energy and drive.

You can be proud of the job you have done and we hope the satisfaction of accomplishment and the experience you have gained will in a measure compensate for the pressure and strain under which you have had to work. We are sorry to lose you.

We appreciate your offer to stay on to assist Allan Jones in familiarizing himself with the negotiations now under way and the various activities and projects of the Grand Junction Operations. We would also like the opportunity to call on you for advice and assistance with problems that may arise in the future.

In accordance with our conversations, we are making your resignation effective January 31, 1956 and we are preparing a consulting contract to become effective February first.

Again let me thank you for your fine service and wish you every success in your new undertaking.

Sincerely yours,

(signed) Jesse

Jesse C. Johnson Director

Division of Raw Materials

Ed Crabtree had left to become director of the Colorado School of Mines Research Foundation and Allen Jones had been my deputy for some time. Allen would succeed me as Manager of GJOO. The Jones' bought our home on Main Street and the Steinway parlor grand piano that was just too big to move. We packed up and hauled Karen's horse Dolly all the way to Pennsylvania. It was an icy day in February when we left headed south toward Texas. Had to stop and put chains on. We were sad to leave Colorado but were already looking ahead to a new challenge.

CHAPTER 7.

PENNSYLVANIA - CALIFORNIA - VIRGINIA - BRITISH GUIANA - HAITI -
JAMAICA & MEXICO

PENNSYLVANIA

The trip across country was uneventful. I pulled the horse trailer with the station wagon and we tried to keep close together with the two cars. I was stopped once on a Georgia Freeway for exceeding the speed limit - no ticket - just a warning.

We had purchased a lovely home in Bear Creek in the mountains south of Wilkes-Barre. It was on a glacial kame and close to Bear Creek Lake. The trout fishing was good and close to home. The house had originally been built in 1895 by a member of the Lewis family and modernized just a few years before we acquired it.

My new job as Vice President of Glen Alden involved efforts to cut mine operating costs and supervise new acquisitions. The company had an \$11,500,000 tax loss from its anthracite operations and was looking at profitable companies to acquire.

I had to become familiar with the far flung mining operations that stretched from the Susquehanna Valley down to Hazleton. Bill Everett, V.P. Operations took me over the countryside to show me the spread. I spent a lot of time underground with Ivor Williams, superintendent of mines.

Anthracite had really fallen on hard times. The industry produced 42,000,000 ton in 1951 but was down to 27,100,000 by 1956. In the same period employment in the industry went from 70,000 down to 35,000.

In Glen Alden employment dropped from 13,251 to 4,650 during this period. The aggregate production of Glen Alden's mines was about 2,500,000 TPY a significant decline from peak production of 10,000,000 TPY. Anthracite was a fine fuel but was legislated to decline.

During this period of decline Glen Alden accumulated a tax loss of \$11,500,000. Under the law loss corporations could acquire profitable companies. This led Glen Alden into a program of diversification. We bought the Mathes Company, manufacturers of air conditioners and heatpumps. Then Glen Alden bought Ward La France Truck Corporation that produced fire engines and other special purpose vehicles under the direction of Norm

Tracey. At the same time Glen Alden worked to improve its anthracite business. It acquired the Hershey Motor Stoker Company and offered a free motor stoker to home owners that would enter long term contracts for anthracite.

Research under Dr. George Brady took on a multi directional thrust to find new markets such as a substitute for coke in blast furnaces. Work proceeded on improved flotation of anthrafines. It was a tough row to hoe! Still we were making some progress. Combined with mechanizing the mines and greater productivity per man, costs were being contained.

The mines themselves were presenting many problems. The folded anthracite beds, the heavy water pumping problem; we were pumping about 60 tons of water for every ton of coal produced didn't help the problem any.

The area had a long history and several influxes of foreign mine workers set the scene for the current local conditions. First came the cousin Jacks or Welshmen, then the Irish, and later the Poles and Italians. The valley was cosmopolitan to say the least.

One day underground at Nottingham I got to talking with a miner who was driving a room on a steep up-slope. It turned out that he was an ardent fisherman also and we made a date to go trout fishing that weekend. We had a great day and fished late. I was invited to his home for dinner. When we sat down for dinner my miner-fisherman friend introduced me to his family. One son was a doctor, another a lawyer. Here was a day's pay immigrant Italian who saw to it that his children got a good education.

In trying to improve mechanization at Glen Alden I took a trip to Nova Scotia to visit Dominion Iron and Steel bituminous coal mines at Glace Bay. There the seam inclines at about 12 degrees and goes far out under the Atlantic. The Dosco Miner was a self propelled unit with about 8 cutter chains on a head that could be raised or lowered. It did a good job on longwall mining. We tried one at the Avondale mine but it could not handle the hard anthracite. Years later, as bits improved, it could have done the job.

The day I went underground at Glace Bay I was ill from eating a bad lobster the nite before. I thought I would never be able to eat a lobster again. When the mine visit was over I decided to take a few days off and drove around the spectacular Cabot Trail that follows the north coast of Nova Scotia. We visited a lobster boat at its dock and bought two large and lively lobsters. That night Happy and I camped out near the west end of the trail and cooked them in a bucket of salt water. They were delicious!

Next morning we went fishing for Atlantic salmon. Happy had one on and it was beautiful to watch with its repeated leaps. Finally it took off. A look at the end of the line showed that I had failed to tie an adequate knot to secure the fly. I never even had a strike.

On the way home we stopped to fish at a lake in the southern part of the province. I parked the Ford station wagon on a gentle slope leading to the lake. We were horrified to see the car rolling slowly toward the lake. It ran into the water floated out and sank drowning our beautiful Doberman Pinscher. When the car was fished out, we learned that it was still in reverse gear. We had the car worked on and were able to drive it back to Bear Creek.

Sitting on the damp seat with the wind blowing over me resulted in a muscular problem in my back that took months to get over. Finally massage and sauna treatments did the job.

Glen Alden's mines stretched about 12 miles along the Susquehanna Valley. There was Wanamie at the far west beyond the town of Nanticoke. North of the river were Avondale, Nottingham, Lance, Kingston and Woodward at the east end. South of the river and east of Wanamie were Bliss, Loomis, Truesdale, Nanticoke, Sugar Notch, Huber, Inman, Buttonwood, South Wilkes-Barre, Stanton, Empire, Hollenbeck, Kidder and Peach Orchard. Many mines and many different conditions, but all affected by water seeping in from the river.

Most production came from company operation plus a number of lease operations. One of these was adjacent to a populated part of the town and was an open pit operation. The blasting had to be carefully controlled to minimize complaints. The contractor reported the number of rail cars mined, but it just didn't look right. I placed an observer in a nearby building who photographed each car that was loaded. After a month of this we checked the photographed car numbers with the operators report and found out that he was only reporting about 75% of the cars actually loaded.

There was lots of intrigue and suspicious dealings going on. It was suspected that several company officers were taking kickbacks from some of the shady deals. There was one defunct operation that had a lot of material left around that had high coal content and could be processed. Before I could complete arrangements to have the stuff processed at Huber Colliery, a VP had leased the area to Pagnotti a local contractor.

Huber colliery dumped a large volume of tailings from the flotation plant into a nearby artificial pond. I asked about the quality of these fines and was told that they were about 14% ash and hence of no use for a fuel of any kind. I looked into how this material was sampled and found that there was a spigot on the shell of the large centrifugal pump that moved the tailings to the pond. A sample was taken every shift at this spigot and analyzed. Review of the records showed that the sample taken truly was high ash.

But taking the sample as the crew did, they had a centrifuged sample that would be biased toward material with a high density. I set up a sampling system at the discharge end

of the tailing's pipe designed to sample the entire stream part of the time by manually pushing a box through the pulp stream. The analysis of the sample showed that the ash content was actually about 10%.

To check the results I contracted with Sprague and Henwood to drill the accumulated fines. That work confirmed the low ash content and the material was sold to the Luzerne Valley Gas & Electric Co. for \$12,000,000 to be used as a powdered fuel.

Every time I embarked on similar projects there were efforts to frustrate the task. It just wasn't an easy place to work when some of the folks who were supposed to be part of the team were working against you. So I began to look around for a happier connection. Before I got far in that effort another major event took place. We had been talking with Albert List who controlled the RKO Theatre chain, some cloth converting companies and a few other things about Glen Alden taking over.

List came to Wilkes-Barre and looked us over. As he was leaving he said he didn't want to sell out to us and posed the question , "I don't suppose there would be any objection to my buying into Glen Alden?" He was told there would be no objection. To our great surprise a few weeks later there was a full page ad in the Wall Street Journal and other ads as well offering to buy Glen Alden stock for \$14.50 when it was normally selling at about \$12.00.

Soon List controlled Glen Alden and its \$11,500,000 tax loss. At the first board meeting List reduced all pensions. At the second board meeting he eliminated pensions entirely. I resigned in protest. Glen Alden financed its pension plan and there were many individuals who had given a lifetime of service to the company and were looking forward to living out their lives under the pension plan that had been in effect for many years. I told List that to abolish the pension plan was reprehensible, immoral and inhuman. He flushed at my remarks, but refused to alter his position.

My resignation after only two years with Glen Alden took effect January 6, 1958. At the same time I resigned from the Greater Wilkes-Barre Chamber of Commerce and the Pennsylvania Manufacturers Association. In my letter of resignation to the Chamber of Commerce Presidents Edmund H. Poggi, Jr. I said "...in these two years I have obtained some grasp of the problems that confront a city that was once based on a single industry. It is a real chore to turn such a community to other economic mainstays to replace the decline of anthracite activities. The Chamber of Commerce, the Industrial Fund and the Committee of 100 have played a key role in sustaining and enhancing the economic life as well as many other aspects of human activity in the Greater Wilkes-Barre area. It is with

deep regret that we leave this pleasant area, but the recent changes in control of Glen Alden leave no other course.

"It is my hope that distance alone will not sever the many ties we have made with a host of friends in Greater Wilkes-Barre. I wish them and the community a prosperous and happy future."

List accelerated changes in Glen Alden. By April Frank Case left and retired. The company name changed to List-Alden and several mines were shut down. It was the beginning of the end for anthracite mining.

Walter Rice of Reynolds Metals telephoned and asked me to consider coming to Richmond as his executive assistant. But I was already committed.

CALIFORNIA

On January 20, 1958, I entered my new post with Western Machinery Company in San Francisco. There were many challenges on this new job. Strangely enough in February I received a letter from Albert List asking me to come back to Glen Alden. It seems he had been reading some of my reports and felt that I was on the right track to reviving Glen Alden. He offered me substantially more salary. I turned him down despite the offer of \$55,000 per year.

Jack How had employed a management consultant in an effort to improve control and achievement within Western Machinery Co. and Western-Knapp Engineering Co. Work centers were established and each month every work center had to file a report covering experience in goal attainment for the prior month, why goals were not achieved, what corrective measures were to be taken and a revised objective and how it would be met for the month ahead. All this generated mountains of paper. Jack gave me the task of reviewing each report and reducing the mountains to a digestible sized mole hill.

This took up a lot of time and instead of making history, everyone spent too much time writing it. The entire program was finally abandoned after paying a sizable consultant's fee and lots of lost time by key people.

Research and development of equipment to do better jobs fell under my direction. This involved working with the foundry and metal working shops in Sacramento. A part of this work involved acid proof lead-lined equipment. At the plant where the lead burning was done, I met Dean Schamp who was also interested in trout fishing. Frequently on weekends Dean and I would take off for the high Sierra to try new spots for trout. We covered much of the mountains and had great fun.

I would prepare the camping gear and get food on Thursday evenings. At the close of business on Friday, I tried to take off before the traffic got too bad. I would drive to Berkeley, pick up Dean and we would head for the hills.

One weekend we went to a stream that flowed east out of the Coast Range. It was reported to have excellent fishing and we could actually see many trout. But there were lots of rattlesnakes and we had to spend so much time looking out for them that the fishing was no pleasure. Another time we drove through Yosemite to Tioga Pass and on up to Saddlebag Lake. There we took my old Adirondack guide boat, crossed the lake, stashed the boat and trekked to some high and lonely lakes where the fishing was great.

In the Sierra the rule of thumb was that the fishing improved as the square of the distance from where you left your vehicle. So Dean and I did a lot of hiking. I joined the Sierra Club to do some organized hiking. In those days the Sierra Club was not so environmentally biased. We did carry burlap sacks and cleaned up trails and camp sites. But all in all it was a fun group and we enjoyed being with them. Also there was time to fish.

We fished the Tuolumne, the Mokolumne, the Merced, Strawberry Reservoir, Mammoth Lakes, the Truckee, 1000 lakes west of Tahoe and many other spots. Late one season, fishing near Donner Pass we were pinned down for several hours by some snipers. There was little fishing that day and we stayed hidden while the three madmen took pot shots at us with their deer rifles.

Trips to the coal regions were an effort to sell WKE services in the design and construction of coal preparation plants. We did the job at New Cadiz, Ohio for preparing the feed for the coal pipeline. In addition to crushing, screening and washing, a fine coal flotation plant was built to create a size consist that would remain in suspension during transit. That pipeline was built to combat high rail prices. When the railways got reasonable, the pipeline ceased operating. It did show that coal could be moved efficiently by pipeline. Several coal pipelines were subsequently constructed.

The brief stay in California was a good experience and there were new friends aplenty. Included among them were Mike Mulcahy, Walt Crowther, Gil Murray, Ray Byler, Murray Eisner, Bud Galland, Doug Newton, Bill Newton, Herb Mayer, Clif Goering, E.J.O'Connell, Jim Jensen, Jack Bergstrom, A.J. Saarinen and Ken Ferguson.

Sales engineering was not my bag! I was pleased when Walter Rice, president of Reynolds Mining, the raw materials arm of Reynolds Metals, again approached me about coming to Richmond as his executive assistant. As Walter had already contacted me while I was still in Wilkes-Barre, I was not totally unprepared for the offer. I was eager to get back

into mining as neither the manufacturing work of Western Machinery nor the sales of engineering services held much appeal. So in December 1959, we moved to Richmond, Virginia.

VIRGINIA

We rented a home while we looked around and finally found what we wanted on Sleepy Hollow Drive at the west end of Richmond. It was just a few miles drive to the new "glass palace" that was Reynolds main office. Reynolds had far flung raw materials operations. Underground bauxite mines in Arkansas, underground fluorspar mines in Mexico and a flotation plant in Eagle Pass, Texas. Open pit bauxite mines were in British Guiana, Haiti and Jamaica. Within a short time I had made a familiarization visit to each operation.

Caribbean Steamship Company was also part of Walter's province as the ships carried the bauxite to US plants and ports. The first ship commissioned was the Oscar Schmedeman named after the company geologist that first recognized the Jamaican bauxite. Several self unloaders were built to increase the fleet, the Richard, and the Louise. Later, when we began to ship alumina by sea, the Walter and the Inger were built.

Reynolds had more capacity to produce bauxite than was needed so the company participated in the General Services Administration / US Department of Agriculture stockpiling program. This involved putting British Guiana, Jamaican or Haitian bauxite into stockpiles in exchange for surplus feed grains.

This was a complicated process. Participants had to "close the leg" of each transaction by disposing of the feed grains in a manner so the final trade would involve the country where the bauxite was produced. Such deals were fictional at best but were made along with the documentation to prove it. Thus Jamaican bauxite was shipped to stockpile. Jamaica was then a British colony. First feed grains were sold to Ireland. To "close the leg" a commodity had to be found to move to England. Cattle were moving from Ireland to England steadily, but it was no problem to find brokers who, for a fee, would provide documentation that certain shiploads of cattle were moved because of Reynolds involvement. I negotiated the sale of the stockpiled bauxite to GSA based on certain grades plus premiums and penalties. The involved feed grain trades that followed were handled principally by Bernard Jacklin and Irving Roberts.

Continued operation of the high cost Arkansas bauxite mines was essential as those operations provided a base cost for establishing the transfer price of bauxite imported into the United States.

BRITISH GUIANA

In one instance I was trying to make a deal on Guiana bauxite from our mines on the Berbice River close to the Surinam border. That operation was under the direction of W. W. Zeglin in Little Rock, Arkansas who told me that the Guiana operations just couldn't meet the specs. So the opportunity to put several hundred thousand tons in the national stockpile went down the drain. But this disturbed me as I had seen the bauxite from the Mombaka pit and felt sure it would meet specs. But the deposit had just been opened as a new pit and drilling was still going on.

I went to Guiana to observe the drilling and sampling process. It was immediately evident what was wrong. Holes were drilled with a rotary bit through the 30-50 feet of sand overburden before the sampling of the bauxite horizon began. But the holes were not cased down to the bauxite and the bauxite was being badly salted with sand. It was immediately obvious that our bauxite would have met specs had it not been for the technically rotten job of sampling.

The drilling procedure was changed right then and there. Some millions of dollars profit were lost because of a poor job of sampling .

It wasn't long after that event when Zeg retired. Direction of the Kawkwani operation was moved to Richmond and Jack Fuller became the Arkansas Manager. A new manager and other personnel were recruited for Kwakwani.

The original owner/operator of Kwakwani and the Everton drying and loading plant was Allied Chemical. When it decided to unload, Walter was the high bidder. Prior to the bidding a Reynolds engineer had gone to British Guiana to make an assessment of the property. He was full of interesting stories of that period.

To get to Kwakwani, he rented a boat at New Amsterdam and started up river. After a few days he noticed that someone was following them. The third night out the follower walked into their camp with a message for the engineer. He thought that the message sure had to be important for all the trouble taken to deliver it. But when he opened the envelope, he discovered that it was only a reference to an arithmetical error in one of his expense accounts.

There was a pretty good camp at Kwakwani with good staff houses and housing for the workers. There was even an air conditioned guest house. It was welcome as the camp was in the midst of the tropical rain forest where it rained every day. Temperatures seldom got above 90 F but then they seldom got below 80 F. The humidity was usually at 80% or above.

The tropical rain forest was magnificent. Red Howler monkeys, sloth, capybara and other critters inhabited the region and resented our intrusion. A Berbice River trip on one the tugs was full of sights to be remembered. We had a mixed bag of six second hand tugs that moved strings of barges from Kwakwani to Everton 136 miles down river.

The camp was close to the river but the deposits were 6-7 miles south toward the Surinam border. The haul roads were nearly level. There were scrapers for stripping the sand overburden and small shovels for loading the 25 ton Euclids with bauxite. Kwakwani had a washing plant but that was an ineffective operation. We discovered we were better off to take care to mine as clean as possible and ship the bauxite as mined to Everton for drying. Actually the slight difference in specific gravity between sand and bauxite required too much delicate control to be readily done.

The dense rain forest and sameness of everything made it easy to get lost. One geologist roamed for two days within a mile of the Mombaka pit before we found him. Tropical snakes from small ones to the huge boa constrictors were common so he had reason to be concerned.

The barges usually held 300-350 tons but there were a few 400 ton shallow draft barges in the mix. To facilitate loading a canal was dug from the river to a site where trucks could be dumped conveniently into the barges. Digging the canal was some project. Charles E. Bartlett became manager of the operation. Duane Reber was general superintendent and Al Reynoso was chief engineer.

The bauxite was dried in a rotary kiln and placed in a dry storage building that wasn't all that dry. To walk into that structure on the high catwalk was to take a super heated steam bath. Good ventilation helped reduce the awesome humidity.

The same dock used to unload the barges was also used to load the ancient LSTs that moved the bauxite to St. Thomas. There it was off loaded and held for deep draft ocean going vessels for shipment to its final destination. The bauxite was damn near worn out before it ever got there.

Those WWII LSTs were only held together by the accumulations of rust. Before they had all sunk we had some 7200 LWT sea going barges built in Spain. It was planned to use them and a sea going tug to do the future transfer job. To do this the channel from Everton to the sea had to be dug wider and deeper. This channel cut through the long mud bar that extended to the sea. We were fortunate in persuading the US Army Corps of Engineers to dredge the channel deeper.

The trip to Everton with a tug pushing 3-4 barges took about 36 hours. The return to Kwakwani usually required 24 hours. We tried to gauge Kwakwani departures so that the

tides would help when we reached the estuary where Everton was located. Unloading the barges was quite an operation! A dragline located on a pier was used with hand work to push the last of the material into a pile the dragline could handle.

At a Mining Congress equipment show in Salt Lake City the Melroe Bobcat, a small front end loader was on display. It was ideal for cleaning up the barges.

When the Dutch would no longer handle the transfer at St. Thomas the transfer was switched to Trinidad and the Alcoa facilities there under a handling fee arrangement. I think the name of the Alcoa facility was Tronador. It was located on the north coast of the island. In overseeing this spread out operation, I got to see a great deal of that part of the world.

As if it wasn't enough to be plagued with failing equipment and technical errors, the dock at Everton began to sink. It seems we were experiencing the so-called Dutchmen's Fault. The thirty foot greenheart piling that supported the dock were sliding out into the river. There were several thousand feet of unconsolidated layers of mud. An LST was found in Florida and pile drivers, welding machines and steel I beams and H beams of various sizes were gotten together. The objective was to pin together the two portions of mud on both sides of the fault. The 125 ft. long steel piling were driven to refusal

The LST took off for British Guiana and within a week beached at Everton to unload its equipment and manpower to do the job. It was around the clock operation but was successful in fastening the slipping segment under the pier to the more stable underlying beds.

I enjoyed going to Guiana even though it was beset with so many problems. We had to clear off the ancient rain forest made up of a variety of tropical hardwoods in order to mine. Company crews cleared to ancient forest over orebodies to be mined. Contractor floated their log booms down the river to New Amsterdam. Now and then they would lose a log. We would find it when we would ram it with one of the loaded barges to sink the barge and lose its load of bauxite.

The tidal effect would reach all the way to Kawakani. We had to do some dredging to keep the upper reaches of the river sufficiently deep. So we purchased an Ellicott dredge with a cutter head and sufficient pipeline to discharge the sand on shore. It did the job. Looking back, we might have installed a gold recovery system on the discharge. Kwakwani wasn't too far below the fall line where the water fell off the Pacaraima plateau. Only a few miles above Kwakwani there were operators who dredged up the sands and gravel in pools below falls and processed them for gold recovery.

On the plateau there were lots of gold and diamond seekers. Locally they were known as "pork knockers" for their habit of killing the capybara as provender. They were supplied by traders from Georgetown who would fly up above Kaiteur Falls and meet their prospectors. The trading would take place and the prospectors or pork knockers would have supplies to keep on working. It was an active business. On the single flight I made to Kaiteur there were four agents, each going to meet their own group of pork knockers.

Fantastically beautiful, Kaiteur is one of the world's highest waterfalls. Angel Falls not far away in Venezuela is higher but lacks the water volume of Kaiteur. To visit Kaiteur was an inspiring sight. My enchantment with its awesome beauty encouraged me to shoot all the film I had with me, some 5 rolls. It was well worth it to record those memories.

Charlie Bartlett and I flew from Georgetown to Kaiteur in a Canadian Goose. As the Goose approached the falls from below we seemed to be below the rim. The air currents carried us up and above and the pilot landed the amphibian in a big pool above the falls. The flight alone was a thrilling experience.

Georgetown wasn't much of a place. It did boast the world's largest wooden church, however. It was kind of dangerous to walk around town as the local thieves would hit and run and keep on going. Wallets, wrist watches and ladies handbags were the most common prey.

The hotel where most of the foreigners stayed had a pool and the food was palatable. There were many shrimp boat operators there as a new find of shrimp had occurred just off the coast of British Guiana. The coast was an interesting area. Most of it was below sea level for a mile or so inland from the sea. Dikes that stretched forever kept the salt sea out. Where streams came down to the coast gates had been constructed that were open at low tide and then closed against the sea at high tide. I think these were called 'polters.'

Road construction in this area was difficult, mainly because there were no construction materials. Everything was mud! To get something usable, the locals would build big piles of burnable material and cover it with mud. After firing, this "burnt earth" was a slightly better road building material. When we had barge space, we hauled sand to Everton for road construction.

The Aluminum Co. of Canada had a big operation at Ituni where most of the DEMBA mined bauxite was located. It wasn't far from the Demerara River. But Demba wanted to buy some of our high quality bauxite and Irving Roberts and I made a detailed study of how that could be done in 1965.

We designed the mining and shipping systems looking at both rail and truck for transportation. We capitalized the equipment and developed all pertinent operating cost for

mining, calcining etc. It would have been a good thing for Reynolds. It was turned down as Reynolds did not want to spring for the \$9,106,000 capital required. Neither did the four year payout have much appeal.

This was the story on many ideas. I figured we could purchase a large dragline to improve our Arkansas open pit operations. It would have a 2.8 year payout. It took me four years to finally get approval for this machine. I shopped around a good bit to purchase this dragline. Worked with Bucyrus Erie that developed the idea of using aluminum tubing for the mast. I think it was 140' long. It was made of three stringers with two on top and one below. It was all heliarc welded and the tubes were divided into many sections. Each section was gas filled and connected to a monitor in the operators cab. If there was a pressure drop in any section, we would know immediately where to look for the weld failure. As it worked out, we never had a failure.

I set up a contest to name the 16 cubic yard dragline. The prize was air travel to Corpus Christi and a round trip to Jamaica in the owners suite on one of our bauxite carriers. The contest was open to all Reynolds employees. I set up a panel to select the winner which was Deeper Heaper. When it came to make the award everything fizzled. The winner, an employee at the Longview, Washington smelter was recently divorced, didn't feel right about taking a girl friend and settled for money instead. This was alright except the employee wanted payment for the ocean voyage part of the trip at the regular commercial rate for a trip to Jamaica. This wasn't what we had in mind but after considerable dickering, we finally settled on a sum.

We had a big to-do at the dedication of Deeper Heaper and Governor Faubus was there to do the honors.

When Zeglin retired I was assigned to give him a Vacheron & Constantine pocket watch that Richard Reynolds had bought a quantity of with aluminum cases some years before. I had it engraved for the ceremony and presented it to Zeg. It was running at the time.

Within a few day I heard from Zeg that the watch kept erratic time. I had him send the watch to me. It seems that during the years the watches had sat in their boxes so long that the lubricant had congealed. A cleaning and re lubrication set the watch going right. Richard had an obsession that almost anything could be done with aluminum. I thought that aluminum on a watch case would scratch too much and it did.

There was an Oil and Gas division under Walter also so I got much involved in this activity. It was run by a real charmer whose suave manners and personality were probably his major claim to competence. Reynolds had the unfortunate experience of being

successful with its first few drill holes and thought that this was the rule. Gas was found on an offshore lease that would eventually be sent to the Sherwin Plant near Corpus Christi.

Some drilling was done in the Four Corners area with some success and a position was taken in the Anneth field and in western Arkansas with minor successes.

When it came time to pipeline the gas from the offshore platform to the Sherwin plant, the Reynolds brothers insisted on aluminum pipe. A special pipe with thicker walls at each end for heliarc welding was designed. It was welded and then sunk from the laying barge with concrete piers at intervals. It worked well until the shrimp dredges wrapped it up like a bunch of spaghetti. The job was redone by laying the pipe in a trench. As the soil was alkaline anodic protection was provided. Aluminum and alkali do not get along well.

Reynolds had a boat and helicopter contact for servicing the offshore platform and for inspection of the underwater pipeline route. The manager's expense accounts were phenomenal and made me particularly suspicious when every week involved a dinner for four with the same people each week. I got more suspicious when it came to light that our manager was a partner in the companies that provided the boat and helicopter service. Our security people made an onsite inspection of the situation and locked the manager out his office. He resigned and no charges were preferred. But it was an unpleasant experience to deal with such disloyalty.

When Charlie Bartlett became well established in British Guiana we found other things for the engineer on the job to work on. One of these was the Lake deSmet project in Wyoming. There was ample evidence of a large thick coal deposit and there was water, two essential ingredients for the power necessary to operate an aluminum reduction plant. So Reynolds got leases where it could and Walter negotiated long term payment contracts with private owners willing to sell. They were most reasonable deals that allowed the owners to stay on and ranch.

When a huge area had been put together we drilled several holes to find out just what we had. The coal measure consisted on a multiplicity of seams that were interconnected in places. It was a sub bituminous coal but could be used for firing for steam generation and it ran from the surface down to several hundred feet in depth.

Lake deSmet was formed by the runoff water accumulating in the immense cavity caused by an ancient burn. In Wyoming water storage was construed as efficient use. So we had to plan to increase water storage. On a peninsula on the east side of the lake was a fishing resort on lands we now owned. The place was called Seney Point for the two brothers that created the resort. They also owned the pharmacy in nearby Buffalo. Also on the west side of the lake was a community of summer homes. Both developments would be

affected as we raised the water level. Reynolds on-site man took care of these many details. He hired a surveyor from a nearby town and had supply arrangements with several local businesses.

I saw an ad for movies of British Guiana in a sportsman's magazine and got suspicious as the address given was in Little Rock. I had a friend in another town write for information on the films. The advertiser also offered camera equipment and film at reduced prices. It turned out to be the Reynolds engineer. Investigation proved that Reynolds was paying for the film and cameras that were for sale by the Reynolds engineer. He had coerced the contract surveyor to make purchases for him and then charge Reynolds for time and materials.

Walter Rice was traveling abroad so I took the necessary action and accepted the engineers' resignation. Again no charges were preferred. When Walter found out about it he felt sure that there must be a mistake. He had trusted the man implicitly. But there was no controverting the evidence.

HAITI

The St. Croix plateau contained bauxite deposits right on the surface and we mined them with simple equipment - shovels and trucks. There was about a 9 mile haul to our port and dock at Miragoane. It was all down hill and hard on truck brakes.

There was a fine camp built by Reynolds of nice staff homes with aluminum shingle-type roofs. A large swimming pool, as in British Guiana, was the social center of the camp. Jack Ryan, a Mexican national, was the general manager and kept the ball bouncing. When Jack and his wife Bertita went on vacation in 1963, Jack left his number two man Ed Sheets in charge.

When the Ryans came back from vacation, Jack began to write frequently of strange voodoo like activities going on. He said the local houngan was in cahoots with Sheets and they had placed little dolls of Jack and Bertita just outside their bedroom window. The dolls were full of pins and needles. Jack denounced Sheets and fired him out of hand.

Ed Sheets came to Richmond and we heard his side of the story. An investigation was in order and the head of security Jim Reynolds (no relation to the owner family) an ex FBI agent went to Haiti. Jim's study confirmed what we had suspected - Jack Ryan's nerves were out of whack.

So we let Jack Ryan go and replaced him with Al Butterfield, the number two man in Jamaica.

Al was steady as a rock and things were going along smoothly. Our truck fleet was worn out and required replacement. I set up a test with Dart, Cat and Wabco trucks. When all the trials were completed, Cat showed up as the best vehicle for our conditions and Haiti was reflected completely with Cat Units

Walter met a fellow in Puerto Rico that sold him on the idea of growing pineapples on both the mined out lands and the yet to be mined lands on our concession. It was a big deal and was aimed at giving work to the indigenous Haitians as well as make a profit for Reynolds.

Al faithfully nurtured the crop. I bought a book on pineapple growing and marketing. Right off the book said don't try to grow pineapple at elevations over 2500 ft. The St. Croix plateau in ore area was 3000 ft above sea level. But the pineapples grew. When they were ripe the local people had daily feasts on the fruit. We made a trial shipment of a few boxes to Richmond. They were moved by company plane to Port au Prince and then via commercial plane to Richmond .

The case I received was pretty good but most of the case rotted too soon. We thus discovered that one of our major problems would be shipment. The crop wouldn't fit the schedule of our ore carriers and besides we had no chilled lockers in which to store them while in transit. The road to Port au Prince built by the US Marine Corps was in terrible shape - the 60 mile trip usually took three to four hours. Hence, truck shipment was out.

Movement by our small launch wasn't practical either. Soon the pineapple venture died a natural death. That was a blessing!

Our staff was small and had to be compatible. Before hiring anyone, I had the candidate and his wife come to Richmond for interviews. It was possible to sort out many of the potential problems in this way. But now and then I goofed. I hired one young man and moved him and his wife to Haiti. But before long there was trouble afoot.

At the port, while ships were loading with bauxite, there just wasn't a great deal for the ship's crews to do. The Haitians did their bit in alleviating this situation and several bars were opened as well as a red light district. This kept the sailors at the port and provided sufficient entertainment.

But the wife of this newly hired young engineer decided to clean up the port and embarked on a vigorous campaign to shut down the bars and chase the girls away. This resulted in growing numbers of conflicts between the ship's crews and the people in the nearby town of Miragoane.

We had to fire the capable engineer to stop his wife's meddling, but soon things returned to normal.

A major hurricane swept across the southern limb of Haiti and did a lot of damage. It destroyed many of the Haitian's home and ripped the interlocking aluminum shingles off some of the staff houses. It tore part of the roof off the dry storage building in Miragoane. It took the roof of the Miragoane church completely off while many people were inside. Crops were destroyed. I got in touch with the military in Atlanta, Georgia and made arrangement for air delivery of food, tents, fuel and stoves plus medical supplies.

'The Haitians wouldn't eat the canned army rations even though the Americans demonstrated that they were OK. We opened the cans and served the food hot from big pots. The staff ate from these pots and the natives were convinced the food was OK. Bill Cole, manager of Reynolds Jamaica Mines, wanted to help.

His first try was to load the Virginia with supplies. The Virginia was a 24 ft. all aluminum motor boat that Richard Reynolds kept at Ocho Rios for sport fishing. Senior staff were allowed to use it as well. Bill loaded the Virginia with emergency supplies and had it ready for early morning departure for Miragoane. But someone had left the wrong valve open and when the crew arrived at the dock early in the morning they found the near vertical Virginia dangling in deep water at the dock

Then Bill chartered a small vessel and actually unloaded whatever he had in surplus from his stores in Jamaica. Included in this "helpful" shipment were several gross of Here's My Heart Body Lotion, cases of face powder and lip stick as well as several gross of eye shadow. Bill also shipped hundreds of bags of cement that had already gotten wet and set up. I guess everyone has his own ideas as to what is helpful. This stuff was in addition to the spoiled rice and wheat that Bill Cole also shipped from Jamaica.

JAMAICA

Reynold's operations in Jamaica were complex. The company had the inside track as it was first on the scene when the original discovery was made. There was no delay in sending geologist Oscar Schmedeman to Jamaica. Walter quickly negotiated for concessions and set up a tax rate that would give something at least to the Jamaicans. A commitment was made to make the land more fruitful before and after mining.

Lyddford Enterprises was formed to manage the stocking of the lands with cattle, pigs and chickens. Pigs were put on lands where the surface was held by small farmers. They raised the animals under contract until ready for processing at the Lyddford packing plant. Cattle was big business and the herd grew to 14,000. Lyddford was the principal meat supplier in Jamaica. We bought some fine cattle for breeding as well as sperm to upgrade the herds.

When some of the hotels couldn't meet their bills, we got due bills. Thus to realize anything we had to use the due bills of the specific hotel. Bill refused to have a guest house at the mine so any visitor had to stay at Ocho Rios and commute. It was a nuisance and greatly curtailed the work day.

Despite the steep and muddy roads in the karst topography Bill insisted on tractor trailers with bottom dump trailers. They skidded around a lot getting out of the pits, but Bill was firm against the use of heated bodies. Jamaica Mines finally converted to end dump trucks with heated bodies but had to wait until Bill Cole had retired.

The bauxite deposits were scattered around the hills south of the dryers and the camp. The bauxite was hauled to the drying plant for drying in one of the four 9 ft. diameter by 175 ft. kilns. The 2.5 million tons per year of dried and steaming bauxite went over one of the two aerial trams to Ocho Rios at the north coast where it was unloaded into a so-called dry storage building. Upon the arrival of a bauxite carrier, the bauxite was loaded into the vessel with two transporters that moved along the dock from hold to hold to fill the awaiting vessel. A hard look at the dock revealed that it was grossly overloaded. It was OK as originally designed but the heavy transporters had been installed later without thought being given to the load that would be imposed on the dock.

The dock was fixed by major reinforcing including stripping of the surface and installation of welded in Nelson studs and pouring a much heavier reinforced deck. Sipa epoxy was used to make a good bond between the surfaces.

Reynolds owned and operated its own fleet of bauxite and alumina carriers. That operation incorporated as a wholly owned subsidiary was Caribbean Steamship Corporation. Walter Rice was president and Don Wood was the operating vice president. Don lived near the Sherwin Plant in Texas. The top operator was Bill Stevenson, an English sea captain, who was always lots of fun. When he got married he took his bride to Mexico for their honeymoon. They spent their first night at Matamoros across the Rio Grande from Brownsville, Texas.

During the night there was a loud banging on their door. They threw on some clothes and opened the door to a police lieutenant and a few policeman. Skipper explained that they were on their honeymoon and the officer asked to see their wedding license as proof. But it was back in Corpus Christi. They were faced with the option of paying a 1000 peso fine or buying a license to practice prostitution for the bride at 500 pesos. They opted for the lower priced alternative and that license hangs framed in their living room.

Reynolds shipped alumina from Texas to Washington via rail cars lining the box cars with paper to reduce the loss of the flour-like easy flowing alumina. Still the losses were high.

So we decided to go to shipping by sea with the US flag carriers that were mandatory. Bought two surplus T-2 tankers and ordered new mid bodies from Germany. The midbodies had to be in the US before a certain date if we were to avoid paying duty on them. An ocean going tug was arranged for and all was going well. It looked like we would beat the deadline date by several days. But the tug broke down at sea and we really had to get on the phone to find a sea going tug that would pick up the midbodies and complete the tow. The mid bodies entered US waters just hours before the deadline.

Aerial tramway costs in Jamaica were sizable averaging about \$2.10 per ton for the bi-cable and \$2.30 for the monocable. Just too many moving parts. We were planning to expand Jamaica production from about 2,500,000 TPY to 5,000,000 TPY and the idea of another aerial tramway wasn't too appealing. There would be so many wires strung across the north coast of Jamaica that when the wind blew they would play weird music. So we began to look at other ways of doing the job. The plant had nearly been flooded at one time, so the idea of a tunnel had some appeal. We looked at rail in a tunnel, rail on the surface, truck haul, tunnel conveyor, surface conveyor and, of course, another tramway. Each one of these options was the subject of a full scale capital and operating cost study. I hired Bob Temps away from Kennecott's SLC office to help with this effort. Bob did an excellent job.

After detailed evaluation the decision was made to install a covered 42 inch wide belt conveyor moving at 500 fpm. Troughing idlers at 35 degrees were selected. Bauxite came out of the dryers at 200 degrees F, but was down to 140 F by the time it would be placed on the conveyor. So a "Hot" belt was not needed. We projected an operating cost of \$1.00 per ton at a production level of 3,000,000 tons as compared with rail at \$1.26, trucks at \$2.16 and tramline at \$2.29 per ton. All systems except the tramlines could be readily expanded to 5,000,000 tons per year. Bill Cole argued against anything but tramlines.

We took a hard look at a totally different scheme, pumping slurried bauxite. If this could have been done with mill solution back hauled from Texas, it might have come out on top, but when the reflecting of the carriers came in the picture, it was uneconomic.

Link-Belt Company was the winning bidder to install the 6 flights of conveyor using 3,700 horsepower over a total distance of 33,377 ft. The company made a fine installation. Operating costs, the last I heard, were about \$0.65 per ton.

In the course of these studies we looked closely at the bauxite. As mined, the average moisture content was 24%. It came out of the dryers at about 12 % moisture and that

hardly changed at the point where the material was loaded into the dry storage at the port. But when it was loaded on ship, it averaged close to 16% moisture. Some dry storage!

Ventilation in the dry storage building was increased to stop the process of shipping excess water to Texas. When the 6.5-mile overland conveyor was installed we found that the moisture content of the bauxite dropped in transit. Thus a further reduction in shipping costs per dry ton was obtained.

There was always a problem in providing enough things for the staff to do to keep them happy. Over Bill's objections he was told to put in a swimming pool as a further means of providing diversion. Bill finally agreed, but had it built in his own backyard where the staff showed reluctance to use it. Bill converted it to a sunken flower garden.

Bill Cole was a character! He compiled a huge book to prove conclusively that there was nothing new under the sun. I think he believed his own BS. Although the staff houses were less than half a mile from the office, Bill insisted that every one carry a lunch and eat at the office. Then their day was over about 3:30 PM. This made it tough for me to get things done as by the time I had breakfast at a North Coast resort hotel and was taken up to the mine it was 9:30 AM. It was slow business to get things done in Jamaica with such a short working day.

Reynolds had a lot of leases in a valley on the southwest side of the island. But so did Kaiser. With the objective of a joint effort, we began a real assessment of the bauxite resources by mounting a major drilling program .

That operation was a pleasant drive from Ocho Rios through some beautiful countryside. There was an English style inn part way to the site and not far from the Look Behind area. It served typical English meals including kippers for breakfast. A bit further on our route took us by the two-car garage building where Pick-a-Peppa was made and bottled.

This effort resulted in a new alumina plant and port on the southwestern coast operating under the name Alpart.

Walter's able bargaining had originally established a negotiated tax rate on mined bauxite. Through continued negotiations instigated by the Jamaicans, the tax was increased several times. But finally the Jamaican government took action in a very positive way and made a substantial tax increase.

Elmer Pehrson of the US Bureau of Mines visited me in Richmond and tried to persuade me to consider the post of Director of the Bureau. I turned him down as I just did not want to have anything to do with a job that was a political appointment. I did become a member of the National Defense Executive Reserve and have continued to serve to this

day. Also I became the mineral man of the Natural Resources Committee of the National Chamber of Commerce.

MEXICO

At Eagle Pass, Texas, Reynolds had a fluorspar flotation plant to produce acid grade spar used to make cryolite for the aluminum reduction plants. The fluorspar was mined in the state of Coahuila and imported into the US under bond for processing. We owned a number of mines scattered throughout Coahuila.

Most were pretty crude operations some using the ancient *ciguena y burro*, a hand cranked windlass, for hoisting from the shallow shafts. We did bring in some gasoline operated small hoists from time to time. The twin engine Apache was a useful tool for such clandestine imports. The hoists and other items could be hidden in the plane's nose cone and elsewhere. When we did get caught bringing supplies in payment of an adequate mordida usually managed to straighten things out.

The miners lived in crude jacals, mere shelters from the sun and infrequent rains. The prospectors we hired lived under even cruder conditions. More often than not the prospectors were goat herders who covered a lot of ground as they moved their herds from place to place. We would show them samples of fluorspar to give them an idea of what to look for. Now and then one of these goatherders would turn up with a fairly good prospect.

In the aggregate we managed to produce or buy enough fluorspar to keep the mill operating. Bruce Randall did a good job of running the operation. Ernie Ovitz handled the operation and metallurgical problems of the mill.

In Eagle Pass we always seemed to lunch at a Mexican restaurant where, if one failed to ask for a half order, you would get more than you could possibly eat. Meals at the mine were typically Mexican. The fresh home made tortillas were outstanding.

I enjoyed working at Reynolds. I hadn't been there long too until I was promoted to vice-president and the generous Christmas bonuses were further increased. There were problems. Reynolds was sales oriented and didn't want to invest much in raw materials. We had a great opportunity at Gove in Australia but gave it up as Reynolds didn't like the idea of another firm having the casting vote. Other opportunities came and went in part due to Reynolds reluctance to pay much for raw materials.

Actually their thinking was tempered by the negligible amounts paid for their position in Jamaica and Haiti. They felt that raw materials everywhere should be handed out on a silver platter.

The time came when Reynolds, over Walter Rice's objections, planned to hire Bud Uhland and put him in as my superior. I liked Bud but had no respect for his limited engineering capabilities and experience. He was a real charmer and had a great impact on David Reynolds, his prime sponsor. I wasn't about to stay on and work hard just to make Bud look good. Instead of sticking it out with a comfortable salary, I resigned.

I thought long and hard before taking this action. I liked Richmond and we had a fine home in a good location and many friends. We especially enjoyed the James River and its tributaries. There was a group of us that fished together often, Jim Smith who was my canoe partner, Hank Dial, Al Miller, Walton Vaughn and several others.

We took some wonderful two and three day trips. We frequently fished the Shenandoah. In those days there were no public boat ramps. But Hank got all over the State in his job of selling bottles, caps and other containers. He made arrangements with various farmers along the Shenandoah so that we could put in our canoes, camp and takeout.

There were but few other canoes seen in those days. Mostly we had the river to ourselves and had some fine fishing and camping fun. One evening, along the Rivanna, we decided to try some farmer's young field corn. It wasn't bad and the cobs were so soft we dubbed it 'self-wiping' corn. Some times we got caught in some real frog strangler downpours, but we took it all in stride. Where we camped we always had to clear a spot big enough. It was a hard and fast rule that we would leave no trash and we often picked up some we found. But generally the rivers were clean as they were mostly untraveled.

One stormy night camped on an island in the James River, we tied up our canoes, pitched tents, ate steak and slept without a drop of rain falling on us. But it had rained someplace and in the morning we found our canoes just about to pull free and go downstream without us. We never left them in the water again.

I caught a citation small mouth bass on the James on May 30th, 1964. It weighed 5 Lb. 3 oz. We were sliding down a riffle as I was casting with a 6" Rapala. I felt that I had snagged and yelled out to Jim in the bow. But then that "snag" took to the air and the fight was on. I was using 4 lb. test line so the real credit for landing that trophy bass goes to Jim for his skillful maneuvering of the canoe.

Oftentimes on a summer evening we would ride out to Billy Reynolds farm on the James west of town and fish from there. It was deep water with many huge boulders-excellent bass water and we caught many nice bass and lots of blue gills.

LIBERIA

I began to look around and found that there were many opportunities. Kennecott offered me the Chief Mining Engineer post in its Utah operations. We traveled to Liberia and then on to Stockholm in connection with the resident manager's post at Liberian American Company's iron mining and processing operations in the Nimba Mts and at the port in Buchanan.

Happy and I left New York on October 19th for Dakar and then on to Roberts Field in Monrovia. We flew from Monrovia to Nimba in a single engine plane that looked rather sad. I sat in the co-pilots seat and noticed that the door was held shut with a rubber band. The black pilot noted my unease and said that even though the aircraft looked sort of run down, it was in good shape for flying. He said he came from West Virginia and enjoyed working in Liberia. We flew for an hour or so over the jungle, with an occasional village showing up.

We met with lots of folks at Nimba who had a direct or indirect interest in whom might be the next resident manager. Trygve Angel of Grangesborg, Mr. & Mrs. Noreen, Chairman Boliden, Olle Wijkstrom, John Barner 1st National City Bank. We had dinner at the Lowes, the then resident manager along with Ambassador and Mrs. Ben Brown from the USA and Ambassador and Mrs. Ripas from Sweden.

We spent a few days at the mine. There were many interesting aspects of the job. It paid very well and there was a long vacation period each year. When we had dinner with the resident manager we were shown around the house that we would occupy. It had a huge storage room off the kitchen for food stuffs. For every meal, Mrs. Lowe would actually take what was needed from the storeroom and issue it to the cook. She said this was necessary as otherwise everything would grow legs. There were never any leftovers.

Dinner was interrupted by the need for Mr. Lowe to make a decision over two natives who had been slicing each other with their ever handy knives. It seems that they were respectively the cook and gardener for a French couple. The servants took turns with the lady of the house and the argument arose over whose turn it was to provide the service. I had already generated serious doubts about working in Liberia and that event added to our concerns.

There was a passenger car called an autobus that was now and then hooked on to an ore train headed for Buchanan on the coast. The plant facilities there included a pelletizing plant and the docks for outloading. The dedicated track ran through jungle for its entire route. We saw pygmy elephants and men and women washing stream gravel for gold and diamonds. The air conditioned passenger car was well equipped and included a bar with drinks of all kind.

We flew back to Monrovia and stayed at the Hotel Ducor. We visited with Joe and Ginger Schumacher. Joe had been personnel manager at GJOO and married Ginger who was the widow of the GJOO construction manager.

From Monrovia we flew to Abidjan via Swiss Air and then over Timbuktu and on to Stockholm where we occupied a lovely suite in the Grand Hotel.

Met with Granges top people including Erik Lionhead, Ake Hagstrom, Marc Wallenberg and Trygve Angel. They had as yet, not committed themselves to hiring me nor had I committed to work for them.

We left Stockholm for Copenhagen and the Royal Hotel. We went shopping on the Stroeget, had fun at the Tivoli and dined at some interesting Danish bars. We were back in New York on October 25th. On October 27th LAMCO made the offer of the job as resident manager at Nimba. Now for a look at Peru so we could make a decision.

PERU

On November 1st we were visiting Toquepala. I thought long and hard about the three job offers. What appealed to me most was the job of President and General Manager at Southern Peru Copper Company near Tacna and Moquegua in southern Peru. It was a tough task to evaluate these three posts and to reach a decision, but we put everything behind us and moved to Peru where I was to succeed Frank Archibald. He was moving to New York as CEO.

So Happy and I moved to Toquepala in January 1967. At first we lived in one of the regular staff houses. Within a few months the Archibalds left and we moved into the house of the general manager overlooking a large part of the camp from a ridge top. It was but a short walk to the office but I usually took the car. I was certain to need it later to get to the mine, the mill or somewhere.

This was a big operation! About 1950, Juan Oviedo stumbled across a copper outcrop in the vicinity of some old Spanish workings and got a concession from the Peruvian government. H.A. Kursell was then representing ASARCO in Peru. After considerable hassling and negotiation Cerro de Pasco with 16%, Phelps Dodge with 16%, Newmont with 12.5% and ASARCO with 57.75% got together and decided to combine their efforts to make a mine out of Toquepala.

It's been amply documented how the job was done. Edward McL. Tittman had done an excellent job of building the entire operation from scratch. When we got to Peru Toquepala was a well run operation involving a minesite town and a smelter town for a total of 3,800 employees who, together with their families, totaled some 15,000 people.

There were all the attendant problems of operating the two towns, with supermarkets, hospitals, churches and even a jail. The smelter produced about 120,000 tons of copper anodes per year. Located on the western flank of the Andean Cordillera, Toquepala was in an area of frequent earthquakes. In an unusually well coordinated effort, the start of major stripping and construction began in January 1956 and production started about January 1960.

Toquepala had a fine camp with an expatriate population of about 400. Well stocked supermarkets went far toward keeping folks reasonably content. There was a golf course with the most expensive golf carts - pickup trucks. There was a club house for frequent parties and a bowling alley and swimming pool. A theater with rotten acoustics provided more entertainment. The sound was improved by hanging plywood tetrahedrons to break up the reverberations.

Trout fishing was great! Each expatriate had either a passenger car or pickup with no limitation on use. There were lots of places one could go and explore. A trip we liked was to head on up above the mine and take the road to Quellaveco, the site of another deep canyon and another copper deposit. One dropped about 3,000 feet down to the Asana River at Quellaveco and then you had to climb out on a zig zag road about 3500 ft. to head for Cuajone.

The streams at the bottom of some of these canyons provided excellent trout fishing with catches up to 16 inches and three and four pounds. The Asana at Quebrada Quellaveco and the Torata north of the Cuajone camp were fun trout streams.

A crew housed at Cuajone was drilling out the Cuajone deposit and had a camp there to house the development crews. Cerro de Pasco had put down 40 diamond drill holes between 1942 and 1945. When they assayed the samples they made no distinction between copper occurring as sulfides and copper occurring as oxides. The core samples were no longer available so there was no choice but to redrill the deposit.

The Cuajone crew put down 83 diamond drill holes finishing the work in 1966. That work confirmed Cerro's results on total copper content and pinned down the recoverable copper as well. The entire project was based on those drill hole results. Using a 0.45%Cu cutoff, a 15 meter bench height, a volume-weight factor of 2.56 metric tons per cubic meter, resulted in a sulfide tonnage of 430,000.000 metric tons with an average grade of 0.99 % Cu.

Peru's government had some odd requirements. One was that a mill had to be built to process one thirtieth of the ore body per year. When it was determined that our drilling had indicated more than a billion tons, drilling was halted promptly and the excessive holes

and drill sites concealed so that the company would not have to build a mine mill smelter combination that would greatly exceed our financial capabilities. Facilities were designed to 40,000 short tons per day.

The decision to open Cuajone was based, in part, on the unusual problems associated with the Quellaveco orebody. Quellaveco lay at the bottom of the deep Quebrada where the Rio Asana bisected the ground directly over the ore body. Most of the time the Asana was a tumbling stream that you could jump across in the morning before the sun melt snows of the Andes increased its flow by several times in the late afternoon. Freezing in the high country each night, the flow was diminished in the mornings. There was a small bridge across the Asana. When the Nino changed its course there would be torrential downpours that would swell the Asana tremendously.

In looking at Cuajone and the subsequent need to develop Quellaveco, a number of significant decisions had to be made. The waters of the Asana and Torata were the lifeblood of Moquegua. To maintain the Asana flow and still permit mining of the Quellaveco orebody would require a huge diversion tunnel and an upstream dam that could handle the periodic floods and divert them to the tunnel. The steep canyon walls precluded the possibility of Open Pit mining. The deposit would have to be mined underground by block caving unless someone came along with a better idea.

The Quellaveco Quebrada offered no place for a campsite nor shops and mill. When selecting the campsite at Cuajone and the Botiflaca millsite, provision was made for the future housing and milling needs to process Quellaveco ore. Milling Quellaveco ore at Botiflaca also solved the problem of concentrate transport to the smelter. The concentrates of the Botiflaca mill would go through the tunnels and on to Ilo over the Toquepala track. Similarly, the tailings from Botiflaca would move by pipeline through the tunnels to Quebrada Simarrona near Toquepala and would then flow into the sea.

Accordingly, a large substantial bridge was constructed across the Asana. When Ed McL.Tittman, then president of Asarco saw this bridge he inquired why it was so high and long above such a tiny stream. I showed him some pictures of the Asana in flood and that ended the discussion.

An adequate road to handle both truck and rail traffic out of the Quebrada Quellaveco to the Botiflaca millsite was needed. Asarco engineering in New York came up with the idea of a huge jumbo and many drills to breast the rock face for the 100' wide new road. We thought we had a better idea and finally convinced New York. The largest shovel obtainable that would operate on diesel and that could later be converted to electric's was purchased. Also, we purchased the first Cuajone drill that had the same capability.

A contract was negotiated with Antonio Biondi to drive a pioneer road above the layout for the Quellaveco-Botiflaca road. From the pioneer road we drilled 9" blast holes and blew most of the rock into the quebrada and shoveled off the balance. The roadway was smoothed out using a number of Ingersoll-Rand Trac-Drills. The process worked fine and we had a wide road to use that both shortened travel to Cuajone and eliminated use of the many switch backs on the old road out of the quebrada.

Subsequently, all this effort seemed in vain. The Peruvian Government, oblivious to economics and world copper markets, passed a law limiting the time one could hold a concession without production. This law was made retroactive and Southern Peru lost Quellaveco.

Leaving the Cuajone area en route to Moquegua one passed Cerro Baul, a steep sided mesa that once had a village on its flat top. A narrow and easily defended trail went from the canyon bottom to the summit. There was ample evidence that, at one time, the region was blessed by far more rains than what we had in the 20th century. There were old canals and many andenes or terraces that were once cultivated. But with the drying up of the water supply, the entire region became almost uninhabited.

Proceeding on west one came to the lovely old city of Moquegua. On the road from Moquegua to the coast the road traversed some windswept plains. Horseshoe shaped sand dunes marched across the road sometimes blocking it for days.

Frequently on such trips herds of thirty or forty Vicuna would be observed. Llama trains were common and so were herds of Alpaca. There was evidence everywhere that the land had once had more population. Above the mine at Toquepala the road passed up the small valley with many old stone houses at Candarave now used by a few herders. The story goes that there were once two villages on the narrow stream and they were continuously fighting over water rights.

Finally the upstream village decided to take some action. They held out the olive branch to their neighbors and invited them to come and have a pachamanka with them. They celebrated far into the night, but before the night was over, the hosts fell on their besotted guests and wiped them all out. That is one way to settle a dispute.

We put on a pachamanka for the entire camp to celebrate Peruvian independence day. It was held on the playing fields at the mine/mill town site. Jose Ramallo, one time pastry cook at the Waldorf Astoria in New York City, was in charge of all the company cafeterias and restaurants. Joe and his crew worked for days to get ready for the pachamanka. Huge chunks of beef were placed in brand new galvanized garbage cans and soaked in wine.

Hundreds of cases of beer were hauled to the soccer field. Choclo, corn on the cob, was assembled in huge quantities.

The Quechua Indians of the high country have an interesting tribal trait. Often experiencing a real shortage of food, when they do have food they keep on eating till it's all gone. Everything there was to eat or drink at the pachamanka vanished! In totting up the outcome Joe Ramallo told me that each pachamanka guest consumed a kilo of meat, 8 choclo and fourteen bottles of beer. What a party!

One of the features of the pachamanka was the group of Puno dancers brought in from the shores of Lake Titicaca. Their costumes were bright and colorful and they were agile dancers. Frank Archibald and I were required to initiate the dancing. Our partners were about four and half feet high. So we danced at 11,000 ft. and gasped for breath.

The two supermarkets the company operated were located at the smelter town site near Ilo and at the staff camp at Toquepala. It was particularly interesting to be in the store when some Quechua Indians new to the camp wandered in.. They obviously thought this was a grand establishment and kindly too. Frequently they proceeded to open cans and jars and boxes of crackers and have a picnic in the aisle.

Pipe tobacco was a scarce item and the supermarket supply often vanished before I could get any. There were no restrictions on who could buy at the stores and many items were soon sold out to reappear for sale in Tacna at much higher prices.

The store cashiers were kind of a problem too. When a friend came by with a laden shopping cart, I think the cashiers only rang up every other item.

There came a period when Peru, in order to preserve foreign exchange, prohibited the importation of many food items. This embargo included peanut butter. And how can you keep gringo kids happy without peanut butter? So an expert was brought in and set up a manufacturer in Arequipa. He did well for a while almost duplicating US style peanut butter. But soon he began to reduce quality. The jars leaked and the contents resembled cement more than peanut butter. We had similar experiences in attempting to encourage Peruvians to produce other gringo style food products.

When it came to ham, bacon and sausage we got lucky, a German refugee in Arequipa made quality products and kept on doing so.

Southern Peru Copper was allowed the duty free importation of things used in and for operations including mining machinery, milling equipment, blasting supplies, trucks , automobiles and parts

When the time came to reflect automobiles, this caused some interesting problems. We had been importing Chevrolets and had accumulated a considerable stock of parts. We

reflected with Fords that were assembled in Peru. Rather than pay duty on the no longer useful Chevy parts, they were thrown into one of the waste dumps even though the nation was short of parts. But if we had paid duty on the parts, as required if the parts were not used at the mine, and resold them we would have lost a bunch of money.

The executive committee kept close watch over the number of vehicles purchased. Once, when we urgently needed another pickup, one was assembled out of parts stock. At a time when a pickup could be imported for \$6,000, this assembled unit used \$16,000 worth of parts and that didn't include the labor of building that pickup.

The town site was a source of many problems! At Toquepala there were some 745 single men and 1,456 married for a total worker population of 2,211. Campsite design was based on an average family size of six persons but that was a bad job of estimating. In addition to averaging more than four children per household, the worker often invited other members of his family or even friends to come and live with him. This not only crowded the apartment, it made for the use of substantial more electric power, water and waste disposal than we had figured on.

Food brought in was subsidized and the larger than estimated population consumed more food than was figured on, increasing costs significantly. Likewise with the hospital. There was a total of nearly 1500 apartments and more were being built. Water supply and waste systems were strained and had to be enlarged. Perhaps this situation could have been anticipated as Toquepala was an island of economic well being in a sea of poverty. Everyone who could get there wanted on the island. So building new facilities continued.

The Quechua Indians were good workers and good machine operators. They had more money than they ever had seen before in their lives and they spent it on food, drink, radios, cars and whatever. They got fat! When the Peruvian government Health and Welfare Department looked us over we were cited for having an occupational disease - obesity.

Competitions were fostered of various kinds to provide some entertainment for the workers. Awards were given for various achievements. Mother of the Year award went to the woman with the most children. One year the winner had fourteen children! Now that's entertainment!

Children also became an issue in wage negotiations. Many obreros felt that a worker should get more money in direct proportion to family size, regardless of the job. During one wage negotiation I was visited by a woman's organization with some 40 representatives. I agreed to meeting with 16 of them as my office wouldn't hold any more.

The issue of pay according to family size came up. I asked why they had so many children and the answer was, "When my husband comes home from the mine and has a few beers, what else is there to do?" We all had a good laugh over that and then the ladies began to brag on the number of kids each had.

The home we occupied was spacious to say the least. The living room was 24' X 32' and had a fireplace big enough to roast a whole llama. The master bedroom was 18' X 24' and the other rooms were proportionate. We could have a sit down dinner for 32 and if we had an outside buffet, we could handle 150. We soon learned that when we had many Peruvian guests, as we most often did, that whatever there was in the way of food and drink would vanish.

Two Quechua girls from the high country kept our house in order and prepared meals. They did an excellent job and we became quite attached to them as individuals. Jose, the gardener, kept the grounds and garden in order. Once I brought him some stateside seed, but he preferred the local varieties. And with good reason as the Peruvian corn or Choclo is much larger and tastier than ours.

There was a fine organization headed first by Elmer Haug and later by W. L. Parks, General Superintendent. Orlando Jimenez, a most capable young man of mixed Peruvian Japanese origins, served as secretary. Les Kitch ran the mine, Mark Campbell, the mill and Bill Machie in Ilo ran the smelter. Shorty Josephson was mechanical super and Leonard de Jong ran the metallurgical development. Victor Barua was geologist along with Frank Stephenson, a Boliviano.

The support groups were vital also to the great success of Toquepala. Art Beers was assistant comptroller with our comptroller Orville Wright located in New York. Ken Johnson was in charge of engineering, Charlie Keyes headed Industrial Relations. J.O. Smith ran the school system, Tom Findley the town sites. Oscar Kieffer as chief surgeon ran the hospitals, Jack Porter was in charge of aviation. Rod Hunt was chief engineer for the Cuajone Project that was soon to become a major copper producer.

Most of the Peruvian fincas produced Pisco, a potent grape brandy. Pisco sour was the cocktail drink of choice at most parties and other events. I was partial to Pisco and was soon inundated with garrafons (about a 4 gallon container) of all shapes and sizes. It was welcome.

Antonio Biondi was one of the Peruvian prime contractors upon whom we relied for all sorts of tasks that were of limited duration. This type of arrangement avoided putting men on the payroll and then confronting the almost impossible task of laying them off. Tony

had a fine finca in the Moquegua valley and produced excellent pisco. He held a party now and then and whenever possible I attended.

One day, en route to Moquegua and a Biondi Jarana, we flew by some gargantuan figures of two llamas laid out with stones on a mountainside. We saw another huge figure of a crouching lion. This I had to see again and get some pictures. We flew what we thought was the route on which we saw those figures but never again could we find them. They were reminiscent of the Nazca lines.

On a number of occasions there was the opportunity to fly to Cuzco in the Helio Courier and to go on and visit Machu Pichu. That place of mystery was ever enchanting. When daughter Karen and her husband Ron visited Peru, we took them to Machu Pichu. We were in Arequipa frequently for one reason or another. I was named an honorary citizen of Tacna and presented with a fine gold medal to commemorate the event.

Travel to Lima via the Grand Commander could get exciting. Just before I moved there an Aero Commander was lost on New Years Day when the pilot took off solo for Lima after a long celebration. The plane was headed for Lima but never arrived. Speculation was rife, but the most logical scenario seemed to be that he set the auto pilot, flew until out of gas and crashed in the Pacific. We made many flights along the coast and coast range looking for the wreck. There were even some with the idea that the pilot had gone to Brazil with the plane.

The lost Aero Commander was replaced with a Grand Commander, that is an Aero with a built in outhouse. We took off for Lima with a pilot and copilot. No more auto pilots! There was a funny smell once and we quickly noticed that the dry coffee pot had fired the shelf it sat on. We made a quick return to Ilo. Another time, departing Lima, we noticed that the gas tanks were near dry. Another quick return!

Altogether too much time was being spent in flying back and forth to Lima at 3.5 hours each way. Our profit level was high, too much so as proved later. I decided to look into getting a Jet Commander to reduce flying time. I had to look at one first, so Happy and I flew to Los Angeles, where we picked up daughter-in-law Jerry Wimpfen and then flew in a Jet Commander to Kamloops, British Columbia. Then we switched to a small plane and flew to lake Hoopetatkwo that was only accessible by air. It had a fine lodge and good accommodations and food. It was late in the season and there was only one other guest, the lovely actress Rhonda Fleming. She fitted in well with our group and the fishing was outstanding. Duke and Fran Effinger and Jim Clark, the Commander representatives, took real good care of us.

When three bears attempted to wipe out our accumulated trout catches, they were eliminated. We flew into another lake in Greys Provincial Park. There we liberated a row boat and went up to some icy springs that fed the stream that flowed into the lake. Those were the scrappiest trout I ever encountered.

The Jet Commander was purchased from Duke Effinger. It made the otherwise tedious trip to Lima a real pleasure. The Peruvian coast and sights of the Andes were always interesting as were the Nazca lines. I came to know various peaks and ranges as old friends. But after a few times, I got used to the scenery and attended to my paper work.

Although Pisco in Pisco sours was the cocktail of choice, Peru boasted many fine wines and excellent beer. There were many varieties including Aquequipena and Cuzquena. I usually managed to have a few cases of these around the house. On Sunday afternoons the local brass band would usually gather on the point in front of the house. I would always break out a jug of Pisco with cold beer chasers to reward them for their efforts. They wore uniforms and played fairly well.

Sunday was the day of the Feria Dominical up at the mine town site. You could purchase most anything there from sewing machines to ammo for Russian made automatic weapons. One of the ever present features of the Feria Dominical was the Indian drugstore. There would be a superannuated Quechua lady squatting in her pailleras surrounded by many little paper bags. The top of each bag would be folded down to reveal their contents. None of the bags was labeled. But if you described your symptoms, you would get a prescription from one bag or another.

Cuye, guinea pigs, were always for sale. They were a basic item in the Indian diet and many of our obreros raised them in their apartments to supplement their larder. Dried llama strips, was also available. This ancient method of meat preservation comes down to us as jerky.

The cavernous dimensions of the mill building were illuminated by high-power bulbs mounted in huge reflectors. Once, in reviewing mill accounts I noticed an item for replacing reflectors. A few months later there was that item again. I couldn't figure that out. Reflectors don't wear out. I finally figured out what was going on. One day at the Feria Dominical, I saw huge enameled bowls for sale with a round plain steel patch welded in the bottom.—the recycled reflectors.

The mill used a lot of water, 266 gallons per ton milled. There were three 325' diameter tailings thickeners to reclaim water. Reclaimed water was pumped back to the mill at the rate of about 15,000 gpm. Five 5000 gpm pumps were in use but somehow or other the return rate kept dropping. Finally it was discovered that the 260' long 48" return line

was becoming coated with so many solids as to reduce its effective diameter to about 18." Various means were examined to fix the situation without a shutdown and a loss of production of close to \$500,000 per day. The solution was to build and install a new pipe line at a cost of about \$180,000. It was a crash program.

As near as could be figured some \$20,000- \$25,000 per year in hand tools and small parts were stolen. Periodic raids on the single men's dorms were conducted to look for SPCC tools. News of the planned raids leaked in advance and all sorts of stuff could be found thrown out the dorm windows. Once there was a radiator and a fender in addition to all kinds of hammers, axes and a variety of tools. Cars going in and out the several gates were inspected, but the theft kept on. But the amount was not high enough to warrant additional controls. Electric engravers were used to mark wrenches, pliers etc. Still, from time to time, SPCC marked items would be for sale in stores in Tacna and Moquegua. I came across SPCC marked wheelbarrows for sale. The thieves were ingenious!

The main mining tools were the thirteen P&H 1800's that could handle 9 cu. yds. in their huge buckets. But there were problems with the fixed and rotating tables as they were cracking up. After much study and conferences with P&H engineers it was decided to rebuild the shovels one at a time. One key to this rebuild was a surplus huge horizontal lathe purchased from the US Navy. They used it to make the monster propellers that drove battleships and carriers. Modification of the rotating and fixed tables of the shovels added about 25 tons of steel to each of the weldments. Then the fixed and rotating tables were machined down with our new lathe. The "fix" worked and all thirteen shovels were rebuilt for about \$200,000 each.

There was a church in camp, a Mormon church built with materials furnished by the company. The Mormon group that started Toquepala had been sizeable but was down to just three families. The camp needed a non denominational church that could serve double duty as a community center. The Mormons refused to sell. Finally some high officials of the Mormon Church came down from Salt Lake City. It was finally possible to get the church in Toquepala by agreeing to build them a new church in Tacna.

The two hospitals always had their share and more of problems. Patients would roll up their bed clothes and open one of the doors at the end of each hallway and throw the bundle to a confederate. Later they would claim someone had robbed them. Then the sheets were dyed to the ugliest color of variegated green and theft declined. Panic type doors were also installed at the hallway ends and that may have helped. Those doors would let a person out, but then there was no getting back in.

Medicines were a headache. Doctors would prescribe and give the patient a supply of the medicine. Then the patient would sell his supply at the Feria Dominical or in Tacna and claim theft. A system was devised where by each prescription was kept in readily available small drawers and issued daily to the patient.

The population at Ilo and Toquepala was growing. Something had to be found for the new generation of young men to do as the company operations could not employ them all. A building in Tacna was acquired through the good offices of Don Jorge Odriazola, our local agent. There were company agents in Moquegua and Arequipa as well. Facilities were set up to manufacture the kind of furniture used in the company and some 30 young men from the mine were employed. This worked well for a while but came to an end when the regular Peruvian suppliers found out what was going on and pulled their ropes to stop us.

Farms near Moquega were purchased to employ many young men in growing food stuffs for the company supermarkets. This also worked for a while till the government stopped us on some pretext. Part of the deal was that the government would buy our lands. It issued a special series of bonds for this purpose. The bonds received for the land were handsome - and worthless!

Records were kept on the doctors and disclosed that there was wide variation in their prescribing practices. Some averaged about \$5 per patient call and others were more than twice that. There was nothing we could do about that.

A computer was installed an IBM 360 I think. It was first used to control the \$18,000,000 of materials and supplies issued at the warehouse annually. It would automatically reorder when the supply of any item fell to less than a nine months supply. Nine months was the gestation period for filling an order from the US. Most of the time was spent in the Aduana in Callao.

Next the payroll was computerized. A strike was imminent when there was a breakdown. But the data were flown to Lima where a leased machine did the job.

There were frequent trips to New York for Executive Committee meetings. I often occupied a suite at the Hotel Barclay just south of the Waldorf Astoria. Flying into Kennedy airport, Orville Wright always had arrangements made to hustle me through customs into a waiting Carey sedan.

It seemed like Toquepala was always having a strike or just getting over one. The wages lost were never made up by the increase in wages gained. At that time the Peruvian Sole was worth \$0.0235 US. When a strike occurred the Guardia Civil would be called in to protect life and property. After the strike was over it was customary to reward the troops

with cash grants. The Guardia troopers usually received about 1,000 soles and the noncoms and officer more. I would give out the larger sums in my office with the money discreetly enveloped.

After one strike I tendered an envelope with 25,000 soles, about \$ 587.50 to Colonel Humberto Flores who had been in command during the three weeks of strike. He was greatly offended and told me so. I was really surprised. Always before there had never been a question. I wondered whether I had given him too little. I finally decided that Col. Flores was genuine. So I took the Helio Courier and flew to Tacna and went to Col. Flores home together with Roman Mostacero, our head of security. I explained my position to Humberto and he understood. Thereafter we became good friends and Humberto and his wife were our frequent guests.

The railroad track to Ilo on the coast was deteriorating. It seems that there was not adequate inspection when the rail was being laid. It had been placed on beach gravel and walked all over when a train came by. Long slivers of steel were slicing off the rail. Looking into what it would take to correct the error including equipment to remove the gravel and to place crushed slag into place resulted in a total of more than \$400,000.

Along with other budget items, the railroad repair was presented to the Executive Committee made up of Ed McL.Tittman of Asarco, Bob Koenig of Cerro de Pasco, Bob Page of Phelps Dodge, Plato Malozemoff of Newmont and me.

About half an hour was spent on the subject of an attached toilet at the Ilo hangar. Using a sand hill wasn't always convenient especially when we had women passengers. The toilet was finally approved but the railroad project was turned down. I was the only one for it. After all the track was in use only 5 or 6 years and just couldn't be worn out.

I went back to Peru with a Panama stopover. When I saw the Minox camera on sale there I had an idea and purchased two of them. The morning after I got back to Toquepala I took a locomotive and started out for Ilo. At every point where there was rail damage or evidence of shifting track I took pictures - lots of them. I had seven copies made of a photo album and attached it to a resubmission of the rail renovation project. It was approved without any discussion.

Earthquakes were more common than rains in the Toquepala area. But our buildings were constructed on solid rock and there was seldom any damage. There was a Tsunami at Ilo caused by some distant major quake. It was accompanied by heavy rains that caused mud slides and covered parts of the rail line between Ilo and the smelter. The huge wave destroyed the rock jetty that protected the intake to the Aquachem. A better way was needed for getting the sea water into the desalinization plant. A shallow shaft was sunk

near the shore and drove out under the sea. Then a raise was driven to the ocean floor - with great care. This served well as the water intake.

The rains were so bad at Toquepala when the Nino got off course that the office roof leaked and destroyed some records and office machines. Tar alone wouldn't do the job so the roof was rebuilt using some ultralite material to construct a slope for runoff. A gutter was installed on the 75 or 80 ft. long porch at the front of our house. The installers nailed it in place absolutely level.

Negotiations with the Peruvian government for Cuajone and many other reasons took me to Lima frequently. I spent about one fourth of my time there and kept a suite in the Gran Hotel Bolivar. It had a closet bar that was well stocked. As the head of the company that was the largest employer and largest taxpayer in the country, I was accorded every courtesy.

The flight to and from Lima was never boring. Peru is spectacularly beautiful and following its coast line offers outstanding views of the Andes. After one passes the island called Ballena, or whale, the flight usually goes across land to pass over the Nazca lines. These long straight lines across the desert continue to be an enigma. How could those figures have been constructed without the benefit of sophisticated surveys and a view from above?

Now and then there was a stop at San Nicolas to visit friends working at the Marcona iron mines. Marcona had a steep downhill conveyor that generated much electric power for the operations.

Further south there was the parade of giant volcanic peaks, literally the backbone of the Andes: Coruna, Ampato and Chachani to name but a few. The flight also passed nearby many of the fertile valleys of Peru including Pisco, Chaparro and Camana. The Rio Camana further upstream bears different names including Colca where it cuts through the Andes in the world's deepest canyon.

Lima office hours were different from those at the mine. At Toquepala I worked from 7 AM till noon. An hour off for lunch and a brief siesta and then back to work till 5 or 6 PM. In Lima the office didn't open until 9 AM. Work stopped for lunch at noon and then resumed at 3 PM to work until about 8 PM. Dinner invitations were usually scheduled for 9:30 PM. It sure was a different world!

The Club National in Lima invited me to join as its sole gringo member. I accepted and enjoyed it greatly. The luncheon menu was excellent and I particularly enjoyed the conchitas al orno - baked scallops with parmesan cheese. After lunch one could go to the hotel Crillon and enjoy a sauna, massage and nap. Then back to work refreshed.

Lima offered many diversions with its bull ring, theater, museums and fine places to eat. These included the Pavillon, Trece Monedas, El Dorado and the Aquarium in Miraflores.

But I was always glad to get back to the mine. For the trip from Ilo to the mine there was a Helio Courier - all wing and engine. It could, with its turbo equipped engine, fly at 24,000'. Oxygen was mandatory at altitudes of 10,000' or more.

The Toquepala strip was in the canyon below the camp and at an altitude of 9,000'. It was close to the Club Incapuquio (Inca Springs) where the golf course lay. The Helio Courier when coming in for a landing had to fly over a transverse ridge and then make a turn and drop sharply to land on the up-sloping runway. The takeoff was equally perilous and several planes were lost there on takeoff or landing. But there was no other choice for a landing strip.

The hospital was close to the mine town site and the staff were denied access whenever there was a strike which was all too frequent. Operating the mine mill and smelter was pretty routine but the strikes and dealing with government were a real source of headaches.

During a strike, there just wasn't much to manage. I spent lots of time at the office, planning and conniving on how the strike might be settled. Then too, I read quite a bit. I picked up an annual American Petroleum Institute report once and noted to my amazement that primary, secondary and tertiary production from United States oil fields only averaged about 33-35%. That meant that about two-thirds of our original petroleum resource still remained in the ground. I found out that the US Bureau of Mines in 1932 had made a study aimed at recovering petroleum by oil mining and sent for a copy.

I came up with the weird idea that if we could breed critters, maybe we should consider breeding people. We could improve the general health in that way and also increase resources by breeding people that were shorter and would consume less. Such a venture would double the capacity of our roads. Smaller automobiles and buildings would be used. Food supplies would be vastly improved. An interesting concept!

The company was ever being prevailed upon to do something out of the ordinary. Nearby towns wanted to borrow equipment plus operators for street building or wanted motors rewound or a new pump or whatever. The alcalde of Tacna was given a bedroom suite that he badly needed. When he was replaced with a new alcalde, the furniture vanished with the expolitico and another bedroom suite for the new alcalde had to be provided.

When the Peruvian navy needed drinking water, Southern Peru Copper supplied it. The wells on the Ilo river had been running dry, so an Aqua Chem unit was installed near the smelter. It put out 720,000 gallons of sweet water per day or 500 gpm. The installation cost \$2,500,000 and the water produced wasn't cheap.

There were frequent visits by army generals and it was customary to put on a grand party for them whenever they visited. When they wanted small cannon for firing long fishing lines, our shops built them. When the generals wanted their party in Moquega, we went along. The generals set up everything they wanted to have and didn't spare the horses a bit. The food and drink were lavish. The Toquepala senior staff were guests. Shortly after the company received the bill for the event.

When a change in command occurred and a tank division was sent to the border with Chile, there were a number of visitations and the usual long liquid lunches at the guest house. When the General asked us to convert part of our shop facilities to the manufacture of tank parts, I refused as their requirements were so high that we would not have been able to continue operating the mine and mill. I explained this in great detail with all the pertinent numbers, but I felt that the general did not believe a word I said.

Dealing with the government was both challenging and frustrating! Our team was having a tough time concluding a contract-concession for Cuajone. In the Peruvian Congress, the Apristas consistently opposed the granting of a concession for the Cuajone operation.

One day a message came from Haya de La Torre that he wanted to meet with us. Haya, the grand old man of the APRA party, was an interesting character. He was a writer and was I think, a university professor at one time. His house outside of Lima was surrounded by a high adobe wall capped with lots of broken glass.

Frank Archibald and I met with Haya in his office-library. We had a pisco sour with him and chatted about many things. Then Haya got down to business. It seems he was all for going ahead with Cuajone. But he said we would have to wait until the APRA party controlled Congress as he wasn't about to let the opposition party get the credit.

When the revolution took place Fernando Belaunde was dislodged and General Juan Velasco and Colonel Jorge Fernandez Maldonado took over as principals of the new government. I went to visit. President Velasco was in uniform and extremely nervous. He protested strongly that he was not a communist.

At a dinner one night in a suburb of Lima I entertained both Velasco and Maldonado and numbers of their staff. Maldonado told me how he was going to bring the peasants of the altiplano down from their chilly peaks and incorporate them into the mainstream of the Peruvian economy. Perhaps ill-advisedly, I told Col. Maldonado that I seriously doubted that this would work. He brought them down all right, hundreds of thousands of them with no jobs and no way to subsist. The General created economic chaos and suffering barrios in the outskirts of Peru's major cities.

Nearby owners of an olive grove protested that our Ilo smelter smoke was ruining their grove. Research disclosed that olive groves in Spain and Italy were regularly subjected to sulfur smoke to improve the crop, but anyhow, the company ended up owning an olive grove. Efforts were made to do something with the crop. Olives were pressed and the oil sold in company supermarkets. There were vigorous protests from the Peruvian oil producers and that operation was terminated. An expert was brought in from the States to show us how to make the kind of olives that the gringos liked. But when these olives were sold in our supermarkets, the protests were renewed and we were forced to halt olive production.

The Tambo Valley lay about 40 miles to the north of the smelter. It was intensely cultivated by a number of farmers who were no dumbbells. When they learned of the success of the owners of the olive grove, they saw a good thing and smoke complaints proliferated. SO₂ detectors were installed at a number of points along the Tambo. It didn't take long to learn that you could hold a lit cigarette next to the intake of an SO₂ sampler and easily screw up the results.

Study of the history of the Tambo revealed the existence of large salt springs on an upstream tributary. A few agricultural reports concluded the Tambo would never be very productive because of the stream's high salt content. An arrangement was worked out with the Munoz-Najar brothers who were progressive farmers and vintners. Each spring, flood water covered the lands and raised the ground water level. This action usually leached out some of the accumulated salt in the soil.

Some agricultural experts on salt land irrigation were brought in from the States and were soon busy laying lots of drain tile on the test finca of Paco Munoz Najar and his brother. Thus when the spring floods came the water would percolate down to the drains and reduce the salt content. That finca prospered and had excellent crops. Their neighbors saw what was going on and wanted us to install drains on their lands as well without relinquishing their assertion that smelter smoke was to blame. This hassle went on for years.

Toquepala mill tailings were channeled to the sea. From the air one could see the fan of gray looking water as the tailings dispersed in the Pacific Ocean. Peruvian fisherman soon learned that the pine oil and other reagents attracted fish. Scores of fishing boats could be seen working the edges of the fan to make their catches. But the Peruvian government was insistent that dumping the tailings into the ocean had to stop.

Copper recovery at the mill normally ran about 85-86% with an indicated recovery of 89% of the sulfides. The rest went down the mountain and into the sea. You could see

accumulations of sulfides on the beach where wave action performed some concentration. There were also some snipers who made minor recovery along the tailings stream. Now and then they bribed our mill operators to reduce recovery so their slim pickings might improve.

The Peruvian government charged the company with wasting the nation's resources. In self defense a small recovery plant was built near the beach at Ite. It was capable of making a bulk concentrate ranging from 1-3% copper. This would reduce tailings by 0.02-0.05 % Cu indicating a possible reduction of 0.015 % in the copper content of the entire tailings stream. A woefully uneconomic undertaking. But it was continued for political expediency.

Cuajone work progressed. A small underground operation was begun to get to zones of the several different types of ore. Then a costly truck haul was begun to get these bulk samples to the newly constructed pilot plant at Toquepala. There campaigns would be run on the different types of Cuajone ore striving for a method that would provide maximum recovery for all types.

Water for the Cuajone operation was another problem. Lake Suche was supplying all it could to Toquepala and a new supply had to be generated for Cuajone. All sorts of possibilities were examined, even milling in salt water. Examination of the topog sheets of the area showed elongated areas where the surface brush concentrated. Certainly this meant more moisture. A few of these areas were drilled and some water was found.

John Harshbarger, a Texas Mines grad, had done a good job for the AEC when more water was needed for the Monticello, Utah uranium mill. So I contracted with John to find us water for Cuajone. He looked into ancient glacial kames and eskers and eventually found an extensive aquifer that could be tapped. Then by a complex system of small dams and pumping, sufficient water for Cuajone was developed.

Costs were low and in July 1969 Toquepala produced for 13 cents per pound of copper in anodes. That was when copper was selling for 85 cents per pound. The largest single items of cost were mining and indirect costs that ran about 5.5 cents per pound each. A more representative average cost was about 20 cents per pound.

Trips to the high country and Lake Suche, our principal water source, were always interesting. We saw condors now and then. I found they could be attracted readily if one walked away from the road a bit and lay spread eagle and still for a while. Soon a condor would appear. We saw avestruches, the South American ostrich, striding swiftly. Pampa de Vaca, the artificial water storage lake at the western end of the 42 inch pipe line from Suche, was home to many large trout. The services of a fishery expert were used to

rebuild the inlet into a stream that would foster propagation of trout. It worked fine. But then there was an extended strike and the Guardia Civil wanted trout. They milked the streams and the lake for everything. I watched one Guardia sergeant as he "fished" one of the most productive streams. He had six helpers. Four men beat the water as they walked upstream while the others were ready with nets. When they were though, all the trout were taken. Then it was necessary to start all over to rebuild the fisheries.

There was a visit by a team of Japanese geophysicists. They sought the opportunity to conduct some tests on deep drill holes in connection with their work on plate tectonics - continental drift. They stayed around for several weeks as they did their thing on such drill holes as were still accessible. When their work was published as "Debate About the Earth," one of the co-authors Seya Uyeda kindly sent me an autographed copy. I learned how the basic concepts of geology had changed since my school years!

Our Lima office was small. Klaus Kursell, brother of the Howard Kursell that closed the deal for Toquepala with Juan Oviedo, was in charge as Vice President. Klaus was a fine scholarly man with a keen analytical mind. He and his lovely wife Tanya kept a fine home in the suburbs where we often spent an evening. They were both refugees from Lithuania.

Jean-Pierre Cougnenc was manager. His wife, Haydee, was a vivacious and attractive Argentine from Patagonia. Daniel Rodriguez Hoyle handled the engineering with an assistant. Danny had a lovely Peruvian wife and a family of nice kids. Danny was always borrowing against his retirement and managed to build a fine home and drive a fancy car. Alfredo Hohagen and his son Alfredito were attorneys. They both had attractive wives and homes but followed the Peruvian custom of devoting many of their siesta hours to entertainment. The Lima office was managed by a fine Peruvian gentleman, Ismael Marquez.

Frequently after lunch I would return to the suite in the Bolivar for a shower and siesta before returning to the office. That was most refreshing and gave me the energy to keep going for the balance of the long Limeno day. From time to time I would go to the Hotel Crillon for a sauna and nap. That was refreshing also.

Haydee Cougnenc became a nuisance. She came to Toquepala for some contrived illness or another that required treatment at the Mine hospital. She stayed at the guest house and preyed upon the young and unsuspecting members of the staff. Hans Noeth, a young family man on the accounting staff, was one of her victims. His lovely young wife and mother of two came to the house one evening and pleaded with me to get Haydee out of camp before permanent damage was done. I ordered Haydee to leave, and she

became violently angry. Guess she got her revenge when she returned later as Frank Archibald's wife. That happened after I was long gone.

While this was going on Happy became increasingly ill. Both Drs. Kieffer and Coello urged that I take her to Lima for certain tests that could not be done at Toquepala. The tests were made and the final recommendation was to go to the Mayo Clinic at Rochester, Minnesota. Pancreatic cancer was diagnosed. She had three months to live without surgery or maybe a year with surgery. Happy decided on surgery.

We left Peru for the Mayo Clinic on August 23, 1969 and never got back to live in Peru.

DENVER

Frank Archibald returned to Peru when it was determined that Happy had to undergo surgery. In a matter of weeks, Jean Pierre divorced Haydee and Frank Archibald divorced Louise. Reports from Peru were that Haydee and Frank were together all the time.

About the end of October 1969, Frank advised that I was not to return to Peru and that I was being discharged. Frank told the Executive Committee that I had "said no to the wrong general."

On November 7, Ed McL.Tittman, Chairman of ASARCO, wrote me to advise that I should move to Denver "for consultation with Stearns-Roger regarding the design of the mill for Cuajone, extension to the Ilo smelter, shops and other facilities and with Fluor-Utah if we desire.... As compensation, you will be paid at the rate of \$55,000 per year and you will have an allowance for living in Denver of \$600.00 per month."

"The expense of moving your belongings from Toquepala, Peru to Denver will be for the account of Southern Peru Copper Corporation. Also, the expense of moving your household goods to one other location after June 30, 1970 will be for the account of Southern Peru Copper Corporation."

"I understand that when not engaged in work with Stearns-Roger for Cuajone, you may wish to consult with others on mining and metallurgical problems. Provided there is no conflict of interest, it is understood that this will be satisfactory."

On November 25, 1969 Bob Koenig wrote "Dear Sheldon-..."

It is with regret that some things were handled in a particularly club- footed manner . It is strange what gets into people at times.

Regards, Bob."

Ken and Alice Johnson packed our household and we soon became established in Denver. Stearns provided me with an office and a car. We had many visitors from Peru, Dr.Carlos Cuello, Bob Nichols, Rod Hunt, Leonard and Betty de Jong to name a few.

I felt it important to stay close by Happy. She kept pushing me to set forth my plans after she was gone. I told her once that I would get a motor home and fish north in the summer and south in the winter. This failed to meet her views and she insisted that I find some regular employment. There were a number of offers. One was in New York City as the mining and minerals man for the prestigious investment house of Lazard Freres. That wasn't satisfactory as during the day I would be too far away from Happy. Another offer in San Francisco presented the same problem. I was interested in the upcoming job of director of the Colorado School of Mines Research Foundation but lacked the research background to qualify.

While in Denver I learned a great deal about the Henderson Project on which Stearns was working. I visited the project several times. It was familiar country as I had worked nearby in 1934.

CHAPTER 9.

WASHINGTON, DC. - SHEP & SPEP - MINNESOTA - PARIS HONEYMOON -
ALASKA - SMOKE AND MIRRORS

WASHINGTON,D.C.

There was an offer from the US Bureau of Mines in Washington, DC. that would place me reasonably close to where we might live and that would be OK as long as I didn't have to travel.

So I became Assistant Director for Mineral Supply for the Bureau. It involved all the commodity and foreign country specialists, included the energy minerals, coal, oil and gas plus the direction of what areas of research should be attacked to solve supply problems. Products included the Mineral Yearbooks, commodity statements, Mineral Facts and Problems, Information Circulars, Reports of Investigations, International Coal Trade, International Petroleum Annual, plus numerous other items. There was a sizable organization of close to 600 people that were required to do all the work. Many were formerly employed in the mineral industry. But those older heads were being replaced by career employees who joined government employment when they finished their education.

We moved to Washington and stayed with Bob and Margaret Mary Margin in Potomac, MD, while we looked for a place to rent not too far from my workplace. We rented a two story condominium on S. Delaware, but before we could move in Happy began to have seizures and was hospitalized in George Washington Hospital. I would walk up to see her at noon each day and after work as well. It was a trying time as Happy approached the end of her year of grace as she had to be heavily tranquilized for the pain.

On Sunday August 16 Happy had several seizures and went into a coma from which she never emerged and died on August 21st, 1970. A memorial service was held in Richmond on August 27th at the River Road Methodist Church.

When Happy was gone I tendered my resignation to the Bureau of Mines. Earl Hayes refused to accept it and said that I should stay on and bury myself in work as that was probably the best medicine for me. So I agreed to stay on.

Shell and Karen came and so did Ron. Gladys Odell visited. Karen and Steve came on September 5th to stay for several days. All these visits took my mind off my loss.

Jim Smith, Ken Grandstaff and Jim Hutchinson insisted that I go with them on a Rivanna float trip on August 29th and 30th. It did help some as it was a distinct change. On September 19th I hiked north on the Appalachian Trail from Harpers Ferry. Later on in September I was in Denver for a training session in a hardened facility at the Federal Regional Center, and then went fishing in S. Park with Vince Canning. In October a hike on the Billy Goat Trail on the left bank of the Potomac and then a James River Float downstream from Scottsville with Jim Smith, Hank Dial, Allan Miller, Walton Vaughn and Rich Brandt. Jennie Porter from Illo came to visit for several days. We walked around Great Falls and visited the Smithsonian.

On October 30, I met Hilda Pastor at a singles event. On November 7th I took a long hike on the C & O Canal footpath then. went off to Denver to visit the Intermountain Field Operation Center and on to Spokane to visit the Western Field Operation Center. I went down to the Breaks of the Snake River to hunt chukar partridge with Dick Appling, Eldon Pardee and Ken Baber. I went out to a missile site with Bob Bates.

When I came aboard the USBM, E.F "Ozzie" Osborne, was Director. Frank Lamb was Acting Director of Mineral Supply and became my Deputy. Some months later Ozzie hired John Morgan and I was asked to remove Frank Lamb and put Morgan in as my deputy. I declined to do this. Frank was doing an excellent job and besides I didn't get along too well with Morgan.

This situation stemmed from my days as Editor of Mining Congress Journal when John Morgan was with Government. He had an article he wanted published titled Economic Mobilization and the Mineral Industry. When I altered some of his language in the editing process, John raised hell. I told him that we didn't have to publish his piece and that he could withdraw it if he wished. He agreed to let my editing stand, but the hard feelings still stand.

Took another Billy Goat Trail Hike, this time with Hilda Pastor. I was named the U.S. representative to the OECD Energy Conference and left for Paris, France November 28. OECD stood for the Organization for Economic Co-operation and Development. It was headquartered in the Chateau de la Muette in Paris, once the home of a prominent member of the Rothschild family.

Going to work for the Bureau of Mines wasn't the smartest thing I ever did. I began to find out how the bureaucracy worked. I was required to divest all mining and mineral related stocks. This was extremely painful as I had a sizable position with ASARCO and in South African gold stocks - the so-called Kaffirs. But I followed the rules and got rid of

them taking a financial beating in the process. When it came to getting rid of Minnesota Mining and Manufacturing, I rebelled. I wrote the company to ask about its mining holdings. The only thing it had was a part interest in a limestone quarry in Arkansas that represented less than one-tenth of one percent of its holdings. I was allowed to keep the stock.

I was fortunate to have an excellent secretary who knew the Bureau of Mines inside and out. Helen Seitz also knew a great deal about minerals and mineral economics. She had worked for years with Elmer Pehrson and kept in touch with Elmer and Tilly regularly. Frank Lamb, my deputy, was equally competent with a most able secretary, Hawthorne Agner.

The flight to Paris was uneventful. I stayed at the Hotel Sylva Pergolese but moved to the Hotel Massenet as it was closer to the Chateau de la Muette, site of the Energy OECD meetings. I celebrated my birthday at Mere Catherine's on Montmartre with a bunch of Finns and Swedes. It was great fun! When the OECD meeting was over I went on to K^oln where I stayed at the US Embassy guest house in Plittendorf. I took the train to Bonn where I met with Wolfgang Sames, Gunther Daniel and others in the German equivalent of the Bureau of Mines.

On to Goslar to stay at the Niedersachsischer Hof. The next day visited the 1000 year old Rammelsberg Mine and took a long trip underground with Klaus Janssen. Rammelsberg has an incredible history. At one time when it appeared that they were running out of ore in the 17th century, they drove a long crosscut trying to find a parallel structure. When they failed to find one, the mine shut down for almost a century. Then geological work confirmed the merit of the crosscut. It was driven another 40 meters and hit ore.

The veins were about 2-3 meters wide and dipped 80 degrees. A tough dense ore, it ran close to 60% sulfides. Most of the mining was by shrink stoping. At the time of my visit they were mining 1300 TPD of the high grade sulfide ore body to produce 660 ton of concentrates. Mining costs were about \$10 per ton. But the veins being mined finally were worked out and Rammelsberg shut down in 1990. Maybe history will repeat itself to reopen the mine again.

I went on to Hannover to visit the German Geological Survey where I met with Drs. Closs, Fritz Baum and Helmut Schmidt. Then back to Cologne at the Kolner Hof and thence to London and the Hotel Britannia. At the Kolner Hof, when I packed up, I found that my Peruvian gold shadow box cufflinks had been stolen as well as an Igorot gold tie pin. The Igorot item was a gold nose ring of the kind prized by the Bontoc warriors.

After meeting in London with Peter E. Nielson, Minister of Trade and Industry, returned to the States.

I spent Christmas 1970 in Sanford, NC with Karen and her family.

SHEP & SPEP

Flying so much was new to me. I always had plenty of paper work to do. There wasn't much to see as the planes flew high. So when eyes tired with all the paper work there was time to think and plan. Looking at the airline magazines led me to come up with an idea. How about advertising in such a magazine about two new organizations that would be registered lobbyists?

One group would be called SHEP, the Society to Halt all Environmental Processes. It would strive to stop erosion, global warming, holes in the ozone layer, volcanic activity, earthquakes and the like. Anyone could become a member, for say \$25 per year. For this fee the member would receive a monthly news letter containing reports of activities and actions taken toward the SHEP goals.

The other organization would be called SPEP, the Society to Preserve all Environmental Processes. Obviously, it would be the opposite of SHEP in all respects.

The two organizations would share space in an office building and use common facilities for printing and publishing. Membership costs would be the same for both groups.

Although without much merit otherwise, the concept should prove to be a real moneymaker. But I never found the courage to give it a whirl.

In addition to the host of regular reports on each mineral and on the mineral industry in each state, the Mineral Yearbooks, Mineral Facts and Problems, there were numerous Information Circulars published on specialized topics. For example there was much loose talk about the excessive use of the land by the mineral industry. We knew that was not the case, but it took a lot of research to prove the point.

So in 1974 the Bureau of Mines published IC 8642 Land Utilization and Reclamation in the Mining Industry, 1930-71. That report showed that land use by the mineral industry amounted to 3.65 million acres or 0.16% of the land mass of the United States. Further, that report showed that 40% of the land used by mining was re-claimed.

This same report was reissued in 1982 as IC 8862. It showed that during the period 1930-80 land use by the mineral industry was 0.25 % of the US land mass and 47% of the land used had been reclaimed. The December 1992 issue of Mining Engineering quoted Skillings Mining Review as reporting that land use by the mineral industry was less than that used by Safeway parking lots!

Some comparative studies were conducted including IC 8656 Comparative Porphyry Copper Mining and Processing costs - Alaska and Arizona. This study showed that production costs in Alaska would be almost twice the Arizona costs.

The process of educating Congress was a continuous one. There were always new members with no understanding of the industry. Some advocated changes in the Mining Law of 1872 that would be certain to change the US into a have-not nation. In an effort to dispel some erroneous concepts, we released a study IC 8702 Time Required in Developing Selected Arizona Copper Mines in 1976. Lorraine Burgin, widow of my friend Bill Burgin, was its author. Lorraine was the daughter of geologist Joe and mining engineer Desdemona Beeson.

This useful report showed that most of major Arizona copper mines actually began as small mines. Further, exploration periods ranged from 1-15 years. Pit development or construction took 1-4 years while time for underground development was 4-8 years. One underground mine took 12 years to get into production. The mine histories brought to light by this IC proved especially interesting. They showed the perseverance, risk taking and huge expenditures needed to find deposits and bring them to production. Without a stable economic and political climate, the United States could be changed to one with inadequate incentive to conduct the exploration needed to find new deposits to meet our mineral requirements.

MINNESOTA

On January 10th I flew to Duluth to attend the annual AIME meeting there. I was on the program. I took advantage of the trip to visit the Virginia Mine of Eveleth Taconite Co. They were equipped to operate in any kind of weather and the subzero temperatures were no impediment. Back to Minneapolis for a short visit with the Bureau of Mines people at the Experiment Station near Stillwater.

Then on to Denver to meet with my favorite curmudgeon, Ottie Bishop. He was doing a fine job as Chief of the Intermountain Field Operations Center. I had known Ottie in the Philippines and had high regard for his managerial and engineering competence.

I went on to Boulder City to visit those facilities where one principal project was alumina from clay. The work was being done on Georgia clay and discrete steps were working out OK. What was needed was to integrate the steps into a smooth running process. It was always nice to visit Boulder City as Shell and his family lived there.

Hilda had me over for dinner now and then. She claimed she couldn't cook but she was actually an excellent gourmet cook. I was glad to find that out as Mother always told me,

"Don't mess around with a woman that isn't good in the kitchen. If she's no good in the kitchen, she's probably no good in the other rooms either!"

There is a lot more to a marriage than romance. I began to think about how we would get along living with her from day to day, in sickness and in health. Further, I was looking for some one of whom I could be proud when I introduced her to my friends and who would be comfortable with them as I should be with hers. Hilda seemed to fill the bill.

February 25th went to New York for the Annual Meeting of the AIME. Off to Sanford, NC early in April for a visit with Karen. Then to Phoenix on business and to Boulder City for a brief stay with Shell. He and Shirley took me for a drive over Christmas Tree Pass where the scrubby mesquite trees were hung with many ornaments.

On to Salt Lake City to meet with Joe Rosenbaum, Steve Wilson and D'Arcy George to discuss metallurgical problems. Back in DC I attended a Colorado Society party on the Hill. Wayne Aspinall was there and we had a chance to chat. Wayne had met Hilda several times at such events and advised that I'd be a fool not to marry her. I had a lot of respect for Wayne's judgment.

Willard Hegberg who headed up the Office of Statistics was looking for a house and shared his findings with me. So we both ended up buying new town houses on N. Abingdon Street in Arlington in a group of town houses called Glebe Commons. Hilda looked at 2055 N. Abingdon and liked it. We bought the place on the spot. I should have listened to Hilda and bought the adjoining house at the same time.

The Bureau of Mines staff included many with long experience in the mineral industry. It was of tremendous value to have those old industry hands in the Bureau. But things were changing. It was becoming more and more difficult to hire someone from industry. The result was that we hired younger people who often found their first job with the Bureau. For the most part these folk lacked any industry experience. Many came to the Bureau right out of school and made a career of government employment. It was painful to lose the old hands and have to replace them with those inexperienced people.

Jack O'Leary was Director of the Bureau of Mines but left shortly after I came on board. He was succeeded by Elbert Osborne from Pennsylvania State University. Bill Pecora, formerly Director of the Geological Survey, was Deputy Secretary of Interior under Walter Hickel. Hickel wasn't there long before he got crossways with President Nixon who sent Malek to tell Hickel he was through. The abrupt and inconsiderate manner in which Walter Hickel was fired created a new term - Hickelized.

PARIS HONEYMOON

Moved in to 2055 N. Abingdon on April 27th and Hilda and I were wed on May 1, 1971 at the Hughes Methodist Church by Ed Porter who had been the family minister when we lived in Kensington, MD. Karen and Erna came to the wedding and I was pleased that they did.

There was the threat of violence in DC and sure enough lots of damage was done. I took my turn and slept at the office May 3rd. On May 7th I was off to San Diego to give a talk at that branch of The University of California. Then to Kennebunkport, Maine at the Shawmut Inn to attend the annual meeting of the American Association of State Geologists.

Karen, Shell and Shirley came to visit. Hilda moved in on May 18th barely in time for our May 20th departure to Paris, the start of our honeymoon trip. We equipped ourselves with all we thought might be useful including separate quantities of American Express traveler's checks.

We landed at Orly and then went to the Sylva Pergolese for a good rest. At least we stayed in bed. After a few days we moved to Hotel Massenet. Visited the Eiffel Tower. We did not go up as Hilda claimed she was afraid of heights. We saw the Aquarium and the Musee de l'Homme. We walked around Paris a great deal and enjoyed the exploration. Now and then we stopped at a bar for a bite to eat. Once in a rainstorm, we stopped at a small place and enjoyed the most delicious onion soup ever.

Had a meeting with the folks at the Bureau de Documentation regarding exchange of statistical data and traveled to Orleans to visit BRGM for similar reasons. Hilda went by herself to the Louvre and Versailles while I attended to business as the US representative to the OECD.

We took a memorable trip on a Bateau Mouche dining while we moved up and then down the Seine. On Saturday, May 29th, we flew to Bad Godesburg where we stayed at the embassy guest quarters. These guest quarters were lovely. Located on the bank of the Rhine, it was delightful to bask in the pale sun and watch the river traffic.

We took a ferry across the Rhine to Koenigswinter on the east bank. and visited the nearby castle Drakenfels which was in ruins. From its heights the guide pointed out the burial place of Adler, Germany's first post war premier. This was the seven hills area, so named for the prominent hills that dominated the region.

When we got back to Bad Godesburg and our quarters, we cleaned up for dinner. When I dressed, I found to my horror that my traveler's checks were missing. After a frantic search, I could only conclude that I had been robbed and proceeded accordingly. I notified American Express and made arrangements for a visit to its Bonn office to get replacement

checks. Later that evening when Hilda emptied her purse, I noticed she had two AMEX check books. Of course, one of these was my missing check book. Gotta watch that girl!

The next day we went to Bad Wimpfen by train. It was a fascinating visit to the old walled town of Wimpfen that is well preserved and is to Germany what Williamsburg is to the U. S. We visited the museum and saw armor made by some ancestor and enjoyed the sights of the town although but few shops were open. The train trip to and from Wimpfen was along the Rhine and the Neckar rivers. Saw many old castles and lots of vineyards on the steep hillsides.

They reminded me that my Grandfather Leopold had been a vintner. When he sold out sometime in the 1890s he bought an annuity of \$250 per month for himself and one for his wife. He was still enjoying his annuity when he died at the age of 94. He died of complications after he was hit by a car when returning from the library.

I met with the German mineral people in Bad Godesburg and the US embassy people that sent their data to us. Then on to Hannover to meet the Overseas Geological Survey. We had dinner with Fritz Baum at his country home where we watched the women in the fields harvesting spargel. They do not wait till the asparagus is growing above ground, but cut it off about 8 inches below the surface at the time the top is just breaking the ground surface.

Back to London where we stayed at Hendon Hall. Hendon Hall was located in the London suburb of the same name. It was a rambling brick structure once the home of David Garrick the famous Shakespearean actor. It had been added on to and altered many times and incorporated all the worst features of a complex rabbit warren. It took us several false moves to find our assigned room as we traversed long and short hallways on several different levels. Our bath with its antiquated plumbing was larger then the bedroom.

The next morning we went down to breakfast in the Hall's dining room only to find that most of the guests had dressed for breakfast-the men in black tie and the ladies gowned. We thought we had stumbled in on some strange society.

We were led to a table already occupied by a couple. Observing we were Americans, the gentleman welcomed us and proceeded to tell us a story. "It seems there was this American traveling on one of our trains. When he entered his compartment that seated four, he put his luggage on the rack and attempted to sit. The dowager English lady had half the seat and her white dog had the other half. The American started to push the dog aside and the lady said, "You can't do that. This seat belongs to Fifi." The American promptly opened the window and threw Fifi out. At this, the Englishman on the opposite

seat dressed in his bowler hat and with his chin on his umbrella laughed, "Har, har. You Americans can't do anything right. You drive on the wrong side of the road, you eat with the wrong hand and now you've gone and thrown the wrong bitch out the window."

We thoroughly enjoyed our bit of melon and kippers and eggs as we were regaled with one story after another.

I met with Peter Neilsen and then with Allen Archer head of the Institute of Geological Services and we had dinner with Allen and Mrs. Archer and Michael and Mrs. West. Saturday visited the Tower of London and then back to the US on Sunday, June 6th. It was an ideal honeymoon combining business and pleasure. But we were glad to get back to our new home in Arlington.

ALASKA

On June 11th I headed for Alaska. Overnight at the Sweptwing in Seattle and thence to Juneau. Tom Henrie was along as he was anxious to see what was going on in Alaska. Jimmie Rosenbruch met the plane and took us to his home where his boat was tied up. We were soon on our way to Glacier Bay. We slept on the boat off Icy Point and fished in the late hours. Alaskan evenings were very long. But only in the summer!

Off to Muir Inlet and Riggs Glacier. What a vast change this was from the busy streets of Washington. Now and then we could see another boat, but there was nothing on shore. We saw many eagles nesting along the shore and whales broke the surface near us. We moved up Glacier Bay slowly as we turned to avoid the innumerable ice floes. Every which way we looked was another eye-catching spectacle.

When we got back to the south end of the Bay we stopped and fished a while for Halibut. They were as big or bigger than doormats and could only be subdued with a .22 rifle. We kept all we could in the freezer and headed back to Juneau. We saw more whales spouting and enjoying the freedom of the seas. It was a memorable trip and one I hoped might be repeated.

Back in Juneau and over to Douglas Island and to Juneau Island where the Bureau of Mines has, perhaps, its ideal site for an office. Juneau Island is off to the west side of the Gatineau Channel for sea traffic to Juneau. To reach Juneau Island one must first cross the bridge to Douglas Island and then cross a short causeway to Juneau Island that is occupied entirely by the USBM. The island is close by the site of the Alaska Treadwell mine and offers views of the Alaska Juneau mill site on the east side of the channel.

The principal structure is a reinforced concrete and brick building that is almost immune to any possibility of being modified. Bill Eckerd, petroleum engineer, was the Alaska

Field Office Chief. Bill showed us Mendenhall Glacier, north of Juneau, and we enjoyed a salmon bake at the site of the old Alaska Juneau shops. Tom and I stayed at the old Baranof Hotel that housed some monumental paintings of the early days of Alaskan exploration. Years later I visited the Baranof with Hilda only to find that the original paintings had been destroyed by an irate hotel employee. They had been replaced with some poor copies.

We flew on to Fairbanks with a stop at the famed Kennicott Mine. From Fairbanks we drove out to Fish Creek to see the placer gold operations of Walter Roman. He and his sons operated the property for about 100 days each year. That is the period from freeze up to freeze up. And you just cannot operate a placer mine in sub-freezing weather. Walter operated with an Intelligent hydraulic monitor breaking down the 60 ft. high bank and sluicing the muck through a trommel and then over a series of riffles. They caught a lot of fine gold, but separated the many nuggets that were sold as is for their precious beauty. When sold as nuggets, the price per ounce is higher.

The Intelligent is an updated version of the old monitors that required a lot of brute strength to operate. Its design is such that the water is passed through some elbows that change the dynamics to a system that can be moved with but little effort. The Intelligent was the invention of John Miscovich. Mining Congress Journal published an article on this new monitor in the late 1940's.

Walter had a sideline. In the course of placer mining, many mammoth tusks and other remains were uncovered. There was a brisk market for the mammoth ivory. There was also a problem with theft. Walter had been ripped off several times and resented such actions as would anybody. There was a sign in front of his house- "No trespassing! Survivors will be shot!" The sign didn't help and Walter was robbed again of his precious tusks.

We flew down to Usibelli to visit the open pit coal mine that operates all year long. It is the principal source of steam coal to provide electric power to Fairbanks. The winds were pretty strong and we were unable to land at Usibelli.

We flew on to Prudhoe Bay, visited the discovery well and marveled at the huge mountains of pipe that were to be assembled in the construction of the Alyeska pipe line. Caribou and Arctic fox were seen, seemingly not disturbed by man's nearby activities. The huge mess hall that ARCO operates was open 24 hours a day and the food was fantastic. An atrium in the center of the building harbored a few trees and other greenery.

After lunch there we flew on to Pt. Barrow to visit Carroll and Dorothe Livingston at the Arctic Wildlife center and with John Schindler. The sun didn't set and I was able to take

outdoor pictures at midnight. The research staff seemed oblivious to the 24 hours of daylight and went to work at all hours. We walked along the beach and saw old Eskimo structures built of whalebones and sod. We flew south over the coal fields at the northwest end of the massive east-west Brooks Range and went on to Nome.

We stopped enroute to Nome to visit Bornite. After buzzing the camp site a few times, standard practice in Alaska, we got someone's attention. We landed on a short strip that was graded with crushed jade. The strip was located on the flanks of Jade Mountain. Riz Bigelow met us and drove us to the mine and camp site showing us what had been done there. Shaft sinking had been in progress when water flooded them out. Located elsewhere in a less forbidding and more accessible location, Bornite would have been an operating copper mine. Perhaps it will be someday anyhow.

As usual, at every stop Tom Henrie was experting the mine operation. He found fault and questioned methods often coming up with what he considered a better way of doing the job. He persisted in such gratuitous comments to the point that it became most annoying. I was reminded of an old aphorism, "Those than can-do, those that can't - evaluate!"

We stayed in a somewhat ramshackle conglomeration called a hotel, but enjoyed the historic town. Nome has several claims to fame, both as a gold producer and the terminus of the famed Iditarod Trail. Pilot Mike Tavis flew us to Cape Wales and then we overflew Little and Big Diomede Islands.

Ice stretched from Cape Wales all the way over to Little Diomede. We saw huge walrus at the edge of the ice that stretched to the north as far as we could see.

As we flew close to Russian territory, Mike dropped down close to the wave tops. There was some concern that the Soviets might fire at us for invading their air space. As we landed at Cape Wales on its black sand beach, the local folks came running thinking we were the mail plane. They were vastly disappointed, but they did open their shop and sold us some items that had been made there and by the Eskimos on Little Diomede. We purchased several pairs of Eskimo Moccasins, Happy Bears and other items.

We went on to Independence Creek where Rhiny Berg was driving an exploration drift under a zinc mineralized outcrop. As usual, Tom Henrie knew a better way. Rhiny Berg is credited with the original discovery of Bornite. We stopped for lunch at Kotzebue and walked along the waterfront. A brisk chill wind was blowing off the Chukchi Sea. Racks of Shee fish cleaned and split were drying alongside the narrow road. We stopped for a beer at "The Old Oar House." It served other items on the second floor.

The next day we flew to Lost River and again saw how cat trains left their mark. To supply camps in the back country, trains were made up of sleds hauling supplies and equipped with a wannigan on one sled for living quarters. Usually pulled by a D8, these trains would leave their runner marks. As drivers sought the best route, they left a multiplicity of tracks that would take forever to heal.

We visited the sand strip community of Shishmaref where we met with local folk who concealed their disappointment that we were not the mail plane. Saw an Eskimo lady cleaning a huge Oogruk, a giant seal, while her baby watched. The baby couldn't walk, but sat impatiently waiting and waving an Ulu, the Eskimo curved blade knife. The mother would cut off a strip of blubber, hand it to the child who would thrust it in his mouth. Then the baby would adeptly slice off a bite sized chunk of blubber, barely missing his nose with the sharp blade. Maybe a history of misses with the Ulu accounts for Eskimo stubby noses?

We had lunch with an Eskimo family that supplemented its income with scrimshaw. Cliff Weyrovanna did a small piece and gave it to me. He did the scrimshaw with a pointed scribing tool and made his drawing freehand. A scrub with a bit of lampblack filled the marks and left them visible when the surplus lampblack was rubbed off. Then we ate some smoked seal with seal oil. It was potent with both taste and odor. Don't think I could take much of that!

At Lost River Murray Watts showed us around this remote tin deposit with its high calcium fluoride content. Ron Sheardown and Willis Beach were there too. Back to Nome and spent some time with veteran resident of Nome Pete Walsh. Father's Day was over and it was time to return to Anchorage.

I went with Tom Henrie as he shopped for something to take back to his wife. He was taken with an attractive necklace. His face fell when I told him the necklace was made of moose turds. He didn't believe me.

Here was my opportunity! I asked Tom if he knew what deer sign looked like and he replied, "Of course!" Then I said, "Well then, I suppose you know what cow pattys look like and bear sign as well?" Tom replied, "Well, sure." Then I asked him, "What's the reason for the differences?" He said, "Well, Hell, I don't know." It was then I floored him saying, "That just goes to show you, Tom. Here you've been experting these mining operations and you don't know shit!"

Flew to Kuskoquim Landing and the Red Devil mercury mine. Also visited the Barometer mercury deposit. The Kuskoquim River has a high mercury content. Such trace element assays were not possible till the development of the X-ray Fluorescence

instruments such as the Perkins-Elmer. But now that these trace elements could be quantified, their presence was often considered bad.

The natives along the Kuskoquim had been eating the river's salmon for many generations. Yet the proposal was made to prohibit the consumption of the river's salmon because of the high mercury content. How ridiculous can you get?

Visited the Grayling offshore oil production platform of Union Oil in Cook's Bay and the Trading Bay Production Co. Then on to Ninilchick where the USBM had extinguished a coal outcrop fire. Landed at Homer for dinner and then back to Anchorage. Then it was off to DC after a memorable 12 day Alaskan tour.

SMOKE & MIRRORS

July 5th was a holiday and Hilda and I fished Seneca Rocks up the Potomac from our usual put in spot at Point of Rocks.

There had been a hue and cry about smelter smoke for some time. Then the EPA had a study made of the additional costs of producing copper if most of the sulfur dioxide in the smelter smoke were removed. After getting costs on a battery limits plant, the EPA concluded that an added acid plant would add only three or four cents to the cost per pound of copper production. But EPA took no account of the additional facilities needed to operate that battery limits plant. When such facilities were added, we figured the incremental cost to be close to 15 cents per pound of copper.

So Carl Rampacek, Sid Katell and I went to New York to meet with the principal copper producers and see their plans and costs. Met with Myles Jacob of International Consolidated Copper; George Wunder of Anaconda; K.D. Loughridge of ASARCO; Oscar Tangel and Bob Ramsey of Newmont and Dave Swan and Lowell Moon of Kennecott and with Warren Fenzi of Phelps Dodge. Their corporate studies of the cost of sulfur removal corroborated our estimates.

In complete disregard of the true economic impacts, Congress passed legislation requiring smelters to cut down their sulfur dioxide emissions. Far more sulfur is introduced each year by the ocean's surface or volcanic action but no laws were passed to alter that!

On August 22nd, I flew to Spokane set for a wilderness trip under the Mineral Land Assessment program. I went on to McCall, Idaho to meet Bob Weldin and Dick Appling. Then we packed in with horses to an area near Sheep Mountain and high above the Snake River. We sampled residual deposits and veins in several exploratory drifts and cross cuts. A nearby lake offered fine evening fishing for cut throat trout up to 16" long. Happy would have enjoyed this area so she will be there forever.

We went on to visit Stibnite and than back to DC. In mid October Hilda joined me in a visit to the Black Mesa, Arizona, coal operation that delivered its product by pipeline to the steam power plant on the Colorado River. Then to Farmington to visit the Navajo Mine near Farmington, NM. On over Molas Pass to Silverton and thence to Grand Junction to visit with Elton and Grace Youngberg. Then drove to Grand Mesa where Happy will also be present forever.

CHAPTER 10.

DOG ACQUIRES US - NEED TO CONFUSE-REORGANIZE - SAN SALVADOR - TRAIL OF LA MANCHA - QUEBEC - THE ALPS - MINERALS AVAILABILITY

DOG ACQUIRES US

Lancelot, a fine Yorkie pup, came to live with us. He was most demanding of love and affection and got lots of it. Hilda fell in love with the charming black and tan bandit. Lance went with us on fishing trips and loved to travel in the canoe. If he got too hot we would dunk him in the river. There wasn't going to be any of this jumping on the furniture, or so we thought. But soon Lance got what he wanted and even slept with us. Before long he had a girl friend, Dolly. Dolly was high strung but Lance loved her.

NEED TO CONFUSE - REORGANIZE

The Bureau of Mines got its work done in spite of the reorganizations imposed by each new director. Each newcomer had a better way. These changes were painful to many but had to be endured. Sometimes they seemed to happen as a way to promote people then to benefit the work process.

We celebrated Hilda's birthday at Trader Vic's Alex Kalushny was there to serve until a new manager could be named. Alex was an old friend. A white Russian, he left his homeland in the mid thirties. I first met him when he was the bartender at the Pines Hotel in Baguio in 1939. Years later in 1957 we met again when Alex was managing the Trader Vic's in San Francisco. Alex invited us to a dinner in Chinatown hosted by Vic himself and it was fabulous. We remained friends and kept in touch until Alex passed on in 1993. When Alex came to visit our home in Arlington, Hilda always had iced Stolnichaya vodka for him.

As a member of the Cosmos Club, we often enjoyed lunches and dinners there. We especially enjoyed the Sunday Morning brunch that featured a huge bowl of Bloody Mary.

SAN SALVADOR

By March 1972 Hilda had recovered from surgery. We took a vacation flying first to Nassau and then by small plane to San Salvador. San Salvador is one of the smaller "out islands" of the Bahamas. We stayed at the Riding Rock Inn in one of the 16 guest rooms on the island. This was one of the islands where Columbus was supposed to have made

his first landing in the New World and there is a monument to attest to that event. We walked for miles on lovely beaches that were almost completely deserted.

We took a sail one day and fished on another. It was a relaxing time. Beach combing, Hilda found many beautiful shells and fishing floats. We walked to the small village and drank beer and danced to their music. Hilda danced with some of the locals much to their delight. Recently Club Med built a huge tourist complex there on what it chooses to call Columbus Isle.

Toward the end of March Dick Lucas of VPI invited me to come to Blacksburg, VA to talk to the Burkhardt Mining Society, the student chapter of the AIME. Dick thought there might be some 30 students that would attend. But I found out that I was in competition with a visitation from some Guru and there were only a handful of students to hear me. Dick Lucas was embarrassed, but I could understand the situation.

Hilda didn't know how to drive when we got married and wasn't particularly interested in learning. I pointed out that she could help me drive on long trips. Still no interest. I then said I would buy her a car if she would learn to drive. That sparked her interest and she took lessons. While this was going on I probed her mind to get an idea of what she wanted. She was not interested in a Mercedes-Benz; they only came in black. She had to have a red car and favored a Dodge Demon.

Without her knowledge I ordered one from a Silver Spring dealer. In the meanwhile Hilda began to needle me about not keeping my promise to buy her a car. She even encouraged my friends to query me about why I was so delinquent in keeping my promise.

But finally the red Demon arrived. I invited Helen Seitz to have lunch with us after Hilda said that would be nice. Then I went to Silver Spring and picked up the Demon and drove it close to home and parked it in a space adjoining ours. Helen drove my car to our house. After a drink with Hilda, we came out of the house. I said, "Hilda, isn't that the kind of car you wanted?" She replied, "Yes, but I'm never going to get it!" I suggested, "Well, look at this one and see if it's really what you want."

Hilda grudgingly ambled over and looked at the car. I said, "Get in and see if it is exactly what you're after." Hilda snorted, "I'm not going to get in someone else's car!" It was then I told her it wasn't someone else's car and she damn near fainted. That was in April.

I returned to Moab, Utah, in May to attend the annual meeting of the American Association of State Geologists. It was great to be in that area again and see the La Sal mountains capped with snow. So many memories of those busy years of uranium demand came flooding back. Hilda stayed home.

I visited the Homestake Mine on my way back to Washington and saw the huge underground tank where they hoped to capture a neutron. Tom and I ate pasties on the 4850 level of the Ross Shaft. Via an interior shaft, Homestake mines down to the 8000 ft. level from its Number 6 winze. Rock temperatures at 8000 ft reach 134 F. To make the mine workable, chilled water at 38-39F is pumped in and fans blow air through this water. Rock bursts, water and heat are main problems at that depth.

Talk of another reorganization at the Bureau of Mines. Shuffling people and jobs seems to be a major preoccupation of every new director. Every time things get going well, the applecart has to be rearranged sometimes to make a place for a director's favorite or to promote someone. The principal result is to slow down output.

John Morgan was a protege of Elbert Osborne's and Ozzie wanted to put him in a key spot. I was told to move Frank Lamb to another position and place John Morgan as my deputy. I declined, so a job was created for John Morgan to put together the annual report required by the National Mining and Minerals Policy Act. He soon had a staff of three to help him..

TRAIL OF LA MANCHA

In March 1973, I figured it was time to take a holiday. So Hilda and I went to Spain for a most memorable trip. We landed at Madrid, picked up the tiny Seat we had rented and drove to the Hotel Colon to rest up. We had a small quantity of pesetas that I had bought in Washington but planned to rely on traveler's checks for most expenses. That night at the Sobrino del Botin I paid for our dinner with pesetas.

Visited the Escorial, Valle de Los Caidas, the walled cities of Avila and Maqueda. The country was spotlessly clean as Francisco, the dictator ,required it. Spent the night in Maqueda at Hotel de Cazador. But then we had a problem. The international exchanges were closed and our traveler's checks were not accepted.

In order to have something to eat we bought sausage, cheese, bread and wine and managed to have a bit left over for gas. On to Toledo and the Alcazar, we picnicked at Puebla de Amoral and then went on to Albacete to overnight at the Parador National. The paradors are great places to stay. For the most part they are onetime palaces or mansions that have been taken over by the government and converted to lovely hotels.

We headed for Manzanares via Muriera, Ruidera and the Alhambra La Solana. Hilda enjoyed driving the sprightly Seat with its stick shift. The Seat is the Spanish version of the VW. From Manzanares we went on to Almaden, the famed centuries old mercury mine that long supplied the major part of the world's needs.

I had made arrangements for this visit while still in Washington. The manager, Sr. Antonio Gallego, was most hospitable. We were taken to what they called The Chalet to spend the night. We had a monster sized room and bath. Later we learned that this was the room Juan Carlos occupied when he visited Almaden. We were served a superb dinner by a butler and maid. Coffee and brandy were served in the living room. Antonio Gallego joined us.

In planning the trip through the mine he also invited Hilda. Hilda had always said that no one could ever induce her to enter a mine so it was shock to hear her accept the invitation. Gotta' watch that girl! The next morning we donned coveralls and hard-hats plus electric cap lamps and went down the shaft to the operating levels. Almaden had been operating for hundreds of years. The mine was an intricate complex of many levels and stopes in a series of en echelon veins. We climbed ladders into several cut and fill stopes, some of them up to 4 meters wide. The backs were drilled with stoppers and the broken muck slushed to ore passes. To get even with Hilda for misleading me about going into a mine, we visited more stopes than we might otherwise have entered. She actually enjoyed the trip and talked about it quite a bit. Back on the surface we cleaned up and then Sr. Gallego took us on a tour of the surface showing us many old facilities and equipment that had been used in the past for the production of mercury.

On to Cordoba where we stayed at the Hotel Cordobes. We ambled around that historic city and drove on to Granada to stay at the Hotel Guadeloupe. Our visit to the Alhambra shared by so many people since its restoration was entrancing. The Moors really did build well and incorporated much beauty in their designs. It was hard to leave that place of mystery and beauty. Strangely enough, the Alhambra was allowed to fall into decay when the Moors were driven out. It became a habitat for goats and other creatures. Finally it was taken into hand and restored.

In Seville we stayed at the Hotel Inglaterra and had dinner at Los Carrales. We climbed the ancient tower and then drove on to Huelva to stay at still another parador at Mazagon before moving on to Rio Tinto to overnight at the Residencia. We were given a tour of the area and saw the old Roman workings. Purchased an old Roman brass oil lamp that had been used in the mines ages ago.

Then we headed for the Costa del Sol via Ronda. First, we tried to stay at the Reina Victoria that is perched on the 600 ft. cliff of the Tajo. But it was a national holiday and the Reina Victoria was booked solid. Inquiring into other possibilities where we might spend the night, the clerk came up with a Posada San Jose.

We drove to the Posada and registered and paid in advance the \$3.00 rent. Then we walked up the wide stone steps to the second floor. The steps were worn down about three inches in the center. We learned later that the wide stone steps were also used by the horses that guests took to their rooms with them. There were iron cots in our room and a wash stand with a jug of water. The huge window had no glass, but could be closed with iron shutters. The remaining bathroom facilities consisted of a hole in the floor down the hallway. Everything was spotlessly clean. Hilda shunned the place and went out to the car. She wanted to drive on but I was exhausted and tumbled on to a cot to sleep for two hours.

When I woke up I went to find Hilda and there she was in the Seat just fuming. She fumed a lot! I finally persuaded her to get out and walk to a bar at the street corner. Once seated I asked her what she wanted. She snorted, "I'll get it myself!" And she tried but couldn't get the waiter to understand. That only made her angrier. So I butted in and ordered her a brandy. Finally, after several glasses of brandy, she calmed down a bit.

Then I suggested that we drive over to the beautiful Reina Victoria for dinner. We were seated and had placed our order when I excused myself and went to thank the desk clerk for finding us a room at the posada. He then said that he had received a cancellation and could now accommodate us. I registered immediately. After dinner, we drove back to the Posada San Jose and recovered luggage and moved into a delightful suite in the Reina Victoria overlooking the cliffs of the Tajo.

We had a refrigerator with a bar and a lovely terrace with a spectacular view. It's been said that if you can't fall in love in Ronda, you're beyond all hope for romance. Ronda was delightful. It was a town since Roman days and there was much evidence of their stay. An old bridge across a deep ravine that led to the Tajo had a lovely mid-bridge restaurant that we enjoyed. It was a delight to stroll around the city and enjoy its rare beauty.

Hilda saw a brochure on the Cueva de la Pileta and was determined that we visit. The following day we drove out only to find the cave closed with an iron gate. But there was a notice that advised us to blow the horn three times and someone would come. We saw below us in the valley a white house and sure enough, at the sound of the horn, a man emerged. By the time he had trudged up the steep hill to the cave some more would-be spelunkers had arrived. They were Spanish Army officers on holiday with their wives.

When the attendant arrived he unlocked the gate and readied a few gasoline lanterns to light our way. The six of us followed the guide as he pointed out the prehistoric cave paintings. They included some drawings of animals no longer found in the area. It was

interesting to take this trip through a cave that had not been developed with paths, lights, and the like.

We had been in the cave about an hour when our guide offered to take the men only over a rough trail to a more remote section. Hilda insisted on going and we went lower and lower into the depths of the cavern. The guide showed us the petrified body of a short woman who had gotten lost in the cave sometime in the remote past. When we finally emerged, it was good to see the sun shining.

We drove down the valley only to come to the roads end where some local folk were picnicking. We were looking for the ruins of Ronda Vieja and they told us how to get there. The old stone structures built by the Romans were evidence that Ronda was an important location to the Roman conquest.

After several most pleasant days in Ronda we reluctantly left to make our way down to the coast. The road was horrible, deeply rutted and full of holes. We moved about 20 mph for most of the way. Finally we could see the Rock of Gibraltar. We drove east down the Costa del Sol seeing the parade of giant hotels that detracted so much from the beauty of the area.

Leaving the highly developed coast we drove into the mountains a short way to stay at the old white stucco town of Mijas. It was delightful! We toured the old town and shopped its many markets. I bought one of the old fashioned knockers - the ball in the hand. The shopkeeper gave us a bargain price as he said the black knocker was made of iron. When we got home we found out that it actually was brass that was highly discolored.

Our visit to Spain was captivating and we regretted that it was so short. But it was time to get back to work, so we returned to the USA on March 21st, 1973. The bottle of fine Spanish brandy we bought in Mijas is being saved for our 25th anniversary.

QUEBEC

In mid May we drove to Northfield Lodge on a large lake in Quebec. Hilda hooked a lake trout from the canoe. I lost it for her with a poor job of netting. She hooked several others but we were never able to land one. They were just a bit too big for our tackle. Hilda and I went to the annual meeting of the American Association of State Geologists at Stone Mountain, GA. Ozzie Osborne, the USBM Director went also. The stay at Stone Mountain Inn was pleasant. We took the hike up to the summit and the train ride around the mountain just like the rest of the tourists.

Our driveway was getting uneven. The bricks were just laid end to end and side by side on a concrete slab. I decided to take them all up, little by little and relay them in a bed of

mortar. Then I would fill the spaces with a dry mix of sand and cement and water them down. It worked well and I ended up with lots of surplus brick. I rebuilt and enlarged the brick patio in the rear of the house while Hilda was off on a trip to Florida.

Ed Heller, the mining engineer for the Joint Congressional Committee on Atomic Energy, Jesse Johnson and I met now and then for lunch to talk of old times. We dubbed the meetings the Pugwash Conference.

In October I went to Estes Park, Colorado for a Copper Colloquium sponsored by the National Academy of Science. We gave the subject a good going over and forecasted what the future held for copper in terms of production, consumption and price. I never went back to make a comparison to see whether the facts agreed with the forecasts.

As the US representative to UNCTAD, I had to head for Geneva and Hilda decided to come along. Heathrow was socked in with fog so we went on to Orly in Paris and then backtracked to London when the weather cleared. Stayed at the Britannia Hotel on Grosvenor Square. Didn't get much sleep as some Osmonds were in the hotel and teenagers kept screaming all night. That Saturday we took a fine bus tour of London and then went to visit the British Museum. We went on to Geneva on Sunday October 28th to stay at the Hotel Longchamps.

THE ALPS

Hilda spent her days exploring Geneva and planning things we could do together on the weekends. One evening we took a boat ride for the entire length of Lake Leman. In addition to the fabled scenery, our guide pointed out the huge mansions of oil-rich Arabs and ambassadors from all over the world.

On November 3rd, we rented a car and drove to the picture postcard town of Chamonix. Took the aerial tram to the Agilles du Midi and then another tramway ride to Heilbronner Pass. There were many skiers along the route. We ended the day's pleasures with a drive through the Mont Blanc tunnel to Courmayeur in Italy. Sunday we took the train and visited Chateau Chillon and then to the Rocher de Naye.

I was busy with the Lead-Zinc meetings of representatives of the world's major producers and consumers for the entire week. Set some benchmark projections for estimates of production and consumption by country.

On Saturday Hilda and I took the train to the junction for Zermatt and then switched trains for the climb to Zermatt. Stayed overnight there at the Hotel Alfa. It was a glorious moonlit night and we spent much of it taking pictures of the awesome Matterhorn. On Sunday we took the rack railway to the Gornergrat. Magnificent views of the Matterhorn.

Back to Geneva for more Pb-Zn conferences to wrap up the weeks work. We walked all over Geneva on Tuesday and stopped at a small restaurant to drink beer and dine on Raclette.

We learned that Raclette is a delightful cheese dish. Half a wheel of a special cheese is mounted in a strange device . A flame is played on the cheese till it melts to the right consistency for serving some to each diner's plate. Small boiled new potatoes are served with the Raclette. Dipping up some of the cheese with each bite of potato offers an unusual taste sensation.

The next day we left for Paris to stay again at the Sylva Pergolese. Arriving Paris we found all the taxis on strike. We had to hire a limousine to get to the hotel. But then all the restaurant workers were on strike too. But the friendly Sylva Pergolese staff took pity on us and rounded up some soup and sandwiches.

We visited the Ecole de Mines. The huge specimens that bordered the courtyard were impressive. Some of these were six feet high and two to four feet across and included minerals such as galena, chalcopyrite, sphalerite, cinnabar and quartz crystal. Although the trip was interesting and enjoyable, it was good to get back home again.

MINERALS AVAILABILITY

For some years I had been thinking about a way in which domestic and world resources might be quantified and rated as to availability. In the AEC days in Grand Junction I developed a methodology that could be extended. Whenever the AEC found an ore body by drilling on withdrawn lands, we developed a mine plan and thoroughly costed the plan. A mining method was selected and capital equipment purchased to do the job - all on paper. We staffed the equipment and supervisory staff and management and developed detailed operating costs. Then we projected operating costs and depreciation, taxes etc. over the life of the property to arrive at a profit projection. On the basis of this study, we determined the percentage royalty that could apply. Then we were ready to negotiate a lease.

A similar process was followed when it came to negotiating a contract to purchase uranium concentrates from a mill. In one or the other of the several pilot plants built at Grand Junction, the bulk samples of the projected ore feed to the proposed mill would be treated. After detailed study of the ore reserves tributary to the proposed mill, a figure would be derived for mill capacity and the flow sheet for the milling operation.

Based on the preferred treatment process a capital cost and detailed operating cost would be derived. The proposed contractor had access to all the pilot plant data and thus could

develop his own capital and operating cost estimate. Then both the AEC and the proposed operator had a realistic basis for negotiating a price. The guideline I set was a 15% discounted cash flow rate of return.

That system seemed like a good place to start to strive to find out how much of a specific commodity could be available to the US economy and at what cost. Thus the Bureau of Mines Mineral Availability System was born.

Ron Michelsen was the first man I put in charge and Ron did much to spur the development of the system. But Ron left before long as private industry sought his expertise. I brought Gary Kingston to Washington from the Western Field Operation Center and Gary embraced the concept completely. Jon Stone worked as Gary's number one assistant with Harold Bennett in Denver at the Mineral Availability Field Office conducting the development of data and putting mines and mills together on paper for the system. As the originator of the concept, first at the AEC In Grand Junction and its further development in the Bureau of Mines, I kept my oar in on a daily basis. Later the Department of the Interior gave me an award for this work. The award included a certificate and some cash.

Since its inception the Minerals Availability System has been a growing and important component of the Bureau of Mines. Under MAS known sources of key commodities are evaluated not only with respect to grade and tonnage but consideration is given to capital and operating costs, water, power, effluent impacts, and other parameters to determine the available supply at different price levels. MAS is a deposit evaluation based, computerized mineral supply analysis program with international coverage.

MAS accommodates location and description of ore deposits, measures of mine potential, deposit extraction characteristics and methods, transportation and a variety of economic and institutional parameters for operating mines and identified paramarginal to marginal mineral deposits.

These supply evaluations are maintained continuously so the data base does not become obsolete and invalid. Extraction cost and financial evaluation models are available for rapid simulations. Analogs of supply availability systems may be modeled for use in monitoring and assessing the contingencies of mineral supply.

We stayed in Washington for most of the first six months of 1974, but went to Bend, Oregon, with Hilda to attend the annual meeting of the American Association of State Geologists. We relied on their cooperation a great deal and jointly with the BM state specialists, the mineral data on each state was compiled and published.

Hilda and I flew to Portland and rented a car for the drive to Bend where we stayed at the Inn of the Seventh Mountain. We fished the Deschutes River and went up to East Lake to fish in a snowstorm.

CHAPTER 11.

OREGON TROUT - POTOMAC FISHING - 8TH WORLD MINING CONGRESS
DOWNHOLE REPLACEABLE BITS - ALASKA REVISITED - ORFUS

OREGON TROUT

When the meeting in Bend was over we went across the mountain to the Mackenzie River. We had prearranged through Dick Appling to be met at the Cedarwood Lodge by river guide Dick Larson. The river float was just great. The bow of the special river boat was a padded curve that was comfortable to lean against as we cast our flies downstream. Dick kept rowing upstream to sort of hold the craft in a good position. Hilda and I took turns in the bow. We caught 67 trout that day, eating some of them at a shore lunch en route. The others were released with care.

We went on to Albany to visit the Bureau of Mines Metallurgical Research station there. Then on to Westport, Oregon to fish for salmon. It was a dry run. The skipper said we should have been there the day before as everyone was catching salmon. On to Sequim for a look at the property we owned there and then on the ferry across the Straits of Juan de Fuca to the lovely city of Victoria.

Butchart Gardens is a sight to see. It was once a quarry and was converted to one of the finest displays of all types of plants. It is one of the main sights to see on Vancouver Island. Took another ferry to get back to the mainland and drove on to Sedro Woolley to overnight before crossing the North Cascades. Even though it was late June, the highway went through snow banks that stood 10 ft. high alongside the road.

After we crossed Washington Pass we drove downhill to Winthrop. This picturesque town is a recreation of an old west community and enjoys the visitations of lots of tourists. It was fun to walk around and visit the various shops and businesses. We overnighted at Omak and went to Spokane via the Colville Indian Reservation and Grand Coulee for a planning session with Dick Appling.

We stayed pretty close to home for a while. The Bureau had another new director. That always created chaos with the almost mandatory reorganizations that followed. In Mid August went to Henniker, Vermont for a conference. When it was over Hilda and I fished unsuccessfully on Lake Winnipesaukee.

Drove to Old Orchard and found the place full up. After much searching we found an out of town motel, the Sun deck. The building we were in was tilted rather badly. Finally

we were able to force the door open . The floor tilted about five degrees and we tended to roll off the bed. We were glad to leave there and walk the beach in the early morning before heading for home.

Ozzie was succeeded by Tom Falkie who also came from Pennsylvania State. Tom was compelled to reorganize failing to recognize the old axiom as stated by Petronius Arbiter in 210 B.C viz:

" WE TRAINED HARD...

But it seemed that every time we were beginning to form up into teams we would be reorganized. I was to learn later in life that we tend to meet any new situation by reorganizing, and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency and demoralization."

POTOMAC FISHING

We fished the Potomac frequently starting usually at Point of Rocks. Headed out one morning with Lance although the weather was threatening. Hilda, ever the optimist, said it was bound to clear. We unloaded the canoe and headed up stream for our favorite island when it really began to pour-torrents. We headed for a nearby island to get some bit of shelter under some big trees. Couldn't get the motor started in the downpour, so headed back to the landing and gave it up for the day.

Put pontoons on the canoe as that seemed to be somewhat safer carrying grandchildren Kenny and Gregg. Headed up to "our" island one day with both grandchildren and Sarah plus the two of us. It was a bit cloudy but it wasn't raining. We made camp on the island and fished and ate and set up camp. The Potomac kept rising. I would put sticks in the sand to mark the progress of the river's rise and it just kept coming up.

Kenny and I decided that we should be prepared in case our island shrunk out of sight. We put all the gear other than tents and sleeping bags into the canoe and tied it up to a well rooted tree. It was nine PM and we were ready just in case. The water was lapping close to one of the tent walls, when, finally, it began to subside about 11 PM. We felt safe enough to go to sleep.

Hilda and I flew to Las Vegas in September and visited Karen and Jim. We stayed at the Nevada Inn in Boulder City. We fished Lake Mead and flew over Nelson's Landing to see the damage caused by the flash flood. Lots of folks didn't believe the report that the flood was coming. It's hard to believe when the sun is shining! Many vehicles and trailer homes were washed away and some lives were lost.

I attended the annual meeting of the Mining Congress in Las Vegas. Then rented a car and drove to Grand Junction to stay at the Ramada Inn. Visited Gene Grutt, the then AEC Operations Office Manager, to see how the program was progressing. It was slow as nuclear power plants were not being built at the anticipated rate.

On to Roaring Fork to visit with Ron and Pat Brownell. Hilda caught a huge trout. We were taken with the place and decided it might be a good investment to buy a chalet there. Ron and Pat talked us out of that notion and into the idea of buying a \$10,000 interest in the Stagecoach Inn that they were operating and that they claimed to own. It turned out that they had no ownership and no right to sell. But they took our money and we had no recourse to get it back. We went over Independence Pass to Leadville and on to Denver for the return trip to Washington.

EIGHTH WORLD MINING CONGRESS-PERU

I went to Lima, Peru to participate in the Eighth World Mining Congress. Gave a paper titled World Resources vs. Copper and Aluminum Demand to the Year 2000. Al Knoerr and I collaborated on the preparation of this paper. We predicated the consumption figures on world population growth. It was supposed to have been a "landmark" paper, but I never went back to see how good the predictions were in relation to the forecasts. But then there was a big gap between 1969 data and the year 2000. Maybe that is when I should see how good or how bad the forecast was.

From Peru I headed to Rome and Geneva to attend the Lead-Zinc meeting. I still have vivid memories of the flight from Caracas, Venezuela non-stop to Rome. It was stormy with lots of lightning. I wondered what would happen if the plane was hit by one of the many lightning bolts.

The meeting in Geneva went off without incident as we developed forecasts for lead and zinc production and consumption for 1975. These forecasts were an annual exercise that was extremely helpful in indicating whether exploration for and development of new deposits should be undertaken. Home was a welcome sight. But then I had to leave again in December to attend the Northwest Mining Association. But I knew that between Paul Yopes, Bill Hall and Bob Griffith that the wheels would keep turning in Mineral Supply.

A new director, Roger Markle, had come aboard and thus the bureau was reorganized again. I knew Roger from a time he had visited Toquepala.

Hilda and I decided to take a Florida fishing vacation. We took our canoe along and drove to a Camp George south of Jacksonville. Fished the river, Lake Stella and Crescent Lake. Caught lots of fish and had fun. I was refreshed and ready to go back to work.

DOWNHOLE-REPLACEABLE CORE DRILLING BIT

Now and then there was an exciting development under way. For years the single most costly and unproductive effort in doing exploration diamond drilling was the pulling of an entire string of drill rod. Sometimes these were thousands of feet long. For years this had to be done to recover the core or to replace the diamond drill bit at the end. The string no longer had to be pulled to remove core since the invention of the wire line system for core removal.

A retractable bit system was developed jointly by the Longyear Co., and Doerfer of Cedar Falls, IA under a Bureau of Mines Research contract. The retractable bit is a one-piece diamond cutting element created by "slicing off" two parallel sides of a conventional diamond core bit. This configuration along with some minor modifications to the coring system allows the bit to be rotated in two planes. With the retraction- insertion tools, the bit may be raised or lowered through the interior of the drill rods using a conventional wire-line system.

The State Geologists held their annual meeting in 1975 at Asheville, NC. We took the scenic route south via Skyline Drive and the Blue Ridge Parkway. On the return trip we fished Claytor Lake. Sometimes we varied our local fishing trips and tried River Bend. It was a pretty good place to fish as there were plenty of rocks.

We would hang up on the rocks now and then. Hilda was usually ready to jump out and shove us off. Once she did so and then took one more step that plunged her in over her head. She came up sputtering and grabbed the canoe. It was hard to keep from laughing at her surprised expression.

ALASKA REVISITED

It was time to see the progress we were making on the Mineral Land Assessment program in Alaska. In August I headed for Alaska overnighting at Seattle. Tom Falkie, our new Director took his son Larry on this Alaskan trip. The next day went on to Anchorage. After flying westwards over Cook Inlet, headed north to Iliamna and Lake Clark. Thence flew to Nome via Kuskokwim. Visited a gold dredge # 5 operated by Ted Hunter an old Philippines hand.

I stopped at the field camp of Willie Foster's on Hannum Creek. Willie was the owner of the Nome Aviation setup. The Hannum Creek camp was where Willie and Jane, his lovely

Eskimo wife, got away from the press of things in Nome. They had a sluice box and did a bit of gold production. We panned some gold there. On the way back to Nome we stopped at the Niukluk River and fished for char. Tremendous fishing!

Overnight at Kotzebue in the new motel built by the Native Corporation. It was called the Nul-Luk-Vik. The dinner menu included Shee fish, salmon and reindeer steaks. Walking around Kotze we saw a huge piece of jade that a craft shop had barged in from Jade Mountain. Whenever they needed a piece, they went to the front yard and sawed it off. We flew to Pt. Barrow, then on to Prudhoe and Fairbanks. I visited the University to meet with Earl Beistline and Ernie Wolff, then took a trip out to see Walter Roman's placer operation and enjoyed a salmon and moose bake that night as guests of Col. Martin.

We stopped at Cordova on the way back to Juneau. We had to make several passes at the Cordova airstrip to scare off the grazing moose. Then on to Juneau where we paid our respects to Governor Jay Hammond and Bill Fackler. Overflew Tracy Arm, the Alaska-Juneau mine and Sum Dum mine.

I went out Saturday with Bob Warfield to Shelter Island and fished for salmon. Good luck! Byron Hardie of Newmont came along with his wife Rita, Will Dare, Tom and Larry Falkie, and Dave and Pat Carnes.

BRADY GLACIER

Sunday Byron Hardie briefed us on the Nunatak property on Brady Glacier. This had an interesting history. The outcome shows that even though you may have patented claims that doesn't always mean that the property can be worked.

Brady Glacier and the area in which it is located was thrown into Glacier Bay National Park to simplify administration. Some pilots flying by a nunatak or rock island in a glacier noted the gossan of iron stains and located a series of claims. The deposit was drilled from platforms located on the glacier and a copper-nickel resource was drilled to delineate sufficient ore to justify the creation of a mine and mill.

The only logical mill site was at the water's edge. The mine could then be opened up from a tunnel with a nearby portal. Drilling underground would be undertaken to fully delineate the deposit. The Department of Interior refused to let the owners have a mill site at waters edge on the grounds that it would impair the natural beauty of the area should anyone venture by. A mill site would have been permitted on the claims but there was over a 100' of ice on them eliminating any possibility of mill construction.

Thus the USA was euchired out of a copper nickel resource of at least 80,000,000 tons running half a percent nickel and a third of a percent copper. Millions had been spent evaluating the deposit - a total loss.

That September Hilda and I went to the American Mining Congress annual meeting in San Francisco. Then on to Sequim and salmon fishing before going via Forks around the Olympic Peninsula. In Olympia I met with Ted Livingstone and Bob Welch, the Bureau's mineral man for Washington. Drove to Portland for a similar meeting with John Hook and Andy Corcoran. Returned home via Las Vegas, Death Valley and the International Mining Equipment Symposium in Houston where I presented a paper.

I spent my birthday in Arlington Hospital for a roto-rooter job. It was successful.

January was cold and wet, but I went to Duluth to present a paper and there it was bitter cold. No sooner had I gotten back to Washington till I was off again to go to the Colorado Mining Association meeting. Then home again and we spent our weekends hiking and, when the weather warmed a bit, it was to Point of Rocks or River Bend and fishing.

It might seem like a silly sport to hold on to a slender stick equipped with a line and a hook in the hopes of have a finny fellow snatch your bait and hook himself. But there is some magic in that pursuit that cleanses the mind and refreshes the soul. It is an absorbing function and releases the mind of any trammel leaving it free to soar and wander where it will. Me, I'm all for fishing!

What's more, it's a good thing to do with your grandchildren. We frequently took Kenny and Gregg and they enjoyed the challenge, the fresh air and being with us as we enjoyed them, watching them grow.

OIL RECOVERY FROM UNDERGROUND SITES

Had to attend the AIME meeting in Las Vegas and gave a paper on one of my favorite topics - Oil Recovery From Underground Sites. I had been pushing this for a number of years. I persuaded Jim Scott, assistant Director for Mining Research, to let two contracts to examine the feasibility of underground extraction of oil and some successful concepts were generated. But we were pushing the wagon uphill.

The resource, oil left in the ground after primary, secondary and tertiary recovery, all belonged to the oil companies. And they just were not and are not interested in producing a barrel of oil at a cost that might be a penny higher than what they can get it for elsewhere. Further, ORFUS didn't lend itself to any major government program like oil shale. Although oil from shale is much higher in cost than oil that might be recovered by

mined access, its projects are on federally owned lands and major efforts could be made, unsuccessful as they might be.

Some day we'll go after a part of that resource as the Canadians are doing now and I don't think the time is far off. I wonder what the cost of our oil imports are if the cost of the Gulf War were factored in?

In Carlsbad, NM in April and visited the Nash Draw mine of Duval. We were involved in the WIP, the Waste Isolation Project for disposal of radioactive wastes. The Bureau's roles was to assess the potash resource that might be lost or impaired if the project were carried out. Hence I wanted a first hand look at the conditions underground, particularly with respect to underground water.

Later, in April, I made a presentation to a Congressional Committee on the Brady Glacier deposit. Although the committee favored allowing the project to proceed, it was a minority.

CHAPTER 12.

GERMANY AND NORWAY - STATE GEOLOGISTS MEET IN COLORADO -
CORE LIBRARIES - REORGANIZED AGAIN - NEW RIVER

GERMANY AND NORWAY

Early in May Hilda and I flew to Hamburg, Germany. I was a guest of the German government in its study of the future needs for minerals and how they would be met. Hamburg was an enjoyable experience. Old friends Uwe Harms and Helmut Strodeck showed us around the city and its environs, including the Rieperbaum. The meeting over we took the train to Copenhagen. Then flew to Stavanger with the object of doing some fishing on Norway's lakes.

Rented a car in Stavanger to take off for the lake country. We drove via Sandnes to Sandnesfjord and on to Solheimsvik. The ferry up the fiord took us to Nesflaten in the rain and then we drove on up to Roldal. It seems we were there at least a month too soon as we drove through cuts in the road where the snow was 15 ft. deep. Overnighted at Haukelisater where we had planned to fish. The lake was visible as the only near flat place around and it was completely covered with snow.

Driving south to Ryukan we saw the heavy water plant the Germans operated in WWII and which our warplanes bombed to destruction. On to Konigsberg to see the silver mine and museum. A deep impression was made by the thousand of silver nuggets of all shapes and sizes in the museum. Another museum feature was a view of reconstructed working places showing figures of miners at various tasks. On the bridge over the roaring river, each lamp post was a different figure and even included one of a boy dousing for silver.

Oslo was a lovely city. We stayed at the KNA Hotellet and toured around to see the Kon Tiki, the Viking ships, the Shoget, and Fram museums plus Frogner Park with the numerous Vigeland sculptures. Vigeland must have been an interesting character. Certainly he had a huge imagination to create the strange and wonderful art that inhabits Frogner Park. We took a bus trip out of town to a nearby TV tower. The bus was loaded with hikers off for a day in the mountains. They did not have to travel very far as

Norway's mountains crowd the cities and small communities. But they also offer an escape from the press of everyday lives.

The Norwegians recognize this and revel in the beauty of their homeland. Much of their lives and activities are socialized. Many are depressed by the envelopment of government but see no hope to escape to opportunity. Their rigidly ordered lives made me feel again a deep appreciation for the freedom of being a citizen of these United States.

We went off to London to overnight at Heathrow's Skyline Hotel and were happy to return to Arlington. It was good to stay home and spend the weekends at River Bend or Point of Rocks to do a bit of fishing even if it was slow in the summer's heat.

But on June 20th, Father's Day, I was off to Denver with Allen Agnew of the USGS. We went on to Leadville to review the situation with respect to the Leadville Drainage tunnel that was discharging pollutants into the upper reaches of the Arkansas River. The water running out of the tunnel was red with its load of leachate from the mines. Later on, a facility was built to clean up this contaminating flow.

Roger Markle stuck around for only six months. His principal accomplishment was to stir things up much in the manner of a desert dust devil. Under the Carter administration, Cecil Andrus was Secretary of Interior. Joan Davenport was Assistant Secretary for Mines and Minerals. Her main claim to knowledge in the field of her responsibility was her father's financial participation in the Carter campaign.

STATE GEOLOGISTS MEET-COLORADO

The next Monday I went to Vail for the annual meeting of the State Geologists. Took a field trip to Climax plus a visit to the Black Cloud mine above Leadville and to the Day Mines nearby operation. The Colony Oil Shale project was on our agenda and I also had the opportunity to go underground at the mine at Gilman with Jack Marchant.

The Gilman mine had a long and interesting history beginning with the Chinese that drove small openings into the mountain side and worked with a partner who would pull out the powder box that his miner pal had loaded. Then, when the powder box was emptied, the miner would pull the box back to the heading with the rope on the other side of the box. That was tough mining but from that small beginning a great mine developed.

On Saturday I fished the Eagle River and Deep Lake providing some fresh trout for Sunday's breakfast. On Sunday fished the Blue River and then returned to Denver via Rocky Mountain National Park to attend the Director's management meeting on Monday and Tuesday. It seemed we were always having meetings. Yet the good work of the Bureau progressed despite all the reorganizations and meetings.

Then Lindsey Norman was acting director for about a year and a half and then director for about 6 months. Robert Horton came along to stay about 6 years leaving in July 1987. T Ary came then and as of November 1992 was still aboard. Now that Bill Clinton is President there will be many changes. Like many government agencies, the Bureau of Mines has become politicized and it can be expected that T Ary may be replaced. There is no period after the T as that is his first name in its entirety.

CORE LIBRARIES

Recognizing that diamond drill core is the best available information on an unworked mineral deposit the Bureau of Mines had long been a repository for the exploration diamond drill core from private company drilling. When and if a company no longer wished to retain its core, it could be shipped to one of several US locations where the core would be stored, maintained and catalogued for ready access. At least that was the theory.

These core libraries were visited frequently by mining company geologists. In any area that had been drilled and where interest had been renewed for reasons such as changed demand or economics, the core libraries were a fertile source of data. Maintenance was a problem. It took personnel. Boxes frequently broke and core was lost or at least jumbled so much that its value was destroyed. This was especially so if the library had to be moved.

So we set out to develop a better system. Larry Walters headed this effort and came up with what appeared to be an excellent system. When we learned that core was to become available from an exploration project, we would ship them cardboard storage boxes. For uniform treatment all core had to be placed in the same type box. Core to be saved would be immersed in water and frozen with the box tilted a bit so the core would be precisely spaced up against a partition.

The frozen core in its box would be positioned on a saw table and slit by three circular diamond saws. This operation provided four slices, two as quadrants of the round core and two flat pieces. The rounded segments were available for destructive analysis. The flat pieces about 3/16ths of an inch thick were usable for study or storage. Now instead of the bulky heavy boxes, the core could be conveniently stored in file cabinets along with any descriptive text. I felt that this project would be a real cost saver and at the same time provide more convenience for storage and study. But funds just weren't available to implement the concept.

REORGANIZED AGAIN

Advent of a new director was always traumatic. Many hours were spent in useless speculation as to how the new man might reorganize. Additional hours were wasted in trying to influence the new director. Plans already made were put on hold or altered in efforts to reflect the new thinking that might emanate from a new director.

It could even be expensive on a personal level. I had been invited to speak at a World Mining Congress in Bucharest and my participation had been approved by one director. I prepared the paper and completed travel arrangements for both of us as Hilda was going along. I had made a partial payment on her ticket and had forwarded funds for hotel reservations. A new director canceled the trip. Hilda was crestfallen as she had looked forward to the trip that included a weekend in Dubrovnik.

In mid July I was in Sheridan, Wyoming, for a fuels conference and visited the Decker and Big Horn coal mines. The Wild and Scenic Rivers Act got the Bureau involved in making mineral land assessments in the areas of candidate rivers. One of the sites was the New River in West Virginia. We had to assess the bituminous coal resources that would be lost should the New River become designated as a Wild and Scenic River.

THE NEW RIVER

The exercise was sort of strange as railroad tracks ran along both banks of the river in a part that would be included in the reserve. There were also a few operating mines along the river. But we had to make the survey. Some core drilling was involved and we also took a trip down the river, stopping to examine a number of the mines.

After overnighting at the new and plush Mine Health and Safety Academy at Beckley, WV, we went down to Thurmond to get ready for the river trip. I was reminded how the new MH&S Academy came into being. I think Osborne was director when he was called to make a presentation on the Bureau's plans for training inspectors to function under the new health and safety law.

We had developed a plan that called for using the underutilized mining schools as training sites for the new inspectors. Facilities for housing the classes of inspectors were up and running and the teaching staffs were in place. The would be inspectors would be moved around as needed to round out their training as inspectors in both coal and metal mines as well as in surface and underground mines.

Senator Robert Byrd of West Virginia hit the ceiling and rejected the entire plan. He told Ozzie in no uncertain terms to go back to the drawing board and report back with a well rounded plan for a specifically designated Health and Safety Academy to be built in

Beckley, West Virginia. This was eventually done at a cost to the taxpayer of \$84 million. It even included an Olympic sized swimming pool under the guise of underwater training for the student inspectors.

The New River raft trip included many stops as we disembarked and climbed up to mine sites. The crew consisted of Will Dare who was in charge of the Mineral Land Assessment program, Bob Thomson of the Eastern Field Operation Center, Pete Morey and Gordon Leaf. Our guide was adept at handling the rapids assisted by his crew's vigorous paddling.

Our efforts disclosed substantial coal resources, but the need for recreational rivers outweighed the value of the coal resource. That section of the New River received the Wild and Scenic River designation.

Shell and Shirley came to visit and we enjoyed their company. Took them to several interesting places to eat and went fishing also. A week later Shell and Shirley took off on a visit to Nova Scotia. Shell really has the wanderlust.

Towards the end of August I went to Carlsbad, NM, after a brief meeting with the ERDA people in Albuquerque. ERDA was the short lived Energy Research and Development Administration that had absorbed the Atomic Energy Commission and that would later become the Department of Energy.

We explored what ERDA wanted us to do on the Waste Isolation Project in Carlsbad. Visited the Duval Mines and National Potash.

CHAPTER 13.

PERU AGAIN - JULIACA - MACHU PICHU - LIMA

PERU AGAIN

In September Hilda and I traveled to Peru. I had been invited to speak at the XIII Convencion de los Ingeneiros de Minas. Blanca Huaco from the US Embassy met us at the airport and took good care of us. We went on to Arequipa to stay at the Hotel Turista in that lovely white city nestling close to the towering peaks of Chachani, el Misti and Pichu Pichu. We took a field trip to visit my old haunts of Cuajone, Quellaveco and Toquepala. It was good to see old friends and associates. Spent the night in the new and pleasant Turista hotel in Moquegua. The ceviche was excellent. I had always enjoyed Peruvian food. Then back to Arequipa.

En route to Arequipa the countryside was the barren sandy rocky land so typical of the western slope of the Andes and the coast range. We encountered several barchans that nearly covered the road. These barchans are an interesting and formidable phenomena. The barchan is a moving sand dune crescent in shape with the horns pointing down wind. The windward side is steeper than the lee side. We saw several that were 15 or 20 feet high and perhaps 150 feet between the horns.

Their movement is inexorable! It takes bulldozers to keep part of the road open to traffic when a barchan crosses it. The alternative is to drive around it on a temporary road. The barchan moves on at rate of several feet a year so the detour around it is most practical. The sole visible sign of the movement of a barchan is the wisp of sand that keeps blowing off its crescent top. As they move to the east across the desert, other barchans of white sand blown up from the coast are formed. As the barchans reach the mountains they move upwards and disappear as the fine sand is worn to dust.

The day I gave my talk, Hilda went off with Sr. and Sra. Ernesto Baertl Superintendent of the Castrovirreyna mine of the Cia. de Minas Buenaventura. The Baertls spoke no English and Hilda no Spanish. Despite the inability to communicate she had a good time and even enjoyed her calamari luncheon - that is until she found out what it was - squid.

There was a cena dansant or dinner dance one night that was enjoyable. It was preceded by a series of cocktail parties around the city. One jarana, or party, was held in an old converted windmill that was now a small and very select hotel. The ambiente was delightful.

On still another evening Copco held a unique party in a monastery the company had taken over for the evening. We entered the several block square monastery through a gate in the high walls surrounding the entire site. The event was a Verbena. Alberto Benavides of Cia Minera Buenaventura, a friend of many years, tells me that this event held in the Arequipa Monastery (Santa Catalina) is, according to the Real Academia espanola a "Velada y feria que en Madrid y otras poblaciones se celebra en los noches de la víspera de San Antonia, San Juan, San Pedro y otras festividades para regocijo popular." All this means is that a Verbena is for the enjoyment of the people to take place at certain times.

Immediately after entering the monastery a cowled server offered pisco sours and another offered candles. It seemed that there was one such monk on every turn as we were led through the facilities. Their offerings varied and some just nodded benignly.

Hilda was decked out in full regalia. Her long gown and high heels were charming but hardly suited to the monastery's cobblestones. Hence our progress along the route of the Verbena was slow. Perhaps it was for this reason that we may have gotten more than our shares of the pisco sours and empanadas.

Through a barred window we saw monks at prayer. As we moved on we were offered anticuchos and delicious empanadas of a wide variety. The empanada is the Peruvian equivalent of the Cornish pastie and are delicious.

Torches helped light our way. They were set in sconces in the stone walls and cast an eerie light over the various proceedings. Chants in Latin were subdued but audible as we progressed through the old monastery.

There were many different types of performers to entertain us as we followed the tenuous route. Singers, dancers and puppeteers were entrancing. It was a memorable evening. I had never experienced anything like it before or since. We wondered whether the many monks we saw were really monks. The next day we learned that they were actors engaged for the very special event.

After the meeting was over we took the train to Juliaca. The train trip was spectacular as the route wound around El Misti as the track went higher and higher. The Nevada de Chachani was particularly beautiful with its snowy crown thrust into the cloudless blue sky. We saw a herd of Vicuna as we crossed the Pampa de Arrieros. This was rare as the herds of the beautiful animal had been greatly reduced by illegal hunting.

At Crucero Alto we crossed the continental divide. From here on all the drainage was to the east toward the Atlantic. Not far north of us was the place designated as the headwater of the Amazon River.

Seated next to us on the trip to Juliaca was an attractive Peruvian family. The two young daughters fell in love with Hilda. They took real pleasure in practicing their English on us. One of the girls was an exuberant baillerina and performed in the aisle several times.

JULIACA

In Juliaca we stayed at the Turista there and tried to keep warm huddled over the tiny electric heater in our Spartan room. Between the cold night and the effects of the altitude neither of us slept well. It always takes some time to get adjusted to high altitudes. Soroche, mountain sickness, just isn't fun!

Hilda got a big kick out of the market square of Juliaca and visited and bargained with the many vendors. Hilda's lack of Spanish seemed no barrier to her trading. She bought a good supply of hand knit sweaters and other items as gifts. The square itself was a colorful sight with the Quechua and Aymara ladies decked out in their dress of many flaring skirts, bright woven shawls and their white painted top hats or derbies.

We took a launch out to the floating islands of the Uros Indians. They live on these reed islands that lay on the Peruvian side of Lake Titicaca. Maintenance is a continuing process. As the older balsa or reed rots and becomes waterlogged, new balsa is added to the top.

The Uros are a rugged people that have adapted to the chill life on their reed islands. They keep cutting balsa and fish. Whatever else they lived on was not evident to us. The Uros seemed to have a resistance to their chill surroundings that we did not share. We saw small children clad only in what appeared to be tee shirts. Even though their bottoms were bare, the chill air seemed to be of no bother.

But they do have some cash from the many tourists that visit them. We returned to Puno and then to our turista hotel in Juliaca before taking off the next day by train to Cuzco.

The train stopped from time to time and we disembarked to walk around a bit. It seems that the train workers were on a strike and showed their independence by periodic slowdowns and unscheduled stops.

The stops seemed to be made at spots that offered something for the train crew. There were usually Quechua ladies in their many pailleras and their white top hats offering anticuchos for sale. Their little stoves fired with ucha not only kept the ladies warm but served to cook the chunks of marinated heart that were skewered on wire. Jugs of chicha were available to wash down the anticuchos. We observed but did not partake as the general hygienic situation seemed to lack something.

On September 16th in Cuzco, we rose early after a fitful sleep. We had not yet fully adjusted to the altitude but were both spared the suffering of soroche. An early breakfast

and we took a cab to the train station. As the train climbed out of the valley we looked over the uneven quilt work of the tiled roofs of Cuzco. The Incas had made a prudent choice in selecting that lovely valley as their capital. What a shame that the Spaniards main objective was to destroy and replace that ancient civilization with their own!

Slowly the train moved to the summit and we had many views of Cuzco as the sun got higher. From the top of the pass we started down. This was a thrilling descent, so steep that there were several switch backs that were slowly maneuvered to descend the steep slope. It wasn't long before we were in the valley of the Urubamba - the thunderer.

At Ollantaytambo there was another unscheduled stop as the train crew expressed itself. Thus we had time to climb up to the nearby Inca ruins to explore the ancient structures. One was a sacrificial altar with drains carved in its surface to carry off the blood of the victims. Back in the village we saw a stone hut that advertised Cerveza. We couldn't resist the temptation and we quenched our thirst. Since leaving the high country it had become quite warm.

MACHU PICHU

Finally the "slowdown" crew said it was time to move on. As the train moved down the valley we caught glimpses of snow capped peaks far above us. Nevada Salcantay and Veronica were among the awesome peaks. Finally we arrived at the Puente de los Ruinas and disembarked. We then boarded small buses to cross the Urubamba and climb the many switch backs to the Turista Hotel of Machu Pichu. The buses crept across the bridge with only a few inches clearance on each side.

The sixteen room Turista could accommodate 32 guests. There were frequent errors in making reservations and many disappointments on the part of folks who had planned to spend the night and then found that their reservations had gotten fouled up. We were lucky and were glad to have the tiny room with its two iron cots.

After depositing our gear, we went out to see the ruins. This was Hilda's first visit and my fourth to Machu Pichu, but there was no lesser interest on my part. Machu Pichu is an entrancing place-full of mystery and beauty. Hidden on a small plateau, 8000 feet above sea level, surrounded by steaming jungle and snow-capped mountains, no one knows for sure why it was built.

Was it an Inca shrine, resort or citadel of final resistance? Although local farmers and herders knew there were some old structures, Hiram Bingham, in July 1911, began his search for what he called "the last Inca capital." It was our privilege to see the place where

the Urubamba, plunging from the cold plateau rips its way through the gigantic granite mountains. As far as I know, there is no equal to its majesty elsewhere in the world.

Snowy peaks rear their summits above the clouds as they tower two miles above Machu Pichu. There are monster precipices of vary-colored granite that rise sheer above the river for thousands of feet. They tower above the torrid valleys with their dense jungle, ferns and orchids - truly a land of severe contrasts.

It seemed rather prosaic to sit and view this scene while we ate lunch. But we were hungry. We sat on the verandah of the tiny hotel and ate thick bean soup, chunks of veal and vegetables over rice, more beans, and the cold dark Cuzquena beer. Then we were ready to follow our guide as we explored the ruins.

We entered the abandoned city through the main gate, a wide archway of granite blocks, topped by single hand hewn stone said to weigh more than ten tons. Rounding a short curve there was spread out before us an extensive series of andenes, terraces that went up to the ridge top and descended toward the valley ending just above a near vertical cliff more than a thousand feet high. Each terrace was six to ten feet above its neighbor. Hand cut granite blocks laid in walls created sufficient rise to provide benches 10 to 12 feet wide. Each bench had been filled with soil so that crops could provide sustenance for those that resided here more than half a millennium ago.

Hiram Bingham's "Lost City of the Incas" describes the scene to perfection. "I know of no other place in the world that can compare to this sight. There is the fascination here of finding, under swaying vines, or perched atop a beetling crag, the rugged masonry of a bygone race, and of trying to understand the bewildering romance of the ancient builders, who, ages ago, sought refuge in a region that appears to have been expressly designed by nature as a sanctuary for the oppressed; a place where they might fearlessly and patiently give expression for their passion for stone walls of enduring beauty."

Llamas grazed on the terraces and took no notice of us, the intruders. We climbed beautifully constructed stone steps beside a waterway that distributed equal quantities to the multitude of terraces. We walked on by many of the small buildings that made up the ancient living quarters. All are open to the sky but once were thatched to keep out the rains. The precision cut stones weighing tons are a marvel.

The Incas had no iron nor steel tools. They used other stones and bronze crowbars to do their artful stonework. One theory is that they split stones by wearing a groove in the surface with their harder stones. Then they built a fire around the stone and when it real hot, cold water was poured along the groove to split the stone. Wedges of wood were driven in the crack and more water added to split the stone.

This seems plausible, but tourists in Cuzco are besieged by small boys with pottery flasks that they sell as containing the liquid supposedly used by their forebears to dissolve stone. Not so believable. But anything goes in Peru. In Lima you could pay ten soles to see the mummy of Pizarro. But if you paid 25 soles you could see the mummy of Pizarro as a young man.

Today the stones of Machu Pichu are smooth to the touch, but they were probably smooth when installed. Some rooms had fours walls, others were open on one side. Machu Pichu has climate, not weather. Year round the temperatures varies only slightly from daytime highs of 85 F and nights of 55 F.

We climbed up to see the "Intihuatana" stone, possibly the only one left intact. The Spaniards destroyed them systematically as they were a source of power to the Inca priests who used the post-like stones to tie back the sun and redirect its course at the times of the equinox. The Intihuatana stone of Machu Pichu was located on a small hill within the complex and was carved at the top of a massive in-place granite mass.

Finally we walked back to the hotel. The sun sets early in Machu Pichu as the towering peaks on either side make the days short. When the last train departed for Cuzco, a vast quiet descended on this place of mystery. We retired early so to be prepared for our planned morning climb of Huayna Pichu, 1000 feet above the abandoned city.

Morning seemed to come too soon, but after a breakfast of strong coffee, eggs and toast we headed out towards the northern limits of the city. We found a small trail winding down from the plateau that soon joined a knife-edged ridge. With the ridge so narrow and the only trail poised perilously on its serrated edge, a single Inca could easily prevail over any would be attackers.

Shortly after traversing this access area the trail zigzags back and forth and is somewhat easier. In the steep spots there are stone steps to navigate. When we paused to rest it was to admire the lush vegetation. Wild orchids, almost magenta in color peeped at us from all directions. As we ascended they gave way to mesquite and mountain grass. Then we came to a fork in the trail.

We selected the right hand fork and moved out. After a crawl through a narrow tunnel we emerged into the sunlight and proceeded to the top for a rest and to pay allegiance to the sun-god. It was Friday, September 17th 1976 - a day to be remembered. Not long after, the Peruvian government closed the trail. Too many people, it seemed, had fallen from the trail, and more often than not, their bodies could not be recovered.

Huayna Pichu is a pinnacle of rock that only falls a bit short of having been an island in the furious tumbling Urubama. Except for the only way to its summit, all the other sides

approach the vertical. We discovered this when we chose to make the return journey via the other route. That involved a nerve wracking descent over 117 stone steps that perched at an angle of 70 degrees. Most of the steps were less than two feet wide and six inches deep. We were forced to sit and descend a step at a time while watching each foothold carefully. To slip meant a fall of close to half a mile. We were so far above the Urubamba that its roar was inaudible.

A cold Cuzquena beer with lunch tasted just right as we sipped it and nibbled crisp chips of sweet potato. Then another walk through the entrancing ruins before boarding the bus to return to the rail station at Puente de los Ruinas. As the bus slowly navigated the countless switch backs on what is called euphemistically the Mason Bingham highway, small boys would follow a more direct path and urge us to toss them coins. Their agility deserved reward and we tossed sole after sole for them to snatch from the air.

Finally we boarded the train for the return to Cuzco. Despite all the chatter and the train noise, I slept for several hours awakening to see the snow clad peaks as we climbed out of the valley. Saturday we toured Cuzco to see its many delights.

In one cathedral we saw abundant silver decorations amassed by the Spanish. I attempted a rough estimate and came up with \$5,000,000 in silver at a minimum. In another cathedral we admired the works of early Quechua artists who had been trained by the Spaniards. One particularly interesting painting some 18 ft. long by 10. ft high depicted Jesus and his followers at the last supper. Tropical fruits overflowed the baskets. The center platter was loaded with cuye. The cuye or Guinea pig, an exceptional treat for the Indians and native to South America, gave us a laugh as the cuye was unknown in biblical lands.

LIMA

We took the afternoon flight to Lima and stayed at the Gran Hotel Bolivar, one of my favorite hotels. Hilda shared my pleasure in its Victorian atmosphere. Alberto Benavides was Mayor pro tem of Lima at the time and put a chauffeured limousine at our disposal so we could tour the city. Our visit included the Place de Armas and the President's Palace, Torre Tagle and the famous Huaco Museum.

We paid a few soles entrance fee to the Huaco Museum and were astounded at the thousands and thousands of huacos it housed. Neither the Incas nor their predecessors had a written language. They were great weavers, but their closest approach to writing was the huaco. These small pottery containers were formed to display every imaginable human activity. Pottery making, weaving, cooking, fighting, drunkenness, surgery, tool

making and all were among the activities shown. Included in the displays were hundreds of huacos portraying all kinds of animals. Birds and fishes as well as vegetables made up many of the collection of huacos. We spent several hours examining the wide variety of portrayals that varied in color, size and with the skill of the potter.

When we had finished our tour, the ticket taker asked if we would like to see the other Huaco museum that was devoted to sex. So we paid an additional few soles and were conducted to a separate building, not quite as large as the main museum. Here every imaginable sexual activity was shown in the extensive collection of pottery. Normal, abnormal and weird sex activities were constructed in the collection. It was obvious that the Moche and Chimu people were devoid of any inhibitions. Perhaps what seems abnormal sex to us was the accepted thing in the Mochica-Chimu civilization that thrived for more than a thousand years before falling before the Inca warriors in the 1400's AD.

And, as in the main museum, there was not just one or two huacos showing a function, but a multitude laid out on the innumerable shelves. In addition to sex, every bodily function was reflected by the huacos. They didn't need a written language but told it all with their cleverly wrought pots.

Our patient chauffeur awaited us and took us through town and to the outskirts where we visited the underground gold museum, perhaps the most extensive collection of Inca gold in existence. The museum is privately owned and admittance is restricted. We felt quite honored in having been allowed to see the great treasure. Those goldsmiths of long ago were most skillful artisans, but the impression the gold collection made was somewhat overshadowed by the history shown by the Huaco Museum.

That night we had dinner at the Key Club with Alberto and Elsa Benavides and their children Raoul and Mercedes. Also present were Eduardo (Cucho) and Danny Rubio and Carlos Soldi. On Monday the 21st, we visited the Universidad Catolica where Carlos Soldi headed the mining department. Then the long late night flight back to the United States.

CHAPTER 14.

JAKARTA - KUALA LUMPUR - SAR CHESHMEH, IRAN

JAKARTA

The U. S. Department of Commerce had a program aimed at boosting US overseas sales. In the mining area it consisted of sending representatives of US mining machinery manufacturers to selected countries to present symposia on mining technology and conduct one on one meetings with potential machinery buyers. The Department went to the Bureau of Mines to seek a chairman that could round up speakers, select subjects and present a well rounded series of papers that would be useful to the countries visited.

I was designated to conduct a symposium to be held in Indonesia and Malaysia. As Kuala Lumpur was half way around the world, I decided to go all the way and visit Sar Cheshmeh in Iran en route. Hilda decided she would go along as well.

Got busy and assembled a team from a number of companies and assigned them topics. When the program was arranged and advertised in the host countries, we took off. Left for the Orient on 15th with stops at Chicago and Anchorage to overnight at the Tokyo Hilton. Didn't get to see much of Tokyo as there was only a few hours in the morning before our departure.

But there was a lovely temple nearby and time to walk a few blocks in the city. In Hong Kong we changed planes for the final leg to Jakarta. Garuda International Air lines managed to lose our baggage.

That night there was a reception by the US Ambassador Newsom to Indonesia. I went in my traveling blue jeans. Hilda refused to go. But the baggage finally arrived. We stayed at the barely completed Jakarta Hilton in a lovely suite. We were made welcome with bottles of bourbon and scotch in our room and orchids on the pillows. The dining room was not yet open and the waiters training school was in progress. But the coffee shop was operating.

The hotel was situated in a lovely park that recreated a number of lovely Indonesian temples and other structures including artistic bridges over the central waterway. We had dinner with the Ingersoll Rand local representative somewhere in the suburbs of Jakarta. Ian and Sandy Chalmers were wonderful hosts and we enjoyed the company of John and Julie Humphries and Mike Balint.

When Mike learned we would be going on to New Delhi and Agra, he most graciously arranged to have a reliable driver meet us at the airport for the trip to Agra. At the conclusion of the conference, we had a free day to rest up and get ready for the trip to Kuala Lumpur. On October 22nd we left via Malaysian Airlines, a truly luxurious trip.

KUALA LUMPUR

We were booked into the Equatoriana Hotel that even provided us with stationery with our name in gold print. The several bottles were also welcome. On Saturday we visited the nearby Selangor tin mining-a dredging operation. Sunday was a free day that we spent mainly in the hotel pool where we first ate sate.

The seminar took place Monday. Then there was time to visit more mines. Saw several gravel-pump operations operated by Chinese that had, in most cases become wealthy from tin mining. The floating dredges can only dredge to a smooth bottom and are stopped at the tops of the rock pinnacles. But there are huge quantities of productive sand and gravel left lying between the pinnacles of rock.

That is when the gravel-pump operator takes over. They use monitors with high pressure water and flush the muck to huge locally cast gravel pumps that may use several lifts to raise the muck to the surface. The monitors used were not the easily operated Intelligants. They were all the old fashioned variety that were counterbalanced by a box of rock on a long beam. It took a lot of effort to handle them.

On the surface the sand and gravel is distributed through a launder at the high end of an elevated structure that feeds a series of riffles. This tin washing of the gravel pump discharge or dulang is called a Palong. Women in black dress barefooted and wearing conical straw hats tend the riffles, and gather up the cassiterite concentrate. The boss lady, an elderly Chinese, kept close watch on the crew to make sure no pilfering occurred. The women earned about 80 cents per day and with the tin concentrates worth about \$5 per pound, the temptation was great.

We visited Sungei Besi a large open pit tin mine that did a lot of selective mining. The pit floor was drilled and sampled to guide the operation of half a dozen small one yard shovels. The selected ore was trucked out of the pit on steep haul roads. High grade spots of cassiterite were frequently found, hence armed guards were on hand to deter high grading. Ahead of mining, shallow timbered shafts were dug to help delineate the ore body. Drilling was also used but the final checkup was with bulk samples produced from the timbered shafts. These shafts didn't look too healthy. The timbering actually consisted of cribbing with round timbers. To use the word timbers is actually an exaggeration as they were more like sticks with a diameter of two to three inches.

At this time, 1993, tin mining in Malaysia has ceased due to the low prices, combined with new discoveries such as the Brazilian deposits that can mine at lower cost.

Had planned a stay in Bangkok, but our Ambassador in Kuala Lumpur advised against it. Guess he was super cautious after his embassy had been under attack a few months prior to our visit. Hence we only saw what was visible from the air and the airport itself during our brief stop in Bangkok. Then it was on to New Delhi. We did see Mt. Everest during the flight and the awesome grandeur of the Himalayan Range

AGRA

When we landed at New Delhi, the local Ingersoll Rand representative, a Mr. Aasashy Sood was waiting for us. He rushed us through customs and over to the car that was to take us to Agra. Our chauffeur was a Mr. Lal. We were off to see the Taj Mahal!

The traffic was heavy and we moved slowly away from the airport. We saw many women and young girls working on an extension of an airstrip. Rocks and small stones were being placed by hand to build up the base. The heat was intense. Gradually we got out of the densely populated city. Then it was the sacred cows and sidewalk sleepers that held us to a slow pace. Lal drove with his horn as both the two footed and four footed seemed oblivious to anyone's need to go anyplace in any hurry.

Laden camels lumbered ahead of us as Lal crept along behind waiting an opportunity to pass. The horn was forever blowing but neither the camels nor their herders showed any inclination to deviate from their path and give us room to pass. Between the heat, the noise and the dust, it was quite a trip.

Finally we came to a place Lal said was a government rest stop. It was a green oasis in that vast sea of people animals and dirt. We enjoyed the icy cold Pink Pelican beer and the over toasted peanuts as we drank in the sight of the green bamboo and other plants. As we came out to continue our journey, there was a small gaily bedecked elephant and Hilda got on and took a ride. Then it was on to Agra.

We arrived Agra at 7:30 PM four and one half hours after leaving New Delhi. We had an air conditioned room. After showering off the layers of dust, we ate and then took a walk around the hotel grounds. We heard a deep booming sound and followed it to the source. There we came upon a large group of dancers hopping and swaying to the beat of heavy rock. The noise was deafening!

As soon as we had breakfasted the next day, Lal was there to take us the Taj Mahal. En route we were besieged by vendors who hawked their beads, bangles, and whatever each time Lal slowed down or stopped. Lal took us to several shops with which he no doubt had some arrangement. Hilda bought some jewelry and other items. One of the most interesting shops housed a group that worked stones of various types to produce inlays of the type found in the Taj Mahal. Finally it was time to visit this magnificent memorial to Mumtaz Majal.

The approach through a grove of trees filled one with awe as we saw the slender spires reaching into the sky. On the grounds all sorts of things were going on to attract the tourists and win a few coins. There were snake charmers with their cobras in baskets. The charmer would play a flute and wave and the cobra would emerge and wave its head back and forth in unison with its master. In another tableau a magician would toss a rope into the air and a small boy would climb it.

But our interest was in seeing the majesty and the detail of this spectacular wonder built by the emperor Shah Jahan between 1630 and 1648. Shah Jahan assembled the finest artisans of the world to create this enduring monument with the greatest possible skill and artistry. We marveled at the unity of design shown by this huge monument. Who was the skillful genius that thought this project through and harnessed the labors of what must have been thousands in building this unique memorial?

We walked and admired for several hours marveling at the intricate work done in white marble inlaid with semi precious stones. Then we wandered over to the nearby fort where the Shas had lived. They must have had unlimited funds that they wrung out of their peasants to build such extensive and wondrous structures.

The next day we went back to New Delhi with Lal. We failed to get into the hotel of our choice as it was booked solid with a medical convention, so we were put up at the Hotel

Lodhi. Lal stayed with us to be our guide. We saw Akbars tomb and the fabulous Red Fort where the drawbridge and portcullis were operated with elephant power. I recall one place where we saw a much engraved iron column. Tradition held that if your arms could encircle this column good fortune would be yours. I had no problem in grasping hands around this unusual symbol.

Lal invited us to meet his family and took us through many back alleys to finally reach the two room ground floor apartment he and his wife and three children occupied. And they were better off than most as Lal had a good reputation and benefited from the tourist trade. We paid Lal off at the airport.

It was the last day of October in 1975 when we left New Delhi. There was lots of red tape in getting out of the airport and on to the Japan Air Lines flight that was to take us to Tehran. First we had to be at the airport 2 hours before flight time. Many forms had to be filled out. We were separated and given a body search and all our luggage was examined as well. We finally got off at 10:15 PM. It was a disappointing flight as we could see nothing.

SAR CHESHMEH

Arrived Tehran at 2:00 AM. There was no time to go to a hotel and rest as we were booked on a 7:15 AM flight to Kerman in the south of Iran. The airport was cold and uncomfortable. The people that infested the airport seemed unfriendly and tended to shun us infidels. There wasn't much to eat except for pistachio nuts, so we nibbled on them. When we finally took off we were offered packaged cheese and crackers for breakfast on the flight to Kerman. We were met at Kerman and boarded a mini bus that took us via Rafsanjan to Kerman. We were delivered to the guest house and went to bed immediately for some badly needed rest.

We woke about mid afternoon, dressed and walked into the guest house sala. What a surprise to run into Han Hartjens, a metallurgist whom I had known for many years. He was at Sar Cheshmeh to help solve their metallurgical problems.

In their eagerness to get going, the Iranians insisted on doing mining long in advance of the time when the mill would be completed and normal operations could take place. So the ore mined had to be stockpiled. The oxidation of the sulfides in the stockpiled ore made copper recovery by sulfide flotation less than what was desired for efficient operations. Han and a number of other metallurgists were there to try to solve the problems of treating the oxidized stockpiled ore.

We walked up the short distance to the staff dining room passing the bakery on the way. The bakery consisted of a stock of flour and other ingredients in a small building that housed a mixer and a beehive oven... The wood fired oven dominated the scene as the bakers slapped balls of dough on the inside of the dome, and scraped the thin pieces of nan off when done using a long handled wooden paddle.

The warm pieces of nan about 8 inches in diameter and about a half inch thick were loaded into a wheelbarrow and trundled to the mess hall. Made with a coarse ground unbleached flour, the nan was delicious and lots of nan got consumed with the lamb stew that seemed to be a daily feature of the menu.

Met with the Anaconda people that were getting things going. Art Graham was the general manager assisted by Ron Johnson, Frank Gardner, Bernie Fahm, Bill Bates and Emilio Rossi. I was given a tour of the mine as we discussed the various technical problems that were disclosed as the project developed. Took a trip up the inside of one of the tall smoke stacks that were to operate with the reverberatory furnaces. That was a first for me.

Saw the huge tailings dam and then went on to visit the water supply system in an adjoining valley about 20 miles away. As in all arid lands, water supply is a real problem. The ancients solved this problem by the construction of quanats.

Flying over Iran one could see many accumulations of soil that, from the air, looked like ant hills. They were strung out about a kilometer apart usually at right angles to a mountain range. These piles of muck surrounding a shallow shaft are the mark of the quanat builders.

What happens usually goes like this. A tribe will decide it will occupy a certain valley and raise their crops and feed their families and animals in that location. Then they dig a shaft down to bedrock, usually with a spiral tunnel to reach the bottom. At that point they will start to drive a drift close to bedrock and towards the mountains. These tunnels are small, usually about a meter in diameter and lined with a baked ceramic cylindrical liner a half a meter long. These are installed after completion of a length of tunnel. There is normally an opening to the surface about every half kilometer. Frequently a quanat is driven from both ends of a kilometer length to speed construction. There are accidents and the half-life of an Iranian Quanat builder isn't very long.

As the quanat approaches the mountains, it is usually branched out into order to increase water accumulation. Quanats work well and take optimum advantage of the snow melt in the mountains. A quanat system supplied the needs of the community of Khatoun Abad with an abundant water supply from a well laden aquifer. Sar Cheshmeh needed a reliable supply for milling the copper ore and for the community of workers.

A deal was struck whereby Sar Cheshmeh could drill wells and pump water to the mine and, at the same time, meet all of Khatoun Abad's water requirements. The name Sar Cheshmeh means springs. Subsequently a substantial supply of water was found close by the mine site to supplement the pipeline supply from Khatoun Abad.

Not far from Khatoun Abad is a cave city called Maymoud. The city consists of many caves dug into beds of tuff that are cut by the valley. This type of dwelling makes lots of sense in the desert country. There is little or no limit to the spaciousness of one's home. The caves are cool in the intense summer heat and are easily warmed during the winter.

The next day was spent with Gorol Dima the mine geologist. Then through snow and fog we drove to Kerman to overnight at the company guest house. On Friday we visited the Kerman bazaar where we were quite a curiosity. Few foreigners visit Kerman. In the bazaar we saw many different types of people. Perhaps most interesting were the men who had been with caravans that had just arrived from the southeast and Pakistan and India. They were draped in their off white desert robes, and armed to the teeth as banditry was common.

We visited a local museum that offered an excellent idea of the operation of a hammam. The hammam is a traditional type of bath and rest house that is normally located along a caravan route as a place of rest at days end for the weary travelers. They are usually

constructed below ground and are equipped with steamy bath, massage and resting rooms. Other amenities are available to the travelers from the female attendants.

Then we were on our way to Isfahan. Isfahan was truly a beautiful city and boasted a lovely blue tiled mosque. The centerpiece of the city was the Shah Abbas hotel, a one time caravansary built around an enclosed square. There were stables for the camels most of which had been converted into fine quarters for the guests. The food was excellent and served amid highly decorated and pleasant surroundings. Khomeini is said to have destroyed the Shah Abbas as a corrupt facility for the hated ferenghi. What a crime!

We visited the city square and the markets where we admired the copper and brass vessels of all shapes and sizes. The Shah's picture was prominently displayed here as it was at Sar Cheshmeh. Even the guest house had the Shah overlooking the activities of every room.

We regretted to have to leave Isfahan but it was time to head for home. In Tehran we stayed at the Versailles, an old, dirty, run-down hotel. It was on one of the main streets and the din of the bumper to bumper traffic persisted the whole night long. The exhaust fumes were overwhelming as the jammed up vehicles idled and honked interminably.

On November 7th we took off for London via British Airways. Had dinner with Michael and Florence West and Allen and Jane Archer. Michael heads up the Mining Magazine and Allen is England's Chief Geologist.

CHAPTER 15.

HENDERSON - LAKE SHORE - CROW COAL - LURAY, VA

HENDERSON MINE

An opportunity to revisit the Henderson molybdenum mine came in November when the Minerals Availability System meeting took place in Denver. This fabulous deposit always intrigued me. It is located just a few miles from Guanella's Lodge where I stayed in 1934 to begin work at Minnesota Mines. I used to gather firewood up the draw where the deposit was located.

The discovery of the Henderson deposit makes an interesting tale. Off to the south is the Urad molybdenum mine of Climax Molybdenum. Urad was worked intermittently when metal prices justified its operation. Located high up on Red Mountain, Urad wasn't the easiest place to operate.

Climax geologists led by Stewart Wallace developed the theory that the Urad deposit was a near surface offshoot that might be related to a larger deep-seated deposit. A drilling program was initiated from Urad's northernmost underground workings. In this systematic exploration of Red Mountain some surface drilling was also performed.

After two years and the expenditure of several millions on drilling some 45 holes that produced lots of Silver Plume granite, the Climax board declined to spend any further funds in the search for the elusive and perhaps non-existent large moly ore body.

Bob Henderson, then AMAX vice-president for Western operations, was persistent and laid his reputation on the lines. One final hole was authorized reluctantly. That hole was completed in 1965 just after Bob Henderson died. That hole intercepted the mineralization that led to the delineation of the Henderson deposit. Thus a single hole drilled more than half a mile underground confirmed what the geologists had thought.

There was more moly under Red Mountain. Exploration risks are ever great! That final hole penetrated the very fringe of the moly mineralization. Had that hole been drilled only slightly to one side, the ore body would have been missed completely.

More holes confirmed the large size and grade of the Henderson deposit and in 1967 the decision was made to provide for mine production and processing.

At the time of our 1976 visit, Ralph Barnett, another Texas Mines graduate, was mine superintendent. Later he became General Manager. Doug Julin was the geologist.

LAKE SHORE

The AIME Annual meeting was in Phoenix and provided a good reason to visit Casa Grande and the Lake Shore and Sacaton mines. Lake Shore was reminiscent of the Coeur d'Alene mines and didn't impress either Harold Bennett or me at all. It was operated as a sub-level caving mine. A high cost operation, it changed hands several times and became a solution in place operation for a while, before operations were finally halted.

CROW COAL

For some time Harold Bennett and his crew at the Minerals Availability Field Office in Denver had been polishing their techniques using computers to develop capital and

operating costs and make long term projections. A single criteria such as taxes, royalty or labor costs could be altered to result in a rapid response to present new overall data incorporating the impact of any change.

When Barney Old Coyote visited my office in Washington he represented the Crow Coal Authority and asked for Bureau of Mines help in its negotiations with AMAX that wanted to lease extensive Crow coal lands. We assembled a team and were wired in to the main frame in Denver. We were located on one floor of the Northern Hotel in Billings, Montana and the negotiations were taking place on another.

In addition to Barney Old Coyote, who headed up the team, were Jiggs Yellowtail and Jimmy Biglock. As consideration was given to various points of a proposed leasing arrangement we were able to provide the Crow promptly with data showing the impact of each modification. It was a fascinating exercise and provided the Crow with assurance that the tribe was not being taken in.

While in the area took the opportunity to visit the Westmoreland open pit Absaroka mine. It was an efficient operation producing low ash bituminous coal. In addition to observing all the environmental regulations, they were required to preserve and protect den trees by leaving islands in the mining process. Substantial tonnage's of high quality coal were forever lost due to this requirement.

In March I went to Houston to be the keynote speaker at the Reed Bit and Tool company's symposium on mining. The brief stay at Stouffer's Greenway Plaza was pleasant. Would have welcomed the opportunity to see more of Houston as many years had passed since my previous visit.

In April took a quick trip to La Paz, Bolivia but recall that our mission was a failure. The Bolivian official we planned to visit had their respective noses a bit out of joint because they felt that a request for the visit should have been initiated at higher levels of Government in order to be approved. Even though we were there to help them assess Bolivia's mineral endowment, that made no difference.

LURAY

May 21st 1977 was a memorable day as we bought 13.135 acres of land in Luray, Virginia as the location for our retirement home. It was part of a tract of 30 acres and we should have purchased the entire tract, but I just didn't have the vision to make that move. Hilda did but finally quit insisting.

June took me to Newark, Delaware for the annual meeting of the American Association of State Geologists. July was special!

CHAPTER 16.

QUARTZ HILL - CASTLE ISLAND - CHICHAGOF - GREEN'S CREEK -
KENNICOTT - OREGON NICKEL

QUARTZ HILL

Off to Alaska , although I claimed Texas the largest glacier free state as home, it was Alaska that I dearly loved. From Ketchikan flew via helicopter to Quartz Hill where US Borax was drilling out this huge molybdenum deposit. Located in the Misty Fiords area, the discovery of this deposit has an interesting history. In its Mineral Land Assessment program the Bureau of Mines surveyed this area from a ship like the one we used in Prince William sound. Each day small Boston Whalers would be sent out with two geologists to sample beach sands, preferably where a stream entered the salt water. Anomalous moly samples were reported in the Misty Fiords study, Amax, Kennecott and others sent in exploration parties but found nothing to interest them. I do not know what their exploration approach was but Jackie Stephens, field geologist for US Borax working out of Spokane, certainly used another method.

Jackie leased a small ship and equipped it with a helicopter pad and assay office. He hired students from Eastern Washington State University located in Spokane and put them to work. Each morning the chopper would fly these budding geologists up a valley and drop them off. These young men including Lance Senter were instructed to work their way downstream and take samples especially where stream action had concentrated heavy minerals. They were cautioned never to go into water that came over their knees as it would have been easy to slip and get washed away.

Each late afternoon they gathered at a pre-arranged pick up spot and were flown back to the ship. Their sampling operation in the Misty Fiords area proceeded in this fashion for the entire summer vacation period. Then it was back to school. The samples were sent to US Borax analytical laboratories and the results sent to Jackie Stephens in Spokane.

When the Christmas vacation came in 1976, the sample results were compiled by Lance Senter and his schoolmates. When they could see that there was a significant area on one stream that was high in moly, Stephens was advised and he called the home office in Los Angeles. As soon as the weather permitted, Jackie and senior exploration personnel from US Borax flew up the valley for a first hand look. What they saw was more than sufficient to stake claims and begin an evaluation program.

At the time of my visit a primitive camp had been installed and diamond drilling was in progress. To make room for the facilities a lot of small trees had to be cut to make a clearing. To burn this material wasn't easy. The heaped evergreen pile was ignited and to give it more oxygen for combustion a chopper hovered over the pile with it's down draft fanning the flames. We flew to a number of drill sites and it was evident that there was a problem in delimiting the ore body. It was much bigger than anyone had dreamed.

Lance asked me if I would like to see the discovery site and I quickly accepted. He led me on a path through the tall timber and we came to a stream about 20 feet wide that had to be crossed by walking a fallen tree. I followed Lance across and midway I looked in the water and almost fell off the log. The entire stream bottom flashed and sparkled upstream and down with molybdenite covered rock. It was blatantly apparent that this was

something rare! It could have been mistaken for native silver or mercury. It was evident that no one had ever seen this spot until the US Borax team stumbled up on it.

The key people in US Borax deserve great credit for this find. They include Jackie Stephens and his associate, Bob Munro, manager of exploration, Bob Kistler, chief geologist and Dr. Steinberg.

Operating in an isolated area isn't cheap. Base pay was \$7.00 per hour. Providing food cost \$9.00 per man day. Drillers pulled down \$4,000 per month. After the delineation process ended, things really livened up. To locate Quartz Hill, you can draw a line between the headwaters of Smeaton Bay and Boca de Quadra. Quartz Hill lies a few miles east of this line and a third of the way southeast from the tip of Smeaton Bay.

The salmon fisheries said that spawning grounds would be destroyed. A huge hassle developed over the disposal of the tailings into an arm of the sea. The road from the deposit to sea level was a case for a major dispute. Progress was slowed to turtle pace and the moly markets collapsed. After years of fighting, US Borax finally gave in and sold the property. As of this time the future of Quartz Hill remains in limbo. But it is the world's largest known moly deposit and surely must be put in production at some future date.

CASTLE ISLAND

Spent the night at the Hotel Baranof in Juneau. It was always enjoyable to stay there. Of particular interest to me were the two huge paintings of the early days in Alaska that graced a hall adjoining the foyer of the Baranof. One of these monumental paintings depicted a group of prospectors working their way up a forceful stream as they pushed and pulled on the boat carrying their supplies. Unfortunately a disgruntled employee in later years fired the hall housing these historic paintings and they were both destroyed.

Ken Loken flew us to Castle Island on July 12th. There a submarine deposit of barite is being mined at the rate of 10,000 tons per year. The deposit is drilled and blasted under some 20-30 feet of water and a drag line hoists the broken ore to the surface. Grinding of the barite is performed in a beached ship that houses all the processing equipment. The finished product goes mainly to the North Slope where the oil drilling program uses it. The small staff on Castle Island lead a quiet life and do a lot of fishing for recreation.

CHICHAGOF

Ended the day with a hike to Perseverance Basin and the ever delightful salmon bake at the site of the Alaska Juneau mine shops. The next day Ken tried to get us to Bohemia Basin on Chichagof where I was interested in seeing the extent of the drilling for nickel and get some kind of an idea as to what might be involved to mine and process the ore.

We started out in the rain and it wasn't too long before the clouds forced us down to the deck. We kept moving on while the engines idled and pulled us forward on the floats. We had some close up looks at both hump back and killer whales which were as curious about us as we were about them.

Around noon we put in to Elfin Cove where a factory ship was located. This arrangement was a boon to the salmon fishing ships as it provided a market for their catch and sold them supplies so they could continue to fish without taking the long trip back to Juneau. We

lunched on hamburgers and French fries with coffee. The tab for the three of us came to more than \$30.

GREEN'S CREEK

There was time that evening for a walking tour of Juneau and dinner on the wharf at Yancey Derringer's. I had not been back to Admiralty Island since we overflew the cold spring exposure of iron stained muds that assayed high in lead, zinc and silver. So the next day flew to the old cannery dock where a Noranda chopper took us to the Green's Creek exploration camp not too far from the drilling sites. We worked our way in the rain over and under moss covered slippery trees till we finally reached the drilling area near the mud springs.

Barry Wink was in charge of the drilling using a Hydro Winkie drill. Merlin Bingham, and John Dunbier were also involved and told me that some of the core samples looked real good. They mentioned one core that assayed 4% Lead, 8% Zinc, 1% copper and 10 oz. of Silver. That was real high grade! Sufficient drilling had been done for them to make a guesstimate of at least a million tons. Green's Creek has since become a major US producer of silver, lead and zinc. Western States mineral discoveries were frequently based on the iron stained gossans that bore little or no vegetation.

Green's Creek was discovered by geologists working for Watts, Griffis and McQuatt. This was the company that operated under a Bureau of Mines contract that resulted in the discovery of the Red Dog deposit in the western Brooks Range. Striking similarities were observed between the geology of the Red Dog, Drenchwater and the terrane of Admiralty Island. These geologists found the "Big Sore": the cold spring that assayed high in silver and zinc that lead to claim staking, the exploratory drilling and the mine.

Under the Carter administration when Cecil Andrus was Secretary of Interior and Joan Davenport was Assistant Secretary for Land and Minerals, the USBM was conducting mineral land assessments of public land areas high on the list for withdrawal from multiple use including mineral development. As parks, preserves or other reservations, these lands were being rushed to withdrawal so there would be no accounting of the minerals lost. Admiralty Island was to be designated in its entirety as an animal preserve for the numerous black bears that inhabited the island.

The Mineral Land Assessment report on Admiralty Island was being held up in the Assistant Secretary's office along with similar reports on Alaska that included information on significant discoveries. It seemed that the strategy was to withhold the reports so that Congress would have to vote on the action to take on land specifically designated as preserves of one kind or another without the benefit of the information included in USBM reports.

Miss Davenport stipulated that our reports would have to be run by the USGS for it's concurrence. This only resulted in more delays. Ted Stevens office knew what was going on and threatened Secretary Andrus with a Freedom of Information Act suit if the reports weren't released. It wasn't that the USBM claimed that the mineral information it assembled in the short time available was anywhere as adequate as it should have been before such momentous decisions were made. At least it was miles ahead of the

information being supplied to the Secretary of the Interior by the Fish and Wildlife Service early in the process.

Even after release of MLA reports, it was difficult to get the boundary between the preserve area of Admiralty Island set far enough south to be sure to provide sufficient lands for Green's Creek possible operating area. The possibility exists that other mineral deposits of significant value may lie within the area set aside as a preserve.

Green's Creek discovery by geologists of Watts, Griffis and McQuatt was no accident. Murray Watts was a successful prospector who never searched blindly. He studied deposits and absorbed all accounts of their geology and then looked for similar environments.

Tom Butler, who was deeply involved in the Greens Creek project tells me that on December 1, 1978, crews were still staking mill site claims around the old Hawk Cannery. That was the day that President Carter signed the bill making Admiralty Island a National Monument. The Carter administration tried to lock everything up before Greens Creek could obtain its mining permits. It was a close call!

KENNICOTT

That evening had dinner at Mike's on Douglas Island with Phil Holdsworth, my old friend from Mindanao. Friday was with Bob Warfield to go fishing along with Dave and Pat Carnes and Walt Lander. It was a long day and not productive, but that's fisherman's luck. My sole catch was an Irish Lord, perhaps the ugliest fish I ever landed. Dinner at the Breakwater Inn, overnight at the Baranof and then on to Anchorage.

Drove to Gakona and visited the Wishbone Hill coal property. This is a small deposit but it was an important source of fuel for the Matanuska Valley settlers. Visited this property with Arnold Buzzalini and Fred Murray of MAPCO.

July 17th we left Gulkana and flew by chopper across Copper River to McCarthy. Then to the Kennicott mine. It had been planned by the new owners to destroy all the old mill and mine buildings but it turned out that they were too well built and sturdy to make demolition easy. So the place was taken over by some environmentally oriented hippie-like group.

While waiting my turn for the short hop up to the old Bonanza Mine, I stood at the edge of the landing site chatting with one of the hippie-like inhabitants. We were looking over the Kennicott glacier that filled the valley. It was pretty messy with all the sand and gravel covering the ice in a spotty fashion. The hippie looked, shook his head and said, "Isn't it a shame what the mine operation did to this valley?" I tried to explain to the lad what caused the valley's appearance, but don't believe I convinced him.

Finally it was my turn to get choppered up to the Bonanza. It was a steep climb and we could look down on the trails to the mines and the remnants of aerial trams that once hauled the high grade copper down to the mill site.

In 1973 I was concerned about the escalation of costs for exploration, mining and adhering to environmental requirements. So I had Bob Bottge and R. Maloney of the Alaska Field Operation office make the assumption that the Kennicott deposit was untouched and develop the capital and operating and operating costs that would apply if the deposit was opened in 1973.

It was the four mines on the ridge east of the Kennicott glacier, the Jumbo, Bonanza, Mother Lode and Erie that generated the cash flow that provided the economic basis for the Kennecott Mining Company. Oddly enough the 1973 economic study showed that if the mining, milling and ancillary facilities were put in place in 1973 with a haul road to Valdez, the operation would be uneconomic. This Bureau of Mines Information Circular 8602 is worth studying.

When we left McCarthy we flew into the Chugach Range to see the working area of one of the Mineral Land Assessment teams. Landed near the now defunct Yellow Band mine. As at Kennicott, this area is characterized by 15 to 20 feet of snow and many avalanches every winter. The Yellow Band mill had been wiped out several winters ago. I found a steel mortar several hundred feet downhill from the mill and took it home with me. It is great for powdering chili spices.

Tom Pittman, Walter Lander and I overnighted at Gakona and then drove on to Chicken to see the Lost Chicken placer mining operation. It wasn't the most efficient. With a limited water supply combined with the short season, the operators went for the nuggets and coarse gold with much of the fines being lost. Under the limiting circumstances that was probably the best way to operate.

Returning to Tok, we were delayed by an accident where a big truck had gone off the road a bit and gotten mired down in the bog. In doing so the truck blocked all traffic. An enterprising individual borrowed a nearby state bulldozer and finally got the truck out of the way of the traffic.

Back in Fairbanks met with John Mulligan, Earl Beistline and Ernie Wolff. Then on to see the Cold Regions Research Lab. This CRRL project is unique. It was then and still may be the sole site where one can see what the permafrost is and how it reacts to exposure to the air. The entry is into a side hill and slopes downward at about 8%. Huge doors keep out the warm air. The dust of countless ages covers the floor.

Ice lenses could be seen in the walls of the adit as well as bones and tree limbs. The Bureau of mines cooperated in the driving of the adit. Conventional mining methods were used as well as an Alkirk miner. When the Alyeska pipe line was being designed the CRRL project got a lot of study as a basis for design of the pier supports for the pipe.

Walt Lander went back to Washington and Tom Pittman and I went on via Paxon to the Susitna Lodge run by Rick Halvord and his wife. It was a fine place for hunters and fisherman to stay and use as an operations base. It was located on a pass near a slowly retreating glacier. Grayling were in the small ponds and I managed to land one that evening.

Rick regaled us with many wildlife stories. He asserted that the wolves were hurting the moose hunting and felt that the law should permit wolf hunting again.

Tom and I drove up to the Denali mine about a one and one-half hour crawl in four wheel drive from Susitna. Fine grained chalcocite was the principal ore mineral. With an average grade of 6% copper the mine was estimated to have a resource of half to three quarters of a million tons. of copper bearing material. It didn't seem economic as there was a long haul to a port so that the product could go to the Tacoma smelter. Now that the Tacoma smelter no longer exists, the prospects for the Denali deposit have been pushed further into the future. Yet this deposit is worthy of further study. Many such deposits are indicators of large deeply buried disseminated deposits.

Tom Pittman and I went on to McKinley Park. Wall to wall people. We visited park headquarters to get permission to drive to Kantishna. We were turned down, but the park people said they would contact the Washington office. While waiting for an answer we went to visit the Usibelli coal mine.

Usibelli was mining then at the rate of 700,000 tons per year of bituminous coal. The bulk of the product was used to provide power for Fairbanks. The coal was sold then for \$12.05 per ton and cost an estimated \$8.00 to produce. The 75 ton trucks were loaded with 11 cu. yd. Hough Payloaders. Plans were in progress to mine the nearby Poker Flats deposit estimated to have a 40,000,000 ton reserve with a 4:1 strip ratio.

Saturday we drove through the park to Kantishna to meet with some of the placer operators in this remote camp. Kantishna was located in the buffer zone that the park wanted to acquire and finally did. Don and Roberta Ashbrook had a placer operation that handled 2000 cu.yds per day averaging \$2.00 per yard. Their operating season was about 100 days- from freeze to freeze. They liked their life and enjoyed the summer labors and the winters of ease. They said they wouldn't sell out for \$2,500,000. But, in the end, all the mine operators of Kantishna were forced out. The park wanted the area for a buffer zone.

Driving past Mirror lake we were rewarded with some remarkable views of Mt. McKinley. Sunday we flew into the Two Lakes mineral land assessment camp flying close to Mt. Spurr as we crossed the Alaska Range. From the camp we flew up a nearby canyon to land on the glacier and pick samples of copper mineralization out of the ice. Back in the air we saw a near vertical wall of green stained rock indicative of a large copper deposit. Now it is in a park. Someday, maybe someday, such areas may be reopened for the mineral riches they contain.

The small Two Lakes camp consisted of about a half a dozen wall tents. One was reserved for the use of the sole lady geologist in the camp. The presence of women in these camps caused some problems. In this camp one of the offshoots was the breakup of a family when the lady geologist took up with a male geologist whose family lived in town.

It was time to head home and I was glad to get back to resume our weekend activities on the Potomac. But it came to a close when we traveled to San Francisco for the American Mining Congress annual meeting. First there was the Emergency Mineral Administration meeting on Saturday followed by a meeting of the Field Operations Centers on Sunday. Hilda and I stayed at the Marines Memorial Club. I was one of the charter members that put up money for the original purchase and rehabilitation of the building.

OREGON NICKEL

With the Mining Congress over, we rented a car and we headed for Cave Junction, Oregon. I was anxious to see the extent of the nickel rich laterites that could become an important nickel resource for the US. We stayed at the Junction Inn and made trips to see various drilling areas and test pit sites. The lateral extent of the laterite was substantial.

But the metallurgical problems were exceeded by the environmental problems. It would be enormously difficult to conduct the mining and processing in an acceptable way. Yet, in the event of a national emergency, this area was a reliable source.

Drove north to Riddle to see Hanna's operations at Nickel Mountain. It was operating on material similar to that near Cave Junction and had been doing so for a long time. Drove on to Olympia to meet with Bob Welch the Oregon State mineral specialist. Then took annual leave to visit Sequim and see our acreage there. Took a walk on the Dungeness spit. It was cool and breezy with few other folk around. Grand views of the Straits of Juan de Fuca and the Olympic mountains.

Went salmon fishing and Hilda landed a 5 lb. king and I was skunked. Saturday we went out again this time on the Natosha II. Hilda landed a 3# silver and a 12 # silver. I ended up with a 5# and a 9# silver. It was a great day!

Sunday we drove from Kelso, WA to Susanville, CA. Monday we were in Reno, NV to meet with Larry Walters and Frank Block. On to Death Valley with a stop at Scotty's Castle and Furnace Creek Ranch. Stopped to visit American Borate's Boraxo open pit and the Billy shaft which was under construction. For environmental reasons the shaft had to be located where it would not be visible from the road. This meant that a long cross cut had to be driven to the ore zone, result -higher production costs.

Stayed at Karen and Jim's in Boulder City. Hilda suffered a heart attack and was hospitalized in the Boulder City Hospital first and then sent to the Southern Nevada Hospital in Las Vegas. After treadmill and echo tests she was released and we went home to Arlington.

CHAPTER 17.

TURKEY - EGYPT, TUNISIA & MOROCCO - PAKISTAN - EMERALDS - TURKEY AGAIN

TURKEY

Towards the end of October, I was scheduled to attend the CENTO Meeting in Ankara, Turkey. So it was off again via Rome where a stopover provided time for a visit to the Roman Forum. On Sunday October 21st went on to Istanbul and via Turkish Airway to Ankara to stay at the Otel Tunali.

After the three day Copper Symposium, flew to Samsun to visit the KBI copper smelter designed and built by Western Knapp. Its flash smelter was operating at half capacity due to a lack of concentrates. The plant and facilities were run down and poorly maintained. It seemed that parts and supplies were hard to come by.

Drove along the picturesque Black Sea Coast to visit Cayeli. This high grade sulfide copper deposit lay right under one of the county's most important tea plantations. The trick was to mine the deposit and still preserve the tea production. It wasn't a question of just planting tea elsewhere. The Cayeli(tea) region was characterized by a micro climate and said to be the only place in Turkey where tea could grow.

That gave me much to think about. How would one go about mining this valuable mineral deposit and leave the surface tea plantations intact? Numerous different methods were considered. Finally the concept developed of a modified panel top slice with back fill of tailings with sufficient cement to solidify the fill. At this time the report is that Phelps Dodge is involved in a consortium that is going to mine the Cayeli deposit. I'll be interested in learning the method that will be used.

We overnighed in Rize at the Otel Tunit. It was a pretty crummy joint. Small rooms, broken down iron cots and smelly water. The hygienic facilities consisted of a battered crockery pitcher and a washbasin. The toilets were the typical Turkish facility. A once white porcelain rectangle two foot square set flush with the floor. It had two footprints impressed in the surface geometrically located with respect to a four inch hole that dropped excreta to an uncertain end.

On to Hopa, a closed city on the Soviet border. We had special permission to enter and drive on to Borcha and Murgul in the nearby mountains. Chakmakaya the ETI Bank copper operation was so named for its hard rock. The sulfides were disseminated in a quartz matrix that was tough to drill and broke into fragments and chards that were hell on cutting rubber tires. They were mining and milling 2600 tpd of ore that ran 1.3%-1.6% Cu.

The mine had rather poor drilling and blasting practices. It seemed that the men doing the operations were not well trained and wasted lots of time in getting their job done. The mill was even worse. There were three autogenous mills. At the time of our visit all three were shut down. One mill had lost a few liners and the shell was holed. The flotation plant was operating cells with two or three V belts on five belt sheaves. This made for poor bubble generation and cut capacity. We spent the night at their guest house and drank Raki with the manager.

Raki is the Turkish equivalent of Ouzo and turns milky when water is added. Mr.Kuyker was the third manager on the job since the operation started a few years before our visit. He was pretty depressed over the situation as parts and supplies were hard to come by. The mill liners were made in Turkey and just didn't hold up. Some were very brittle and others were soft as butter. V-belts were rationed and the same policy of scarcity and scraping by seemed to apply to every phase of the operation. No one could run an operation like that and be expected to do a decent job. When we left, we drove down through the smoky town of Murgul

Drove on to Trabzon and the Otel Ozger. Trabzon was a place with a long history and was once the western terminus of the silk route from the Orient. There were numerous ancient structures of considerable interest. Flew via THY to Istanbul and the Otel Gezi. There wasn't much time but did manage to visit the Topkapi Harem and the Grand Bazaar.

Routine Bureau of Mines work kept me pretty well tied down for several months. Headed for Denver in early February. Had difficulty getting to the airport and even worse problems getting back home. All flights were canceled and the roads were ice topped with four to six inches of snow. What a mess that can be when there are lots of cars trying to get through many driven by folks just not used to that kind of driving.

About mid February Hilda and I flew to Rome. I was heading up a Department of Commerce team that was aimed at promoting sales of US mining equipment. Hilda went along for the ride and to see the sights. In Rome we stayed at the Commodore. Did a lot of walking to the Capitoline Hill, the Roman Forum and Palatine. At Vatican City we visited St. Peter's, and the Sistine Chapel.

Started to the Vatican again but went by the bank to convert \$200 in traveler's checks to Italian Lira. Then we boarded bus 64 for the Vatican. I had to hang to a strap and was being jostled by another passenger. I could tell what was happening as a small girl stuck her hand deftly into my pockets just before a bus stop. The man and the girl got off as my attempts to stop them failed. There went my \$200 and my silver dollar money clip as well.

EGYPT ETC.

It was only supposed to take 3 hours to get to Cairo, Egypt, but somehow or other it took us 12 as we went via Athens. We were booked into the Cairo Sheraton on the west bank of the Nile. Had a lovely suite and a balcony overlooking the river and the nearby population of river boat dwellers.

We had a good team to present the seminar. George Tousley of Ingersoll- Rand, Ray Palmer of Kaiser Engineers, David Chisholm of Longyear, Ted Steidle of Marion Power Shovel, Jerry Shelton of Unit Rig and Helmut Kastner of Wagner Mining Equipment. We made our scheduled presentations plus several additional ones due to the local interest in our program.

The pyramids were a must so we took a taxi out to see them and other nearby ruins. Climbed a short ways up on Cheops pyramid but gave up shortly. Some photographers with their camels kept needling us to have our pictures taken with camels. We finally gave in. We leaned on the camel as the photographer made his shots. Then, before we could say or do anything, we had a leg thrown over the camel's back and we were up and away. Hilda was frightened and screaming. Finally we came to a halt. The drivers demanded a

high price. I told them I didn't want to buy their damn Camels and walked away. Of course we never saw the pictures either.

The next several days were busy with meetings receptions and the like. We were taken to visit the Souk, Khan El Khali, Sahara City, the City of the Dead and Mene House, the famed hotel at Giza.

February 28th we were in Tunis at the Hotel Africa, a delightful spot where the meeting were to be held as well. Walked around Tunis. Tried to get Hilda interested in some rugs but she was unconcerned. The next day we drove to Gafsa on the edge of the desert. Part of the lands we crossed were overrun during WWII by Rommel's Afrika Corps.

At Gafsa we stayed at the Jugurtha Palace. Surrounded by desert, the hotel grounds were an oasis of date palms and a lovely garden. Visited Metlaoui the following day and went underground to see how the mining was performed. Although most of the longwall retreat stopes were mined by conventional methods, one stope was equipped with a shearer and mechanical supports. The miners had no hard hats nor shoes and carbide lamps provided illumination. There were no sanitary facilities underground, not even nipped honey boxes. One had to be careful where he walked for the miners just went where and when they had to. That mine really stank! The open pit operations were well equipped and produced phosphate rock efficiently.

One night of our visit the mine staff had us for dinner at their mess. It was lamb as usual but well prepared and delicious. Hilda was the only woman there and the mine manager presented her with a lovely Bedouin woven prayer rug. The next day we returned to Tunis via the holy city of Sheriffe and Karaouan. There we saw a well located in a two story building where a white camel walked in circles to operate the raising of the well water. Stopped at some old Roman Ruins at Sbeitla and enjoyed the visit. Bought some items from the vendors but doubt that they were authentic and of Roman origin as claimed.

Hilda was now interested in rugs so a young man from the US embassy took us to the Souk to see some. We followed him through the tunnel-like maze of the covered streets of the Souk. Finally we entered a two story building. The proprietor showed us rug after rug as we sipped tea and Hilda finally made her selection. She became so taken with the rugs that instead of the single rug we planned to buy, she ended up with two. One of them is the white rug with a kind of Indian design that graces our dining room. The other rug hangs in our bedroom.

It makes an interesting drapery. On one border it has woven in it the names of the ladies who made it. It has been well used and probably was once the floor of a desert tent. The rugs were sent to our home from Tunis and we proceeded to Morocco, the last stop on our trip.

Our flight landed at Casa Blanca but we were whisked to Rabat in a US embassy car to the Rabat Hilton. This was also the site of our meeting with people from the Moroccan mineral industry. After the meeting, I was scheduled to visit the huge phosphate mine at Khouribga but fell ill to something I ate that must have detested me. When that ordeal ended we went to Casa Blanca to await our flight home.

Stayed the Mansour hotel and visited the souk and other points of interest. Dined one evening at a seaside restaurant where the coquille St Jacques was superb. In that delightful ambiance we sipped white wine as we ate and watched the waves roll in on the Atlantic.

Shell and Shirley came towards the end of March. Shell went on to London for a few day where he purchased a London cab and made arrangements for it modification. They were planning a year long tour of Europe and the cab was to be their vehicle and home as well. Hilda and I had to go to Las Vegas for a few days but got back before Shell and Shirley took off for their European jaunt on April 10th. We celebrated our seventh wedding anniversary with dinner at Caesar's Forum.

PAKISTAN

Pakistan wanted some help with its mining and exploration problems in the Northwest frontier. Although the Bureau of Mines had many people mainly as commodity specialists who had worked in the mineral industry, there were but few individuals that had the varied experience that it was my good fortune to have had. Hence, I usually got called on when it came to lending a helping hand to foreign countries.

So I was off to Pakistan on May 12th with an overnight stop in Rome. Stayed at the Commodore and woke to a bomb blast when some irate individual threw a bomb into the office of a Venezuelan travel agency on the ground floor. A few nearby parked automobiles went up in flames and the travel agency was wrecked completely. But nobody was hurt except those in the hotel whose sleep was interrupted.

Another overnight stop was Iran where I stayed at the Intercontinental in Tehran. In Rawalpindi was met by Ahmed Vine and booked into the Intercontinental on the Grand Trunk Road. Met with the key people in the National Fertilizer Corporation. It seemed that the bulk of Pakistan's phosphate needs were met by imports from the middle east. The Pakistanis were anxious to develop a domestic industry and wanted to get my judgment on the possibilities of going into production on some deposits not far from Abbottabad.

Visited the Kakul mine then the sole supplier of domestic mined phosphate rock. Only a minor amount of exploration drilling had been done. No established mining plan was being followed. The operators went down from the outcrop underhand mining the material as they proceeded. Broken rock was hauled to the surface on a jury rigged incline. The product was shipped to Faisalabad for processing into fertilizer grade material.

Then on to Logarban, the deposit they wanted me to appraise. We had a jeep in not too good condition for transport. The road to Logarban involved travel up several nullas, almost dry washes. Some had narrow streams confined to ditches that fed various small flour mills. Finally we left the nulla and ascended via steep grade to the mountainside where several adits had been driven into the near vertical phosphate bed. These adits were something else! About 4 ft. X 5 ft., they didn't make it easy to get around. Broken muck was trammed to the portal by wheelbarrow. A few glimmering low wattage bulbs lit the adit. Where the adit intercepted the phosphate bed, drifts were driven in both directions slightly larger in dimension than the adits. The bed dipped at about 80-85 degrees and measured about 4-5 feet in width.

The progress reports by the British consulting firm that was doing the work led to no conclusions that would provide for the early production of the badly needed phosphate. Engineer Iqbal and I spent a lot of time thinking about how early production could be achieved.

We found a place where an intermittent stream had cut the bed in an area that lent itself to driving an adit on the strike of the bed and that would provide a back, or distance over the adit, of several hundred feet within a short distance. A road to this spot would not have been difficult. My recommendations covered the plan to initiate operations there. I never found out what was done.

Visited Nathia Gali at 8,200 ft. elevation. Wondrous views across the Deosai Mountains to the Karakoram Range and K-2 at 28,250' elevation. Saw the Hindu Kush in a splendid panorama. It was chilly at that elevation and the countryside was dotted with pines. It was good to stop and warm before a roaring fireplace and have a spot of tea.

Back to the exposure of the West Phosphorite bed. We selected a mill site near the small community of Tarawai. The people there lived just as they had for centuries. Their crude shacks all had beehive ovens for their bread baking. Stopped to get some pictures of one of the ovens and was invited in for tea. What hospitable and friendly people ever ready to share the bit they had!

Passed a small building where one man directed the work of about eight boys who were making a rug. I think the youngest must have been about 5 or 6 years old and the eldest about 12 years old. Their fingers flew as the tied knot after knot. When I asked why they used such young lads in the rug making I was told that they have more nimble fingers than older kids.

It was time to move on. We already had our luggage with us so drove on to Peshawar. There were always lots of people on the road, walking or riding donkeys or camels. One man we passed had a tired looking light brown bear on a leash. We crossed the wide Indus river, the main water artery of Pakistan. It had proven to be a barrier to Alexander the Great when he was conquering that part of the world. But he did cross the Indus.

Arriving Peshawar we checked in to Dean's Hotel. I was thirsty for a beer and had to go through the business of getting a permit to use the Permit Room. The Permit Room is an institution all over Pakistan that enables ferenghi, non Muslims, to have an alcoholic drink. It takes a passport to get a permit.

Permit in hand I went to the Permit Room and ordered a beer. It was a local beer but excellent and thoroughly chilled. There was one other man in the Permit Room standing at the bar. We got to talking and I bought him a beer. When we finally got around to the "What do you do for a living?" question. He said, "I'm a smuggler." I found that interesting and pursued the subject.

It turned out that my companion was a Pathan and had access to the Lapis Lazuli - lazurite - mines of the Hindu Kush in Afghanistan. So twice a year he would gather up a supply, cross the border near the Khyber Pass and walk to Peshawar. Then he would travel by air to Hong Kong and sell the Lapis before returning home for a repeat performance. He had a brief case full of Lapis Lazuli with him and let me purchase a few pieces. Wish I had gotten more.

Back at Dean's I was visited by another Pathan, tall, tanned, green eyed and bearded. He had some artifacts and coins for sale that he had recovered from the nearby ruins of the Kinshan civilization that thrived there about 3500 BC. He and other Pathans made a living by exploring the ruins and selling their finds. I bought a few coins and artifacts.

Took a walk through the Bazaar and found a pair of chaplis that would almost fit. Bought them anyway for \$10. The chaplis is footwear characteristic of the Northwest

Frontier area. The sole is made from old tire tread. The uppers consist of crossed band of leather that narrow towards the back where they are fastened with a buckle. They are very comfortable.

The local people of the Sarhad Development Corp. took me across the ancient bridge over a tributary of the Indus and on westward across the Khyber Pass. There were scattered structures on the plains we crossed as we drove to the Pass. Each was a home but looked more like a fortress. Peace is never near among these people and they are always prepared. It was rare to see a man that was unarmed and those that appeared to be unarmed probably carried concealed weapons.

There is a town north of Peshawar called Malakand where the people are noted for their great skill in being able to reproduce any kind of weapon. They supply arms to the Pathans and Afghans as well as to the Pakistani. I was told that these skilled gunsmiths could reproduce exactly any firearm from any part of the world. I saw some of their products - excellent forgeries of Colt handguns.

The Khyber Pass is no divide with a steep ascent and descent. Rather it consists of an extended series of hills, particularly on the east side of the summit. A regiment could hide behind one of these hills and frequently did when the British were attempting to subdue the region. The sites of many battles are commemorated with huge bas reliefs and inscriptions carved into the rock. Various regiments and tribal units are named. In crossing the Khyber Pass and seeing all those inscriptions relating to various engagements, it is evident that there was mutual high regard between the combatants.

We drove to the Afghan border. In coming to Pakistan I wanted to go first to Kabul and then drive eastward to Peshawar. I was told that was impossible, but I was ill advised. Although I failed to see Afghanistan on the trip, I was pleased that the opportunity to cross the Khyber pass did occur. That evening flew to Lahore to meet with the National Fertilizer people re my findings on their deposits.

Went to Faisalabad where the Kakul rock is treated and found them using crude beehive ovens to convert the rock to a soluble product. The process worked but output was small. Rotary kilns would be needed if production was to be substantially increased. Back at Lahore and Lahore Hilton. Had to go through the rigmarole again of getting a permit to use the Permit Room. The food was good and spicy. I was ever amused at their fancy deserts particularly some that were topped off with gold or silver leaf.

The NFC people insisted on my seeing more of their city and took me to Fort Maque, the tomb of Jehan Gir, father of Shah Jehan, and to the tomb of Ner Jehan before returning to Peshawar. Pakistan International Airlines or PIA provided all internal air transport. Some said the initials stood for Please Inform Allah. When we were all seated and ready for takeoff, the stewardess gave us the estimated time of arrival at Peshawar and concluded her comments with the words "Inshallah," God willing! We ran into a fierce storm en route and were glad that Allah was with us. We arrived two hours late. Then it was on to Swat.

Between Peshawar and Mardan we passed many fortified lookout towers including a memorable one to which Winston Churchill was posted. The British had a rough time of it in trying to subdue those irascible hill country tribesman. We crossed over a ridge and dropped down to the lovely Vale of Swat. Two thousand years ago the Vale of Swat was the home of well settled people living in planned communities. About 327 BC Alexander

the Great came to the Vale. There were other invasions including Buddhists, but the Yusufzais Pathans held sway when the British invaded. In his account of the Malakand campaign Churchill gives a colorful description of the battles with these fierce, proud resolute warriors.

We spent the night at the Swat Hotel that was specially built for a visit by the Queen of England in 1961. It was surprisingly nice. Then we were off to visit the emerald mines of Swat. As we approached we saw the barbed wire fences traversing the rough terrain. There were towers spaced along the fence. Each tower had a machine gun. The mines were very well protected. At the mine headquarters we met the Colonel in charge. The entire operation was in the hands of the military.

The emeralds occurred in a shistose structure that appeared to be a filled fault zone as there was much clay present and areas where slickensides could be seen. The mining was done by two men working together. They worked under the watchful eyes of a soldier equipped with submachine gun. Their tools were a crowbar and pick and shovel. They would pick and pry and then break down every piece of rock in their search for emeralds. All the clay-like material that was the known host for emeralds was broken down to pea size before being cast aside. It wasn't the most efficient operation, but it worked. There were about six crews picking and digging in that manner.

It appeared to me that production could be materially increased by driving a cross cut from a lower elevation to the structure, drifting along it and using cut and fill stopes to mine the emerald bearing material. After trammimg to the surface, the ore could be crushed and passed over a picking belt to extract the emeralds. They didn't go for this proposal for several reasons mainly that the miners could not be closely watched.

The miners have a change room and there is a passageway between the area of digging clothes and regular clothes. I asked the Colonel if he felt that any thievery was going on. He said, "Alla time they try!" My question then was what if they suspect a miner of pilfering. The colonel replied, "If we think a miner is stealing, it's usually by swallowing the stone." What then I asked? He said with feeling, "We make them sheet!" and he showed me the gallons of castor oil kept for that purpose.

The Colonel showed us many emeralds that had been produced. As it was evident that no samples were to be handed out, we bid adieu and were escorted to the gate by armed guards. We drove to Kalama at the end of the road admiring the 8000'-9000' ridges on both sides of the steep valley. The Swat had become a roaring turbulent muddy stream as it bounced over huge boulders on its way to the Vale below. Home-made suspension bridges crossed the river infrequently. We saw men and boys near streams that joined the Swat carrying fine brown trout. Some were 16-18" long. It would have been a lot of fun to stop and fish a while.

We did stop at several of the wayside shops. Bought some lovely red flecked green bloodstone and only wish that I had gotten more. Semi precious stone of a wide variety were for sale, all of them mined locally. But time was running out and we drove south out of the Vale of Swat and on to Rawalpindi.

As we crossed the Indus River below the Tarbela dam, I was told that the huge impoundment had been completed when the design engineer reviewed his notes. When he discovered what he considered to be a major error in the design, he committed suicide.

But the dam still stands. If the Tarbela dam goes it will wipe out a sizable part of the population of Pakistan.

TURKEY AGAIN

Although it was only the end of May, Pakistan was warming up. I left Rawalpindi for Istanbul and then changed planes for Ankara. Stayed at the Stad, a gruesome hotel. Met with Nawaz Khan, Doug Martin and the MTA people who outlined what they wanted me to do in southeast Turkey. Went on to Van in far eastern Turkey the last day of May and met with Metin and other MTA personnel to plan the trip to the phosphate occurrences. MTA is the Mineral Research and Exploration Institute of Turkey. It incorporate features similar to some of those of the USGS and the USBM.

That evening we chatted and swapped stories. The English of the Turkish geologists was much better than my limited Turkish. One of their stories was about a geologist who was lost when darkness overtook him. When he saw the lights of a house he went to it and knocked on the door to be greeted by a shapely young lady. He explained how he had been doing some geology and gotten lost. She invited him in and wined him and dined him as well as offered him a bed for the night. She pointed out the door of the room she slept in. But the geologist stuck to his room.

The next morning she asked the geologist if he would like to see her farm. As they walked through the yard he noticed that there were almost as many roosters as there were hens. He remarked about this saying, "Why so many roosters? For that many hens all you need is one or two." His hostess replied, "Actually only one of those birds is a real rooster. The rest are geologists!"

On June first we took off in a Dodge power wagon in a dreary rain and skirted part of Lake Van enroute to an MTA exploration camp in the valley of the Bitlis river. The camp itself was pretty sad - dirty and uncomfortable. But the food was worse. There seemed to be plenty of bread and tomatoes, but little else. Now and then we would get a piece of goat meat with a meal and some nondescript vegetables that I couldn't identify.

Looked at several outcrops and the faces of some short adits that were driven for sampling. One was called Surum Ko. The filled fissures were a blend of magnetite and apatite. Both of these mineral could be recovered but the mining costs would be high as the narrow structure would be mined by underground methods.

This was Kurdish country. The principal prospecting was done by several Kurds who roamed the countryside. One Kurd had an English language copy of a paper back on mineralogy. That dog-eared book was his bible as he combed the mountains.

One evening I indicated that I would like to go fishing and the bright eyed Kurd prospector said sure. I had my rod and reel along and got things ready. So did my Kurdish friend. He dug out a home made shotgun made from a piece of gas pipe mounted on a crude stock. I shook my head - no! no! Fish, not Hunt! He said yes Fish, Fish. I gave up and off we went in a jeep up a narrow trail alongside of a small stream.

Wood for kitchen fires or heating is scarce. Even the trees that grew in spots in and along the stream were cut down to leave only enough so that they might grow some more as the seasons passed.

We finally reached the place he had picked to fish or was it hunt? I unlimbered my rod and made a few casts but became absorbed in what my prospector friend was doing. He had climbed a large boulder and was peering into a pool with his shotgun at the ready. He fired with the rubber band powered firing pin striking the shell. And sure enough, he had either hit, or more likely, stunned a fish as it bore no wounds. He got a few more fish in this manner. I got nothing as I became involved in taking pictures of the fish hunt.

When we finished the examination at the upper Bitlis camp, we jounced on to Diyarbakir an old walled city served by a Roman aqueduct. This system wasn't adequate, so water went to different part of the city on different days. The MTA facilities on the ground floor of an ancient run down apartment building were, again, dirty and uncomfortable.

In the evenings we chatted, told stories and drank Raki. The bread and tomato diet didn't go far to satisfy one's appetite, but the Raki helped you forget you weren't eating right.

Visited Mazidagli, the only active phosphate mine in Turkey. It produced about 75,000 TPY. Etibank ran a pilot plant aimed at upgrading the marine phosphorite. We went on to Mardin City located on a high bluff overlooking the boundary with Syria. Drank ice-cold beer in a beer garden as we nibbled on pistachio nuts. Then back to Diyarbakir and the MTA headquarters.

The next day we drove north to visit the Cosal deposit. It appeared that the Turkish idea of road was to follow a track left by some camel train or a goat trail. They were awfully rough and we had to hang on to avoid being tossed out. Cosal turned out to be another magnetite-apatite deposit similar to those in the upper Bitlis Valley. On the way back to Diyarbakir we stopped at an adobe shack alongside the trail. It had a dirt floor and hewn benches by its rough tables. Either we were exceptionally hungry or the joint really had good food cause we all ate heartily before heading back to arrive Diyarbakir about midnight.

Back to Ankara and the Otel Tunali which was OK. Attended the CENTO meetings made up of representatives from the US, Turkey, Iran and Pakistan. There were some good technical papers presented. I spoke on Equipment Selection for Open Pit Mining

Was much in need of exercise, so on Saturday I took a map of Ankara and headed out. Walked for a long distance beside the ancient walls of Ankara. It was interesting to note that these 600-700 year old walls included many older fragments of marble columns and other pieces from earlier structures. Visited the Citadel and the Museum of Ethnology.

Kept up the walking on Sunday including a visit to Anitkabir, Ataturk's tomb on the summit of the hill Rasattepe. In addition to housing the sarcophagus of Ataturk, there are numerous exhibits commemorating the revolution of May 1960 that brought new direction to the future of the Turkish nation.

It was wonderful to get home after that long trip to Pakistan and Turkey. I was deep into a variety of USBM projects. In addition I was a member of a number of committees working in a variety of mining related fields. One of these was the National Committee on Tunneling Technology of the National Academy of Science. Attended a field meeting at Fresno, California where we took a field trip to the Holmes Project of the Pacific Gas & Electric Company.

While a group of us were on the dam of one of the artificial supply lakes for the Holmes Project, a lady fisherman came by and deplored the development that was ruining, to her

mind, the pristine nature of the lovely lake. Tried to explain to her about the project but don't think she believed.

CHAPTER 18.

ALASKA FIELD MEET - RED DOG - MEXICO - USIBELLI MINE - ARKANSAS DIAMONDS

ALASKA FIELD MEET

It was time for the annual meeting of the Bureau of Mines Field Office Chiefs. John Mulligan, Chief of the Alaska Field Operation Office at Juneau, was the host. Dick Appling, Bob Thomson, and Joe Smith were also field chiefs at that time. A number of staff members also participated including Will Dare, Gary Kingston, Harold Bennett, Dave Carnes and Don Blasko and Jane Roberts.

The trip began with a visit in Fairbanks to Sweet's Spare Ribs. George was once an army chef and when he took his retirement in Fairbanks, decided to stay on and cook spareribs for the public.

So George and his wife, Sweets, opened their first venture in the restaurant field. It was a lean-to type of shed that was augmented by additional connecting sheds till it resembled an early California chicken house. But his ribs were excellent and his place had an unusual decor. Then he took out a small business loan and built a poured concrete mausoleum. The ribs were the same but the entrancing decor was gone.

We held morning business meeting planning activities for the coming year. Afternoon trips to the CRRL project, Cleary Creek, Tury Anderson's Silver Fox mine and Walter Roman's Fish Creek placer operation ended up with a visit to Alaska Land and the Malamute Saloon.

September eighth we took a most memorable trip along the Brooks Range overflying Circle, to Bettles, Walker Lake, the Kobuk Trench, Shungnak Camp, Arctic Camp, Picnic Creek, Bornite, Kotzebue, Red Dog, Eagle Creek, Drench Water and return to Fairbanks. We had flown almost the length of the Brooks Range, first west along the southern flank and then back east along the northern flank.

It was three years earlier, in 1975, when the Bureau of Mines was making Mineral Land Assessments of areas that could be designated public interest lands that the Red Dog potential came to light. We didn't have the manpower to do all investigation with Bureau personnel so some of the assessment work was done under contract.

RED DOG

In looking at the lands that might be encompassed in the Gates of the Arctic National Park, we did a lot of research seeking information on claims that had been staked, occurrences noted and other clues to anomalous mineralization.

One such bit of information was that Bob Baker, operator of a Kotzebue air taxi service, in 1968 had sighted reddish mineral stains along a creek that finally joined the Wulik River. In the summer of 1968 a USGS geologist, Irv Tailleur took a few creek bed samples that ran up to 10% lead. He named the creek "Red Dog."

Hence in June 1975 Bureau contract geologists looked this area over closely and derived many clues as to the existence of a significant ore body. With the 100 day field season drawing to a close, we could project what would happen when the diamond drillers and samplers hit the Fairbanks bars. There would be a claim staking rush and all sorts of recriminations for secretiveness on the part of the Bureau would follow.

It was my opinion that a uniform release to the media would be preferable. So Will Dare and I met with the Director of the Bureau of Mines who concurred in our approach. Then it was necessary to get approval from the Secretary of Interior. At a meeting with his staff that day we showed the location of the Red Dog occurrence with respect to the boundary of the proposed Gates of the Arctic Park in that area.

The deposit straddled the park boundary line! One Interior staff member, Frank Kelley, proposed that the park boundary be shifted westward to put all the Red Dog deposit into the Park.

I vigorously opposed this concept for a variety of reason, not the least of which was that such action would mark the Secretary as being opposed to realistic usage of important natural resources. The matter was then left with counsel to the Secretary who committed himself to contact me no later than 8 PM, the time when the Juneau office would be near closing.

Depressed and angry, I went home to await the decision of the Secretary. Called John Mulligan and filled him in and read the proposed press release to him so that his offices in Juneau, Anchorage and Fairbanks could prepare for simultaneous release. What a relief it

was when a few minutes before 8PM, the anxiously awaited telephone call came and we proceeded to announce the Red Dog find.

In many ways that was a fortuitous event. There are other significant mineral occurrences such as the Red Dog that have now been incorporated in the Gates of the Arctic National Park. Maybe someday there will be a change!

As predicted, the next day brought a rush of claim staking in the area. My phone was ringing all day with calls from folks who sought more information or who wanted my personal opinion. One of these was old friend Bob Haffner from Cominco, the son of Barney Haffner. He had only one question, "Is that Red Dog press release true?" I told him it sure was and Cominco took off with fast action to acquire the major position on the deposit.

Before leaving Alaska, I wanted to see what progress had been made at Greens Creek. Here was another mineral deposit for which we had fought vigorously to make certain that it would not be included to the Prince of Wales Preserve. Overflew Greens Creek, Bohemia Basin, Mirror Harbor, Kimshaw, Chichagof and Hearst Chichagof.

MEXICO

Back at the salt mines attended to the things that had accumulated in my absence and prepared for a trip to Mexico. UNITAR the United Nations Institute for Training and Research announced it would sponsor the First International Conference on "The Future of Small Scale Mining." The conference was to be held between November 26th and December 5th at Jurica in the state of Queretaro, Mexico. That sounded like a great place to celebrate my December 3rd birthday. So I got busy and prepared a paper titled, "Incentives for Mineral Exploration and Development," which was grouped with other papers in the subject of Government Policy.

People came from all over the world to attend this meeting with expenses paid for by the UN. We looked forward to going as there would be many of our friends participating. Arriving Mexico City in the smog that perpetually envelops that basin we rented a car and took off through overwhelming traffic congestion to find the road to Queretaro. Several hours later we were at Jurica in the state of Queretaro.

Jurica was both a hotel and convention center and well suited to the needs of the 180 participants who came from 60 countries. The many ladies that came along augmented the group to about 250 attendees. An Olympic sized swimming pool, a well stocked bar, tennis courts and a nearby golf course were among the many amenities. A field trip to Guanajuato provided the opportunity to visit one of the areas silver mines. It was a replacement - type deposit with open stopes and a substantial contributor to Mexico's silver production.

Fortuitously, there was a fine party on December third. I was grateful for the extra special birthday party complete with Mariachi band and Mexican dancers. We visited Queretaro where opal is mined and went to a jewelry manufacturing shop that ground cabochons and faceted gem stones. We came off with several examples of their work. Then we drove to Taxco via Toluca. I visited the Industria Minera silver mine on the outskirts of Taxco, a mine that supplied most of the silver used in the arts and crafts of Taxco's silversmiths.

Things were changing more than I could tolerate at the Bureau of Mines. Helen Seitz, my secretary for all my years with the bureau, retired. It was hard to take. Helen had been with Bureau for many years and had worked with Elmer Pehrson before my arrival. She knew the Bureau inside and out and was a most efficient and competent lady. It turned out that I had no choice as to a secretary to succeed Helen. Personnel would pick one.

I ended up with a girl who didn't want to work. A draft copy of a letter or any document would be retyped only to include more errors than the original. It was frustrating beyond belief. She couldn't do anything right except go out for a break. Making travel arrangements was beyond her. Now and then I would turn up at a hotel where I thought I had reservations only to find she had canceled them. I appealed to personnel as my work had come to almost a dead halt. I made up my mind to retire as soon as possible as trying to work with that girl was unbelievably impossible. A trip to Morocco for the Department of Commerce had to be canceled because she couldn't get the program typed without errors. She was a costly mistake.

A mid winter trip to Alaska came up in relation to environmental legislation affecting coal mining operations. It was designated COACMAR but I no longer recall what the acronym stood for. But it took place in Fairbanks and began with a trip to the Usibelli mine to see what conditions actually looked like when operations took place at temperatures that went as low as -40 F.

Usibelli had a new dragline that it constructed on track in a building that was cut in half so that each half could roll back and allow the dragline to crawl out. That system worked fine. In an area very close to the mining area stripped waste had been reseeded. There lots of bighorn sheep scraping and pawing through the snow to get at the grass. It was possible to take pictures of these beautiful creatures from just 60-70 feet away. They didn't seem to mind being observed.

Spareribs at Sweets that evening in his new location. Tom Pittman, Chuck Hawley, and Earl Boone were along. We were kind of sad about the new location and missed the rambling California styled chicken shacks where Sweets used to be located. On Friday the 16th we took a cold flight over the White Mountains where a uranium find had been reported and on over the Yukon Flats on our way back to Fairbanks. After a day at Juneau to work with the Alaska Field Operation Center got back home that Saturday.

The Texas Energy Advisory Council was anxious to accelerate research on lignite and asked a group of engineers to visit the several possible locations where such research could be undertaken including the University of Texas and Texas A & M. We flew around in a Texas state plane and heard the presentations and the final decision was to do the work at the University in Austin.

The American Association of State Geologists met in Little Rock, Arkansas in June. It was a fine meeting and both Hilda and I enjoyed the events that included a visit to Old Washington and the Arkansas diamond mine. This deposit had been declared a state park, but it was still feasible to do some work and diamonds were still being found. The deposit had never been worked to any depth. Met several teams that had developed a method that allowed them to make a decent living off the diamonds found.

There was limit of a five gallon bucket full of material that could be taken out of the park daily. So the teams of four or five men would do a lot of washing to end up with a rough

concentrate that would be pooled into their buckets. At home they would work the material down and recover the diamonds.

A float trip on Lake Ouachita was embellished with detailed explanations of the geology by State Geologist Sam Peck and members of his staff. After the meeting, Ray and Norma Jean Stroud took us up to see the Buffalo river. Then we went on to Gastons to fish for trout on the White river. The river starts below the impoundment of the Bull Shoals Lake dam and the water has a temperature of about 56 F, just great for trout. We had a guide who handled the row boat and who, presumably, would spot us in choice fishing areas. We caught our limits without a problem.

Later that June the US National Committee on Tunneling Technology met at Stone Mountain ,GA. We included a hike to the summit and a train ride around the base of Stone Mountain before returning to Arlington. Old friend Alberto Benavides and Elsa from Lima visited. It was good to see them. Hilda was particularly pleased as Alberto presented her with a 50 Sole Peruvian gold piece that weighed an ounce.

There were other trips that year but my thoughts were focused on the home under construction in Luray. I was looking forward to retirement. And with good reason. Will Dare had retired, secretarial help was incompetent. Our Mineral Land Assessment studies were being held up by Joan Davenport, Assistant Secretary for Land and Minerals. It got to the point that Senator Ted Stevens of Alaska threatened the Secretary of Interior with a Freedom of Information Act suit unless he released reports on our Alaskan studies.

CHAPTER 19.

PALM BEACH - RETIREMENT HOME - SOUTH AMERICA - ALASKA 1980 -
MISSION TO AFRICA

PALM BEACH

Hilda has been long addicted to entering sweepstakes and she had some interesting wins. One of these was a trip to Palm Beach and a week-long stay at the famous Breakers Hotel. It was cold and windy early that December but we did enjoy our stay. Took a tour through the Lion Safari west of Palm Beach and delighted in the wild life visible as we drove through - with all the windows up. We fished Lake Worth with little success. We walked all over to see the many famous homes of bootleggers, actors and politicians.

RETIREMENT HOME

In Luray on December 14th we saw that the footings had been poured for our retirement home. It had taken a few years to get to this point. Hilda had done a lot of scouting for a building site and we had rejected most. We finally settled on a 13 acres wooded sloping area that offered the opportunity to have a pond and had an ample supply of oak and other hardwoods. I should have listened to Hilda and purchased the entire tract of 30 acres, but I just didn't have her vision. I regretted it later on.

According to the maps of Shenandoah National Park we thought we were buying land adjacent to it. Later we found out that the Park had traded off that piece of land for some other area. But the maps were not changed. Before we could build we needed to know about water supply, and that required a power line. Two owners of neighboring land turned down our request for a power line right of way. But George Atkins approved a right of way through his land.

With the power line in we contracted for a well and got 4 gpm at 506'. The well went through 105' of unconsolidated fill and had to be cased to that depth. The water was a bit hard but otherwise excellent. Tests were conducted on an area that could be a septic system drain field and proved to be OK. Then we knew we could build!

We spent lots of time acquiring plans and studied to see what would suit us best. I favored a log house but Hilda's opinion was that log cabins were only good to float away in a flood. She had been raised in a log cabin built by her Father on Waite's Run near Wardensville, West Virginia and her Mother still lived there.

We had many discussions and a few arguments. I was for a small house with no dining room. Hilda's reaction was, "No one is going to take my dining room furniture, we are gonna' have a dining room!" That was that so plans included a dining room. When the house was finished, I found that the design was based on the dining table without extra leaves. It was a bit crowded and I realized the dining room should have been two feet longer.

After lots of hassles we finally agreed on a floor plan and outside appearance. Took some purchased plans that were close to our desires and reworked the drawings to suit.

Visited with the MAPCO people en route to Denver for the annual meeting of the Colorado Mining Association. MAPCO wanted me as a consultant on its Alaskan exploration. Later in February visited Las Vegas for the AIME annual meeting. Then in April another Chamber of Commerce jaunt came up that took me once more to South

America. Put a team of manufacturer's representatives together and outlined the program we would present on the trip.

SOUTH AMERICA

We were to meet in Rio de Janeiro at the Meridian Hotel. On the late night red eye express from Miami to Rio there few passengers. I had a row of three seats to myself. In the dim light I noticed a crumpled scrap of green paper on the floor in front of my seat. I picked it up and straightened it out. A hundred dollar bill! Found three more. I considered giving the \$400 to the stewardess but thought, "Why should I make her a gift of the \$400?" so kept the bills, placing them in my leather ankle wallet.

The Department of Commerce team was booked in to the Meridian hotel owned by Air France. It was located on the Copacabana with a lovely view of the bay, Corcovado and Sugar loaf. The scenery at the rooftop swimming pool enhanced by topless stewardesses wasn't bad either.

We learned that it was not a good idea to walk alone in Rio, so I went with another member of our group and walked miles along the scenic beach from the north end to Ipanema. We took the almost mandatory trip to the top of Pao de Azucar. We had a well attended series of technical sessions. On the evening of the first day our entire group went to Oba Oba where we were amazed the abundant energy of the carioca dancers.

Our second series of sessions were even better attended. Paulo Avelino of the National Bank hosted a cocktail party at his home and then we proceeded to the Churassari for dinner. Met with John Albuquerque Foreman of Nuclebras for a run-down on the uranium industry of Brazil.

Early Sunday morning Ted Steidle of Marion Power Shovel and I took an early flight to Belo Horizonte as we planned to rent a car and visit the colonial city of Ouro Prieto. After we checked in to the hotel in Belo Horizonte I noticed that my leg wallet with almost all my funds and the \$400 of found money was missing. I called back to Rio and asked Bill Watts to inspect my hotel room. Sure enough, even though the room had been made up, he found my ankle wallet under the edge of the bed where I had placed it the night before. What a relief!

Ted and I drove through the lovely countryside to Ouro Prieto, an old mining town, with a school of mines and an excellent mineralogical museum. It took more time than we had to do justice to the beguiling colonialism of Ouro Prieto. The town is so replete with enchanting churches, graceful squares with playing fountains and old houses with verdant gardens that it was decreed a protected national monument in 1933.

Belo Horizonte is indeed that - a beautiful horizon. From our most modern hotel on the praca there was a grand panoramic scene of the south end of the Spinach mountains, once the primary source of Brazil's iron ore but now dwarfed into almost insignificance by the vast finds in the north by CRVD.

As mission director, I was pleased to have a fine team; John Fitzgerald of Ingersoll Rand who spoke on Mine Drilling in the Future, Ted Steidle of Marion Power Shovel on the topic of Loading Operations in Open Pit Mines, Octavio Rioja of Paccar International who spoke on Transportation in Open Pit Mines, Bill Watts of US Steel who discussed

Engineering, Planning and Construction of Mines, and Ron Utley of The Fuller Co. who addressed Underground Crushing Plants. My topic was Mineral Exploration.

We gave our presentation twice in Belo Horizonte to meet the request of the local mining people. When the first group heard our papers, they were anxious to have more of their personnel hear our remarks as well, hence the second presentation.

There was little time to see much of Belo Horizonte due to this double presentation, but I did manage to buy a leather travel case for Hilda and a few specimens of the lovely onyx for which the area is famous.

Our presentation was repeated twice in Sao Paulo. There wasn't time to see anything of that city, one of the world's largest. A night flight to Santiago, Chile and the hotel Carrera. On up the country to Chuqui where we performed again. We visited the mine, mill and smelter and had a trip across the north end of the Atacama desert to San Pedro de Atacama,

San Pedro was an oasis blessed with warm springs. Bathing was the popular sport. I was amused at the sign indicating the ladies facilities - a large painting of a girl with her skirts up seated on a commode.

We flew back to Santiago for another session and then went to El Teniente, the famous upside down mine. I took a trip underground and exclaimed over the huge underground chamber excavated to hold the primary crushing plant. After the time spent underground our schedule just didn't allow time for a visit to the mill and smelter. So on April 20th when we got back to Santiago, we took off shortly for Lima where we stayed at the Sheraton. There we repeated our presentation several times in order to accommodate all who were interested.

There was a Miss Pink from the Department of Commerce on the tour who'd been handling all arrangements. Coming back from the Gran Hotel Bolivar her purse was snatched from her shoulder by a motorbike mounted thief. There was no opportunity to do anything about the theft and the young lady lost passport, travelers checks and jewelry.

We took a field trip to Arequipa and visited Cerro Verde. We made our presentation there for the benefit of the mining people in the south of Peru. Then home on April 27th after a successful three week long tour.

Early in May attended a meeting of the US National Committee on Tunneling Technology in Albuquerque. There was a field trip to a pumped power project that featured a huge underground chamber. Then too we visited the Jackpile uranium mine that I had seen so many times before.

May 16, 1980 was my last day with the Bureau of Mines and also the day we sold our home in Arlington to Kim and Nita Calvin who were neighbors for several years. The next day I took off for Alaska to spend the summer as a consultant to MAPCO.

As we crossed the Cascades, the pilot pointed out several prominent peaks identifying Mt. St. Helens as the one without a blanket of snow. The very next day she blew!

ALASKA AGAIN

MAPCO had an office in Ketchikan and was examining prospects in southern Alaska. One field crew was at Hollis. They were not finding anything of particular interest. Arnold Buzzalini and I took a float plane to Hollis on Prince of Wales Island and then went on to

visit the Bokan Mt. uranium deposit which was not operating. Back in the days when I was in Grand Junction, Bokan had shipped several hundred tons of high grade ore that had pitchblende as the principal mineral. We saw traces of uranium as we examined the deposit. It rained all day long.

In Anchorage I visited with Don Blasko and Jake Jansons checking up on whether they had found any new sites of particular interest. Then on to Fairbanks and the MAPCO camp at Belle Creek just about 50 miles out on the Steese highway. The White Mountains were off to the north. MAPCO had a fairly good campsite located close to end of the black top on the road to Miller House and Circle on the south bank of the Yukon.

This Belle Creek camp was the base for whatever work might be done on the 30,000 acres in ten different group of claims totaling 1552 claims that Dick Swainbank had staked for MAPCO.

There was an old cabin that served as the cook shack and dining room and several Quonset hut shaped tents that housed some of the crew and the office. Spent a day with Dick Swainbank on the Mt. Prindle Project. Anomalous radioactivity had been encountered by the Bureau of Mines. Swainbank had located some claims and MAPCO came in and located others. Buzzalini was real high on the prospects for a sizable uranium deposit or two -but that takes more than radioactivity.

MAPCO had been active in the area for several years and on December 13, 1978 had issued a press release quoting Robert E. Thomas, CEO of MAPCO assaying that the company's uranium exploratory operations in Alaska have encountered uranium bearing surface samples with a 5 to 7% uranium content.

The MAPCO statement induced me to accept the job of conducting its exploration program for the season of the summer of 1980. For the first several days. I stayed at the Klondike Inn in Fairbanks while additional tents were being erected at the Belle Creek camp. Although the days were warm there was still lots of snow on the ground and the nights were freezing. I had a rented pickup and went to Belle Creek daily.

Dan Bailey, the camp manager, had installed a pump down by the creek and had strung out several hundred feet of garden hose in an effort to supply the kitchen water tank. Now and then a dribble would get through. Got some 1 1/4" plastic pipe, built a 24' high water tower using the chopper to place the tank on it. Relocated the water line to be closer to the water tower. It worked fine and provided gravity flow to supply the kitchen. In the meantime, was visiting all the claim groups to look them over.

At the Biltiki claim group several trenches had been dug but saw no signs of mineralization. Mineralization was rare throughout the area. But diamond drilling was proceeding regardless of the absence of a geological basis or any indications of mineralization.

Crews of the contract diamond driller were taken to their drill site by chopper each morning and hauled back to camp each evening. Drilling targets were unknown but site and holes were established by Buzzalini. It was hardly a propitious project. After a few days I realized I had made a mistake in accepting the Project Manager's job. It was made more awkward as Buzz set no guide lines and it appeared as if there were three project managers.

This disorganization might have been tolerable were there any signs of mineralization. Beautiful monument grade syenite was being drilled in most of the holes. I felt that the project should be terminated to stop further losses.

There were some bright spots and interesting experiences. Karen, Jim and Steve Ambrose came to visit as they toured Alaska.

Although the White Mountains were pretty shy in the minerals deposit field, there were areas where placer gold deposits had accumulated. There were a number of placer operation along the Chatanika River and on down by Eagle Creek, Earl Beistline had a Brushy Basin deposit on a side hill. After the Spring thaw he would bulldoze off the surface and expose the Brushy Basin shale where the gold would be found.

Placer mining had taken place on almost every creek in the area including Belle Creek. The nearest underground gold operation was the now defunct Cleary Hill mine near Cleary Summit on the Steese Highway. Miner Ed, who ran a little store near Belle Creek, had worked there when the operation closed.

Miner Ed and his wife would be sober each morning but their beer intake rectified that situation before each evening. Ed stocked a lot of other things beside beer and was ready to trade for money or gold. He kept a scale handy as miners from the nearby creeks usually had some gold to trade.

Each day began with the ferrying of the diamond drill crews to their working area. At one location, the "Y" group of claims we found that bear had damaged the rolled up vinyl water tanks. These tanks, the drill, pumps, pipe, drill steel and other heavy items had all been brought in during March when the frozen ground enabled movement. A Nodwell, a tracked cargo vehicle, did most of the job and the John Deere back hoe propelled itself over the icy terrain and frozen streams.

The Sikorsky 55 helicopter could carry four passengers and was extremely useful to haul diesel fuel and especially in moving from one drill site to another. It cost \$100 per day plus \$260 an hour when flying. The flight from the Belle Creek landing pad to the working areas usually took about 30 minutes. During the flights we could often see bear and other animals. The caribou would seek out snow patches where the ever prevalent black flies were less of a bother.

It was ever a pleasure to fly over the countryside. While free of people, their marks were plainly visible. The Alaskan state flower, the empty oil drums, were to be seen here and there. There were several places where we saw the wreckage of small planes. Leaving Belle Creek at about 1000 ft. elevation we had to climb quickly to cross the 2,500 ft. ridge that lay about 7 or 8 miles north of the Chatanika Valley. Crossing the ridge we could see Mt. Prindle off to the northeast about 32 miles away.

The flight north took us over Ophir Creek, a tributary of Beaver creek, the main drainage of the broad valley. There were several abandoned cabins en route as we flew north toward Cache Mountain 4,800 ft. high. The scenery was spectacular! High tors and bold ridges were dominant features.

The "Y" group of claims were located on one of these ridges. One day I landed at the drill site and examined core. As usual, there was nothing of any interest - no mineralization, not even any alteration. I decided to walk down into the valley to the north where we had another drill working about a mile away.

As I was moving through a clump of stunted evergreens, I came face to face with a bear about the size of a Volkswagen beetle sitting on its rear bumper. I yelled and screamed and jumped up and down. It didn't seem prudent to use my .38 revolver on him as that would probably just make him angry. To my relief, he finally came down on all fours, turned and ambled away. I took the next day off to go to Fairbanks and buy a .44 magnum. It did well to keep bear away as I didn't see another one in the field.

Each drill site was equipped with a .44 magnum carbine because of the frequent bear encounters. We were concerned that the ever changing weather conditions might strand a crew overnight. Purchased several galvanized steel drums equipped with locking rings. When packed with sleeping bags, emergency stove and rations, they were a good backup in the event a crew was forced to overnight at the drill site.

One day drove out the Steese Highway and off to the north to visit Meyersville. The name was given to the place because Meyers had squatted there for some years and claimed ownership. He and his family lived in a squalid cabin surrounded by tins cans, bones and other trash. Meyers himself fitted well with his homeplace.

Meyers leased small spots along Nome Creek in exchange for part of the gold recovered. At the time of our visit to this area just southwest of some of the MAPCO claims there were four different groups working the creek. Some lived in tents while others made do with crude jacals constructed from the stunted pine. Most of the crews were Californians enjoying the break from their usual routines as dentists, lawyers and the like.

Don Kronig was the chief geologist. We had frequent discussions about both the geology and speculation as to why Buzzalini had reported the unusually high uranium assays when there nothing to support his claims. Was he a professional con artist or just plain ignorant of the specious and highly variable disparity between radioactivity and uranium content? In any event, his unfounded assertions as to the presence of uranium conned MAPCO into spending more than \$2,000,000 on a series of worthless claims. MAPCO had even purchased an 80 acres mill site adjoining Belle Creek and the Steese Highway.

Buzz was really a case. He got a group of consulting geologists and petrologists to come in and advise. They included John Gableman, Bob Sayre, Zuhair el Sayib and Tony Marriano. Both John and Bob were old friends but I had never heard of the other two. John confided that he had seen better uranium prospects on the streets of downtown Los Angeles.

Even though there were days that were warm, anywhere a few feet below the surface was permafrost. One string of drill steel got stuck and we had no luck in attempting to pull it. The next morning it was frozen solid and was abandoned. We had frequent sudden squalls of snow, sleet and rain. Miserable weather at times.

Hilda and Sarah, her niece, visited. I took a few days off to take them to Denali for a Park visit. We left our car at the park entrance and took the free bus through the park. At times both Sarah and Hilda would duck down on the floor so they wouldn't have to look at the precipitous route. I don't think that made them a bit safer. We saw 12 bear, 12 caribou, and 6 Dall sheep in the park. We also visited with Alice Herring, Earl Beistline's aunt, at her cabin near Eagle Summit. Hilda and Sarah went gold panning in the icy creek water and found a bit.

There were weather days when the chopper could not fly. Drilling stopped and we were glad to have followed the practice of never leaving a drill string in the hole at the end of the

shift. Pancho Montecinos, the geologist Buzzalini placed in charge of the Alaskan effort, came and asked me to visit the MAPCO Sweetheart Ridge project near Sweetheart Lake south of Juneau. This was a vein deposit that was being drilled. It contained gold associated with heavy concentrations of pyrite.

The scheme was that Ken Lokken of Channel Air would fly us to Sweetheart lake in a Beaver where the camp chopper would pick us up and ferry us to the ridge. We buzzed the camp so that they knew we would be waiting for them. Ken off loaded us on a sandbar where a stream entered the lake. We waited and waited but the chopper did not show. We began to make plans for a crude shelter and took stock of what edibles we had. But we were lucky and after three hours the chopper came and took us up to the rain swept camp on the ridge. It seems that they had to recharge the battery before the chopper could be started.

On Sunday August 3rd I continued on to Washington, glad to be shut of what at best could be called a fraudulent undertaking. To this day I cannot understand what was motivating Buzzalini to perpetrate such a bamboozlement. Was it motivated by some hope of private gain or was it sheer ignorance of the relationship of radioactivity expressed at eU (equivalent uranium) to actual uranium content? My feelings were injured to have been taken in by the extraordinary claims of high grade surface samples. But I was not alone as Buzz had convinced the MAPCO people up to and including Mr. Thomas the CEO.

On August 12th I sent MAPCO my final report of nine pages that cited the fact that nothing had been found and suggested use of the area as a radioactive waste storage center. Don Kronig filed his report and recommended scrapping the entire project. It is puzzling as to why MAPCO so readily believed Buzzalini's assertions as to high grade uranium samples and then balked at both Don Kronig's and my equally firm assertions that the project was worthless. I have often wondered what became of Buzzalini after the Mt. Prindle fiasco, but never heard tell of him since.

It was time to get on with other things. Vic McAllister, who was building our retirement home in Luray, said he would have it completed by September 15th. So on September 7th we sold our home in Arlington to Kim and Nita Calvin for \$161,750. This was a direct sale without a realtor being involved. We began to plan the move.

At the same time I was doing a job for the World Bank on Bolivian mining. It was fun to be getting into the current situation in Bolivia. We moved to Luray on October 12th, 1980. We began to settle in and hoped that the painters and other folks still working on the house would soon be gone. Vic tried to borrow some money from us and then walked off the job. We got Rex Ellis to do the sparging of the outside foundations and other tasks that McAllister had not completed.

Then lightning struck! Although we had paid McAllister, he had failed to pay Rex Burner for all the plumbing, Burner Electric for wiring and Luray Builders for all the building supplies. We were hit with three liens aggregating about \$16,000. Hilda was in tears. There seemed to be no other recourse but to come up with fresh money and pay off the liens and sue McAllister. So that's what we did. Vic had remarried by this time and was able to come up with the money to settle out of court. We estimated that we had gone "in the hole" to about \$5,000 and felt fortunate that it wasn't more.

In Mid January 1981, I was involved with the UN Department of Technical Cooperation for Development. This involved a review of all on going projects throughout

the world and recommendations for the future. This effort took place at the UN in New York City. Ran into many old friends and associates including Dr. Alpan from Turkey. A Dr. Kobayashi from Japan was the Chairman of the group.

I spent months in cutting and hauling firewood, working in and around our new home and thoroughly enjoying every minute. But there were diversions. I became a consultant to the Defense Nuclear Administration through its contract with Merritt Case, Inc. Further the Department of Commerce wanted me to undertake another mission to Africa to promote mining equipment sales.

AFRICAN MISSION II

I put a team together and made preparations for the North African trip. There were six company representatives on the tour; C. A. McGough,Jr. of CAM Industries, Derek Ronksley of Driltech, John Betanoff of Esco, David Mangan of Harnischfeger, George Tousley of Ingersoll-Rand and Bernard Saltiel of Dresser. We were scheduled to begin the trip with a visit to Cairo, but Sadat had just been murdered and all Egypt was in convulsions. So the visit to Tunis came first.

We stayed at the Africa Meridien again. After the presentation in Tunis and a party in Carthage at the Ambassador's residence, we took a five hour drive to Gafsa at the edge of the desert. Stayed at the Jugurtha Palace. At the Ker Eshfair visited the phosphate mine and made our presentation to the mine staff. Returned to Tunis via Sbeitla with its old Roman ruins and the holy city of Kerouan.

Then on to Casablanca and the Hotel Mansour where we made our presentation. As mission director I was provided with a lovely suite that served as mission headquarters and lounge. It was well stocked with "hospitality supplies," a fine euphemism for the booze. While we in Casablanca gasoline rose to \$4.00 per gallon.

Bernard Saltiel and I decided we would visit Marrakech over the weekend. Bernard rented a car and off we went to the south stopping at the Khouribga phosphate mine en route. In Marrakech we stayed at the famous old Mamounia hotel with its luxurious gardens.

Marrakech is an ancient city in the foothills of the Atlas mountains. A caravan cross roads, it is a marketplace for desert nomads and those dwelling near the coast. We walked from the Mamounia to the Place Jemaa el Fna where we found a restaurant with a balcony overlooking el Fna. After a cold beer or two we ordered and ate while observing all the to and fro of the colorful people below us. Then we walked to La Koutoubia a strange tower much revered by the people of Morocco.

We were repeatedly hassled by small boys and men who wanted to guide us. We finally broke down and hired a bright lad who led us all over the market place. There was a drug store consisting of the wide variety of herbs and other stuff used to treat illnesses of all kinds. Drugs of all kinds were readily available and put to extensive use by the people.

There were weird people everywhere we looked that were under the influence. We visited the museum of Dar si Said, but time ran out. We had to get back to Casa Blanca to prepare for the seminar on Monday and Tuesday.

Wednesday, with calm restored to Cairo, we took off on Royal Air Maroc. After an overnight stop we drove for 4 hours across the western Sahara to Baharia Oasis, Egypt's

principal iron mining area. On the bus with us were Adel Abdel Karim, deputy Chairman of the Egyptian Iron and Steel Co., engineer Anwar Bishai, director general of mining projects for Egypt, Ed Ruse, the US Embassy commercial attache, and Hatem el Dali and Wagdi Francis of the embassy staff.

The drive across the desert was interesting. The black top road was well maintained despite the ever encroaching sands. And actually, it wasn't all sand. I picked up near flat pieces of quartz that were pitted and cupped into smooth depressions carved out by the ceaseless winds. In time all those pebbles would be reduced to sand. There were several rest stops en route to Baharia Oasis and the nearby El Gedida iron mine.

El Gedida was about 23 Km north east of the Baharia depression. It was connected by rail to Helwan on the Nile where smelting was performed. The open pit mine produced 53% Fe ore with a 40% Fe cut off grade. Electric shovels and diesel operated trucks left over after construction of the Aswan dam were the principal items of mining equipment. The Soviet made shovels and trucks were broken down often and parts just were not available. Plans to convert to US made mining equipment were in progress and a few pieces were already on hand.

The ore bed was about 24' thick and had a 123 million ton reserve. Annual production of about 3.5 million tons of limonitic ore was shipped to Helwan.

The seminar was presented to 30 engineers. Overnight accommodations were provided by Egyptian Iron and Steel. Then we were given a tour of the nearby Baharia Oasis. There were remains of old Roman structures and a large quantity of shards from the pottery vessels in which wine was stored. In Roman times, the oasis was one huge vineyard that supplied wine for Rome.

At one time the fertile area was substantially larger and connected to similar areas that were wiped out by the ever encroaching sand. Thus the peoples living in those areas were separated from their neighbors and developed cultural differences due to their isolation. In time the Baharia Oasis will be wiped out as well. But now it thrives on the warm water coming from shallow wells. Much fruit is grown and we tasted sweet lemons and other types of the locally grown fruit. Most staples were imported over the black top road from Cairo.

At the seminar considerable time was spent in answering questions related to handling the frequent sand obstructions on the road and railroad.

Back in Cairo we produced the seminar several more times before leaving for home on November 4, 1981.

CHAPTER 20.

LOST VIRGINIA GOLD - REAGAN'S TRANSITION TEAM - M-X MISSILE
BASING - TROUT - M-X SITE PICKED - USSR UNDERGROUND - CONSULTING
- POND PROBLEMS

It now appeared that I would have time to do some of the things I had planned for our retirement home. One of the first things to do was to finish off the basement and provide the space needed for an office - library where I could work. Rounded up a lot of local cedar rough sawed to about 1" thickness. Put that 4' high on the basement wall on furring strips and then used burlap covered plywood up to the tile ceiling.

That done, the next job was to finish off the basement bathroom and install a sauna. I really do enjoy that sauna and have spent a lot of time in it in the ten years since it was built.

We wanted a pond so that was the next major project. Got Oscar Sours to come in with a back hoe to dig some pits in the search for some impervious clay that could be used to line the proposed pond. Fortunately, a fine red clay was found that was above the proposed bottom elevation of the pond.

Then there was a major tree cutting job to clear the pond area. Charlie Rickel, Charlie Atkins and Paul Temple did most of the tree cutting in exchange for the firewood. Talked with several contractors about building the dam and settled on Larry Foltz and Buddy Cave, his partner. They did a good job using a rented tractor.

A 64' spillway was cut into undisturbed land. Even so to keep it from washing out with the annual floods, I had to lag it with all the rock I could find. That was hard work, but worth the effort. There were times when water running over the spillway was several feet deep.

The Soil Conservation people designed the dam. They called for a four inch plastic drain pipe running under the dam. This terminated in a several cubic yard concrete block that contained a four inch steel elbow. This elbow was bushed up to six inches and a vertical overflow pipe six inches in diameter was installed. The containment was completed in 1982 and all we needed to make it a pond was the water from the rain that would fall on the 94 acre drainage area.

THE LOST VIRGINIA GOLD MINE

For some time I had been thinking about a tourist attraction that might ride on the coat tails of Luray Caverns. The concept was to "build" a mine on the surface and then cover the

structure, replanting with grass and shrubbery. The "mine" would consist of a self conducted tour down a main pathway from which various side exhibits could be seen.

After one entered the portals on a self conducted tour he would turn on a tape player that was zoned for the nearest display. For example, the first display might be a reconstruction of some of the earliest mining known to man, the Scythians mining gold by hand. The next exhibit would jump to a later period showing mining in the Harz mountains. Then down through the ages with exhibits covering gold mining in veins, and coal mining. Nearby the exit portal there would be a panning shed where visitors could exercise their skill in panning for gold nuggets. An appropriate gift shop would be near the mining park's exit. I started to look for land for this endeavor but the fuel crisis and intervention of other events stalled the mine idea completely.

REAGAN'S TRANSITION TEAM

Following the election of President-elect Ronald Reagan in November 1980, I was asked to serve on the Strategic Minerals Task Force and to recruit a number of additional members willing to work on this effort. Plato Malozemoff of Newmont, Stan Dempsey of AMAX, Warren Fenzi of Phelps Dodge, and Bill Calhoun of Day Mines were among those I was able to recruit. R. Daniel McMichael of Pittsburgh was Chairman of our group.

We went to work to devise a document that would be a helpful guide to President Reagan in his inevitable dealings on the subject. I included consideration of ORFUS, Oil Recovery From Underground Sites. But when a copy of our preliminary report was sent to Michel Halbouy, Chairman of the Energy Policy Task Force, that group claimed jurisdictional authority. Thus the topic of ORFUS was transferred to the Energy Policy Task Force and was killed off. That action was to be expected when one looked at the membership of the Energy Policy Task Force.

My name was submitted by Elbert Osborne as a candidate for the post of Assistant Secretary of the Department of Interior for Land and Minerals. I promptly set forth my lack of interest in that involvement.

M-X MISSILE BASING

While house construction was going on I was busy at several other things. Early in 1982, I went to Norton Air Force Base to work on deep basing of the Intercontinental Ballistic Missile. The basic theory behind this missile and locating it in a deep based site was that

even after the Soviets had fired their best shots, and most of them, that we would still have the capacity to destroy them.

Some folks advocated putting the M-X missile on railroad cars and moving them daily to confuse the Russkys. That sounded like a good idea when you say it fast, but when you consider all the support equipment and people needed, it would be a major task to make the daily move and still be able to fire when ready. So deep basing in a hardened facility with support staff and equipment ever ready, seemed like the best choice. But where?

A lot of study was going on. A Technical Review Group (TRG) was made up of Ron Heuer from University of Illinois, Don Linger of the Defense Nuclear Agency, J.L.Merritt of Merritt CASES plus Gene Waggoner and me and several Air Force officers.

Picking suitable sites was a formidable task. Multiple factors had to be assessed including Constructability, Egress, Survivability, Endurance, Environmental Impact and System Operation. Under almost all of those qualities we had to weigh rock type, geologic structure, rock characteristics, hydrology, topography and geography.

The US Army Corps of Engineers had conducted detailed study of ten possible sites. It was up to the TRG to select the best one of the ten for further work. For the most part, this work was not classified. In fact it considered desirable to awe the Soviets and thus deter their taking any action when they learned what impregnable bases we had for the MX Missile.

Grand Mesa near Grand Junction, Colorado was one of the preferred sites. A tunnel could be driven from the south end of the Mesa some 5,000' below the surface. Extensive underground facilities would then be constructed under the lava capped mesa to provide for the siting of a number of the 92" diameter, 71' long missiles weighing 85 tons. This was the largest US ICBM missile permitted under SALT, the Strategic Arms Limitation Treaty.

For a while I worked on this with meetings taking place at Norton Air Force Base, near San Bernardino, California. Then the work was divided between a western and eastern group and I was reassigned to the eastern group working with UTD, Underground Technology Development. Meetings were held at various places in Northern Virginia.

Our attention was directed to other things as well. The DMZ between North and South Korea had been penetrated by North Korea with tunnels. The big questions were where and how many. That the North was driving such tunnels was discovered when a tunnel holed the surface in South Korea. A rising plume of steam from the tunnel opening gave its presence away.

A lot of expense and effort has since gone into efforts to locate additional tunnels use seismic and sonar methods plus drilling. Some additional tunnels have been found, but I expect there are many more that have gone undetected.

TROUT

The first year of the pond it filled nice and clear. It was cold and lovely so Hilda and I drove to a trout hatchery in nearby West Virginia and stocked the pond. Fed them well and they fed us too. It was fun to catch them on a fly and we fished out most of the 300 planted trout. But when the warm weather came, the remaining trout just perished from the warm water.

Then we went to Zett's near Inwood, West Virginia and purchased what they called a balanced stocking for our half acre pond. Now we have large mouth bass, catfish and bluegills. Actually we should fish the pond more as it is probably getting over supplied with blue gills. There are a half dozen Israeli carp that keep down vegetation. But they also agitate the fine sediments of the bottom giving the pond a muddy color in warm weather.

MISSILE SITE PICKED

Early in June the Technical Review Group held another meeting at Norton Air Force Base. Grand Mesa had been picked as a first site and we did a lot of work on the design. The scheme was to have a series of missiles located in a number of strategically pointing raises. These raises were driven with TBMs Tunnel Boring Machines that were terminated with about 50 feet of rock uncut. The TBMs were to be left in the raises and maintained ready to run. The MX missile was right behind the TBM ready to be fired.

Then, when an emergency dictated action, the TBM would be driven to the surface and run over the hillside and the MX missile would be fired. There was some doubt as to how this would work or if it would work at all. There was also concern as to whether this scheme would work if the rock above the raise had been rubbleized by enemy action.

It was decided to try out the various possibilities so a test was carried out under the direction of Joe LaComb at the Nevada Test Site. It was found that the TBM would perform as planned.

At that point my connection with Deep Basing for the M-X Missile came to an end. It appeared that the Defense Nuclear Agency used different teams for different phases of the work. However my work for DNA through UTD continued.

THE SOVIET UNDERGROUND

The emphasis now was to determine what the Soviets were doing with their underground space. Abundant pictures were available from high flying reconnaissance aircraft and satellites. The operation seemed analogous to the blind men and the elephant as the only information we had was what the pictures showed. Fortunately there were some time lapsed photos so we could get some ideas of rate of progress.

Spoil banks would have provided a good idea of the size of the underground openings. But the Russians were wise to what was going on and where necessary created artificial lakes in which to conceal the muck. We could see and estimate the size of surface ventilation systems, piles of supplies such as track, timber and pipe. Some information was available on the size and quantity of mining equipment purchased. There were also bits and pieces of humint or human intelligence.

From the detailed studies we made, we developed several scenarios as to what the Soviets might have as hardened underground facilities.

The next phase that we got into was the design and construction of underground sites that could withstand a direct hit from a 64 megaton bomb. In connection with this effort I made a quick study of "Going Deep" by putting together all the data available from domestic mining. I completed that study in June 1985 and came up with what would be involved in making openings at depths ranging from 5000'-15000'. To do this I compiled data from all deep mining operations that would supply information. My conclusion was that to drive a 20' diameter shaft to a depth of 7000-8000' in a single lift would require an investment of about \$100,000,000 and sinking costs on the order of \$5,000 to \$10,000 per linear foot.

In a telephone call I was asked to take charge of a construction project somewhere in the greater Washington area. I would be assigned quarters and taken to the project daily in a windowless van. My job would be to supervise construction of a deep shaft and underground bunkers. I would be held almost incomunicado for the months necessary to complete the job, but every other weekend I would have a few days off. My regular consulting fee of \$500 per day plus lodging and subsistence would apply. It was tempting but it seemed to me that the project would be better off with a younger man - I was just too richly endowed chronologically.

OTHER CLIENTS

There were other consulting jobs. For Stone & Webster in Boston, I worked on the design of a mine and mining method for a gold deposit in Ghana. It was called Teberebe and was located near Tarkwa. With a grade of only 2 grams per ton everything had to go smoothly to show a profit. This was an interesting assignment but when Stone & Webster wanted me to go to Ghana, I bowed out. Also worked with Stone and Webster on a proposal for S & W to design mine facilities for Malanjkhand copper in India. Stone and Webster did not get the job nor did anyone else. After Hindustan Copper Ltd. had all the proposals, it decided to do the job itself. The proposals were so detailed that the Indians had good guidelines on how to do the job.

Perini Corporation, also located in Boston, entertained a possible interest in shaft sinking for the coal industry. After Perini got my report, it decided that there was already a large number of competent companies competing in the coal mining shaft sinking business and another entry did not look like a good bet.

One especially interesting job was a subcontract for a consultant that was advising a US company on a suit against Iran in the World Court. It was suing for the hundreds of millions of dollars that were lost by Iran's appropriation of its property, held under a concession with the Iranian Government. To arrive at the numbers took a lot of work. Had to design and equip the mine, mill and smelter on paper and establish capital costs and operating costs. Projected these for 20 years forecasting copper prices, labor rates and the cost of supplies such as steel and explosives.

There was also some interesting work for the World Bank, particularly one job on evaluation of Bolivian tin mines. My life was anything but dull!

Now that I was over 75, there were fewer opportunities. Even so in 1992 along came an offer to go to Hungary for two months to help them rationalize some seven mines that had recently been privatized. Although Citizen's for Democracy Inc. would fly Hilda and me to and from Hungary and housing would be provided, we would have to take care of our own subsistence. On top of that would have to hire someone to live in our home and take care of the dogs. We just couldn't afford to go to Hungary. In addition it wouldn't have been any fun for Hilda. I would be in the field most of the time and she would be stranded in Budapest to get by on her own. And Hilda's competence to talk Hungarian was as nil as mine! Further, I figured that if Zsa Zsa was over here, there had to be a reason.

POND PROBLEMS

The Pond had a few problems. One winter, ice lifted the 6" overflow pipe and broke it off at the elbow in the concrete block. We lost almost all the water. Our recent stocking of a variety of fish were pooled up in a foot or two of water. So in sub freezing weather and with the use of several heat lamps, I fitted a coupling on the discharge end of the drain pipe plus a fitting for a threaded plug. Soon the pond filled up and we had saved the fish. Dug a ditch on the spillway and installed a four inch diameter trickle drain. It worked well to carry all but the heaviest flows and they went over the spillway.

CHAPTER 21.

CHILI - ORFUS - THE SHENANDOAH - EUROPE AND THE RHINE - AEC
REUNION - IRELAND - RETIREMENT LIFE - SCOTLAND - CANNON -
ALASKA BY SEA

CHILI

One of our near neighbors are Ed and Annie O'Brien. We got to joshing each other about the excellence of our respective Chilis. This soon led to the first Shenandoah Valley Chili cookoff. It was held in our yard. We had lots of hoopla. I provided pliers to crack the beans in OB's chili and he provided Alka Seltzer and other medicants for those foolhardy enough to try my chili. All the chili vanished so it couldn't have been that bad.

Then we learned that the Virginia State Annual Chili Cookoff under International Chili Society sponsorship was to be held in Roanoke. A gang of us went down and we soon learned that competition chili was a brand you cooked to please the judges - not yourself. We didn't even make it to the final judging table with our Barnburner Chili. But we did have lots of fun.

Ever since chili cooking and chili cookoffs have been a prominent part of our lives. The Page County Heritage Association asked me to put on a chili cookoff in conjunction with its annual Heritage Festival. That was ten years ago and I have been running that event ever since. Also got involved in a Chili When it's Chilly cookoff. For several years these were held in the VFW Pose 621 home. All chili was prepared at home.

To liven things up we had various events. One of these was to see who could present the most insulting and degrading comments about his opponent's chili. I claimed that one teaspoon of Ron Bushey's chili when dumped in the South Fork of the Shenandoah River would proceed to pollute both forks of the Shenandoah. Joni Waybright topped that. She said her dog took one bite of Frank Harden's chili and then spent an hour licking under his tail to get the taste of Frank's chili out of his mouth.

We cooked at many chili cookoffs in the area and earned points toward qualifying to cook at the International cookoff in Terlingua. In 1990, Hilda earned sufficient points to qualify to cook at the Chili Appreciation Society International annual cookoff at Terlingua, Texas. So off we went with great hopes and high expectations. We flew to Midland where college room mate Bob Estes and his wife Gretchen met us. We visited with Caroline Haigh, widow of my college geology prof.

In a rented car we went on to Alpine to visit with Ralph and Loyce Peters. Daughter Karen and her husband Jim met us there as did geologist Bill Fiero and his wife Ellen. They weren't going to the cookoff but had planned a float trip on the Rio Grande.

Terlingua was great fun. Lots of folk and plenty of high jinks. Among some 232 chili cooks, Hilda came in about 69th or so. She had lots of moral support from Karen and Jim and Bob and Gretchen drove down from Midland to be with us. En route back to Midland, we took the scenic drive up the river from Lajitas to Presidio after bidding goodby to Clay Henry, the beer guzzling goat. It was a spectacular drive! We crossed Alamita Creek on a new bridge that had been built to replace the pile supported one I had built in 1935 when I served as a Presidio county commissioner. We breakfasted on tasty huevos rancheros in Presidio and drove up the new highway to the ghost town of Shafter. Everything was shut down and carried a for sale sign. The mine was the sole reason for the existence of Shafter and it was shut down and flooded.

I am still of the belief that the silver rich deposits of the Presidio mine are not the only ones in the area. Others, I believe, remain to be discovered.

ORFUS

In March 1984, it appeared that some progress was being made in promoting the concept of Oil Recovery From Underground Sites e.g. ORFUS. Senator John Warner of Virginia decided to hold a hearing on the subject on March 2, 1984. Bob Terrell who was working on the Hill at that time had much to do with convincing Warner that the hearing should be held. Little, if anything, came out of this hearing but it did provide a recorded history of much of what had happened already. It turned out that the major oil companies, the seven sisters, who held most of the petroleum resource that might be amenable to underground recovery were not that interested.

On reflection, it became apparent as to why they showed so little interest. All the oil needed could be purchased from OPEC nations at cost ranging from \$14-\$22 per barrel. In contrast, ORFUS oil would require huge front end expenditures of \$100,000,000 or more per mine. The product would have fully allocated costs on the order of \$20-\$24 per barrel allowing for a 15% discounted cash flow rate of return. At first blush that doesn't look too bad especially when one realizes that such production would be domestic oil and would decrease our reliance on imports. ORFUS would reduce an unfavorable trade balance.

But the joker is that OPEC lifting costs are on the order of \$4-\$5 per barrel. Thus should major US companies make the substantial expenditure to go after ORFUS production,

they could find themselves with a knocked down import price of \$10-\$12 per barrel as irate OPEC nations set out to destroy the ORFUS threat. Further, angry stockholders would soon kick out company administrations that created such a predicament.

The AIME local section in Washington presented me with the 1984 Herbert Hoover award. I presented a paper on ORFUS at the Appalachian Petroleum Symposium in Morgantown, WV. Hilda and I attended the 1984 Homecoming at the University of Texas at El Paso. It had been fifty years since I graduated from the then Texas College of Mines and Metallurgy, a Branch of the University of Texas. Bob and Gretchen Estes from Midland were there as were Alan and Winifred Sharp. That was the last time I was to see Alan as he died a few years later. Berte and Caroline Haigh were there. It was the last time I would see Berte. He had been my geology professor in the early 1930's. He will ever be fondly remembered for many happy events geologic and otherwise.

It was Berte Haigh that assigned me to chauffeur one of the cars that carried visiting geologists on a trip to the Solitario in the Big Bend area. One of my passengers was Waldemar Lindgren, a most famous geologist and author.

IRELAND

In 1985 we decided to take a trip to Ireland. Our reasons may not have been the best, but we had never been there and somehow the mood struck us. Also we had never been on a tour but had always picked our own route and came and went as we pleased. But I had reached an age where the car rental companies turned me down. So our only choice was to join a group. We took the Eire visit with a fine group of people who were associates of the Virginia Museum. Most came from Winchester and the nearby area.

Our flight to Shannon left Friendship airport on August 7th at 9 pm to arrive the next day at 8 am. There was no time for any rest. We soon left Limerick on our way to the thatch roofed cottages of Adare, Glin and Tralee to overnight at the Hotel Mt. Brandon. Ireland was green, green, green with it's everlasting rains and cool climate. The scenery was tremendous as we traveled down the coast to follow the Ring of Kerry, Castlemaine, Dingle Bay, Cahirciveen, Waterville, Sneam, Kenmare, Killarney, Muckross Abby and Tralee.

I was impressed by the many small stone cottages vacant and with no roofs, their gabled ends standing in mute testimony to the many trials of Ireland. First came the English that took over the Nation and reduced the Irish people to starvation. The Irish were not even permitted to fish in the sea. It seemed that the English were bent on genocide. Then the

potato famine caused a still further reduction in population. The declines of the past continue!

We rode in an Irish jump cart at Muckross Abbey managing to tear my britches and lose my treasured Swiss Army knife when the pocket ripped. But the Abbey was worth the loss as it was a splendid historic building. We enjoyed the Irish scones. But the food throughout the trip was mostly boiled and too bland for my tastes.

Bantry Bay, McGillicuddy's Reeks, Molls Gap, Ballingeary and Blarney were on our route. I managed to kiss the Blarney stone but Hilda failed to reach it. I think she was put off kissing a rock that carried germs from thousand of predecessors.

From Blarney we drove on to Port Laoise and on to Dublin. A scenic and damp drive, we proceeded north to cross the River Liffey and into downtown Dublin. We had a room at the Braemer.

We went to a nearby watering spot for a delightful and amusing evening. The entertainment was grand. Skilled step dancers performed and bagpipers offended our ears. I especially enjoyed one performer, Shaun Connors an ex policeman. His stories were delightful. One concerned the time he was looking for a bed and breakfast home in Dublin. The rates were high but he said, "I called at one home where the lady of the house said she would charge \$10 per day. I told her, T'll pay \$10 with pleasure.' She said, "With pleasure that'll be \$10 extra!"

We visited Phoenix Park with the tame deer grazing.

From Port Laoise we returned to Limerick and the Hotel St. George. Dined and were entertained at a nearby castle, called something like Knappogee. Visited the Rock of Cashel and Tipperary. At Cashel we saw a small lad with his pet Yorkshire terrier called Yorkie and Hilda became homesick for Lance and Dolly. When we visited a glass factory and its associated gift shop Hilda just had to buy a Yorkie stuffed animal that she cuddled throughout the remainder of the trip.

On up to Galway Bay, Siddall, The Rocks of Moher and dined at the Granary. The Rocks of Moher were cliffs several hundred feet high. The Atlantic ocean waves beat on the foot of the cliffs. On one point reached by a steep path stood the ruins of O'Briens castle. It must have been a gloomy place to live. Certainly it was difficult to attack.

Back to the US on August 15th after a hasty but impressionable visit that would be fun to repeat at a slower pace.

THE SHENANDOAH

The two forks of the Shenandoah River are prominent features enclosed by the mountain ranges. The rivers flow in a northerly direction. Since moving to Richmond in 1959 the South Fork played a repeated role in my outdoor recreation. Three or four combined camping and fishing trips were annual highlights.

In the early years the river was all but inaccessible to would-be travelers. Prior arrangements had to be made with various farmers for a place to put in, to camp and to take out. These locations were often characterized by steep muddy banks that made entry and egress difficult. But it was well worth the while.

There were but few boats on the river and we had most stretches all to ourselves. Fishing was excellent for 3-5 Lb. small mouth bass and blue channel catfish. The river isn't like that any more. There are many well-located public boat ramps that are heavily used. Boat liveries rent canoes to all comers and provide services for put in and take out. Summer and holiday weekends offer the spectacle of "wall to wall" canoes. Large small mouth bass are few and far between. Worst of all, the river and its banks have been trashed by the overwhelming amount of humanity imposed on the unprotesting stream. Water flows seem reduced from former years. The Shenandoah National Park has dammed a number of streams to pump its supply up to facilities along the drive, making for reduced input to the Shenandoah. Trash and litter control efforts result in tons of trash being hauled to the county landfill each year. But, come a weekend of hundreds of canoes and the job remains to be done all over again. Perhaps someday we'll learn to keep our nest clean, but there is nothing to hint that the time is near.

Still manage to take a few float trips on the Shenandoah each year. It's great sport and there are lots of 8"-10" small mouth to be caught on ultralite tackle and returned to the river. It's getting harder and harder to get in and out of the canoe. My knees just don't work as well as they used to. And low water makes getting in and out a frequent requirement. The beautiful water and the scenic views make it all worthwhile. Just don't try it on a weekend or holiday.

There was an East Coast Invitational Chili Cookoff in Herndon on March 8th, 1986. It was held inside in a horse show arena. Despite the protection of the walls and roof, it was bitter cold. As with all chili events, it was a lot of fun. Chili When It's Chilly on March 29th was blessed with balmy weather. In April we cooked again at Dulles.

EUROPE AND THE RHINE

June 1986 saw us on a jaunt to Europe. We landed in London at Gatwick airport and bussed to the Royal Kensington on the West side of London. We had a small, hot room assigned after waiting for three hours in the lobby until the room was ready. It seemed we arrived just after the dining room had closed after breakfast. Hungry and bone weary, we were denied both a place to rest and food. The Kensington seemed like an over rated fourth class hotel.

When we finally got to our overheated room, we were bone tired. We tried to sleep with the roar of London's traffic doing all it could to keep us awake. That evening, when we had more or less recovered, we took a combined bus and boat tour on the Thames. We departed from the Tower of London pier and traveled downstream to Greenwich. Crossed the meridian that is the basis for all global longitude measurements. Our guide was voluble and pointed out the sights as we moved first down and then upstream on that historic river.

Dinner was served on a tray so that we saw the sights while we dined. The wine supply was more than ample. We passed Parliament and Big Ben before returning to the Tower pier and then back to the Royal Kensington.

June 28th we got on a bus to head for Dover and the ferry to Ostend. Two of the group didn't believe the departure time was for sure and got left. They did catch up to us in Dover having had to take a cab all the way.

Driving through London we found that once you crossed the Waterloo Bridge and went beyond Lambeth it was a different London. The area was principally immigrants - Jamaicans, Hindus and Africans. It was dirty and unkempt, evidence that the folks living there took no pride in their surroundings.

Leaving London behind as we drove to Dover we were delighted to see that the fields actually were full of clover. Then we were at the cliffs and descended to the port. It is a large port with many docks harboring ferries to many destinations on the European mainland.

Aboard the ferry, we left at 4 pm and watched as the tall white cliffs receded. A fine dinner aboard and four hours later we landed at Ostend where our tour director Concetta took us to a brand new Holiday Inn. What a change from the Royal Kensington! Saw the Atomium about 150 ft. high, a model of the atom with a large restaurant on its summit.

We visited downtown Brussels and one of its lovely town squares. This was a commercial square surrounded by three story buildings all ornately and beautifully painted. A few blocks away was the statue of the small boy pissing, a monument erected in

gratitude when the lost boy was found. The boy's father had committed himself to erection of a statue showing the lad doing whatever he was doing when found.

Then it was on to Bonn. No definable physical feature marks the boundary between Belgium and Germany. The countryside is flat and not appealing. We made a stop in Bonn and took a nice walk to see the home of Beethoven and drink some excellent beer.

But then we were in Cologne at the tiny Hotel Team. But it was a comfortable hotel and within walking distance of the downtown. We enjoyed the company of Vern and Sue Racer from Winchester and liked to do things together. Vern and I decided we needed the exercise and walked to see the famous Cathedral of K^oln and other downtown sights.

We were off again early in the day. A steamer trip on the Rhine to see the Lorelei and visit Rudesheim. We saw many castles including Sturnburg and Liebenstein and passed many picturesque small towns. We had lunch aboard the steamer. We had boarded at Koblenz and went down to Rudesheim before turning around. Here was where my grandfather had vineyards before emigrating to the States. We saw Castle Marxburg, one of the best preserved in Germany.

That night at the new Dorint hotel in Offenbach we had a huge, well equipped room. We took a sauna and a swim. There was a nude man in the sauna and Ursula got embarrassed as did the unknown gentleman. It was only later that we learned there was a topless night club in the Dorint. It was cooler there than in Bonn and the fine Reisling wine was great.

Everything was well coordinated. We had to have our luggage outside our door at a fixed time and have breakfast at a specified time and then board the bus. Passed through Freiburg where Dad had gone to the school of mines long, long ago.

A cloudless sky made the scenery highly visible. We were in the mountains abruptly and stopped at Titisee, a tourist trap by a lovely lake. Sue Racer, or Ursula as I called her, bought a cuckoo clock. On we went to Schaffenhaus in Switzerland and climbed around the Rhine Falls. A delightful spot well known in history. Then to Lake Constan^z. The Bodensee was lovely. We walked out on a wooden bridge of ancient age as we admired the swift flowing Rhine that feeds Lake Constan^z. In 1993 fire destroyed the bridge.

A brief stop was made in Vaduz in the tiny principality of Liechtenstein. A crowded place but it had excellent beer. We drove on into the Swiss Alps past the town of Chur and into Domat/Ems to spend the night in a chalet-like small hotel, the Stern. Our busload was scattered to several such places as none was large enough to take care of all of us.

That evening we walked up for a look at the ancient Cathedral on a hill that dominated all of Domat/Ems. There was a niche of apparently revered skulls and a well kept

graveyard. Then, as we ambled back to our chalet, we stopped to listen to a local group that was enjoying the evening with songs and dances.

Early the next morning we were up and on our way over the spectacular Julier Pass. Then we visited the wide Engadine Valley and drove on to St.Moritz with it's expansive scenery. We shopped and then waited in line to have lunch on an open patio restaurant. It was easy to see why St. Moritz was such a popular watering place. Again aboard our bus we passed the blue Engadine Lakes, over Maloja Pass and down the steep valleys to the Italian border and the vineyards and villas of Lake Como. From the neat and well kept villages of Switzerland, we had passed into the unkempt communities of Italy.

Lake Como was surrounded by many villas of a time gone by. We stayed at the Bellvue, a one time private villa that had been converted to a hotel. It was turn of the century building constructed at a time when the Italian empire was at its peak. It was located in the tiny community of Cadenabbia just opposite the point where Lake Como's southern end is divided into two long arms. The lake is only 900' above sea level but has a depth of 930'.

Back into Switzerland to Lake Lugano where we took a boat ride to have the opportunity to see the lovely homes and churches built on the lake shore. Known as Switzerland's sunniest city, Lugano has much going for it. One particularly interesting sight was Switzerland in miniature - a scale model of the entire nation. It was equipped with paths so that it could be studied in it's entirety. It was the Fourth of July, 1986

From this smiling southern face of Switzerland, we traveled north back into Alpine scenery. Through Bellinoza with its watchdog castles and then the road began to loop upwards by granite peaks to the St.Gotthard tunnel. The tunnel is 11 miles long !

We overnighed at Fluelen near Altdorf at the southeastern tip of the Vierwald Statter See. Vern and I took an evening walk into Fluelen from our hotel, the Gasthaus Tourist located on the northern outskirts of the town. Stopped at a grocery store where I tried to buy some muesli. Asked the fair haired girl who was a store clerk, but she denied ever hearing of such a thing. Vern and I looked around some more and came across a shelf stocked with muesli. I took a box and showed it the clerk. She said, "Oh, you meant mooshli!" It was obvious then that my pronunciation left much to be desired. That evening we bussed to Luzern for a gala evening of dining, drinking, yodeling, and dancing and what I supposed was typically Swiss entertainment. They made music on those monstrous Alpen horns. Seems like it would be best to have a three story house and have the player on the top floor with the horn resting on the ground. It was a lot of fun and we got back to Fluelen about midnight. That was our Fourth of July entertainment.

From Luzern we took a side trip via our bus to Stans and then Engelberg. There we took an aerial tram for a 45 minute trip through many changes of scenery from the green valley at the start to the high alpine glacial scenery en route to the 10,000' summit of Mt. Titlis. There we had a fabulous view of much of central Switzerland as we walked thru ice grottoes and to various view points. Lunch at the summit's panorama restaurant was expensive as everything had to be handled many times en route to the top.

The next day after an early start and travel thru numerous tunnels we went to Basle. We found we had just missed the once a day tour of the city. So Hilda and I and Sue and Vern Racer took off on foot to see what we could see. Our first stop was an excellent museum. Among its many exhibits was a series that particularly intrigued me. It showed Basel from the beginning of its habitation by the Celts and carried the theme down to the present. Then about 500 years ago Erasmus decided it should be a real city.

I got a kick out of the restrooms. The door of the ladies room was embellished with a bas relief of a queenly dressed dame seated on a commode. Similarly the men's room door was decorated with a bent over kingly clad gent making a big splash in a bucket.

We were then ready to proceed wherever our fancy might take us - and that was to the Basel Zoo. We walked as no transport was available. Hilda's shoe came apart but somehow or other she made do as we wandered about admiring the fine collection of animals. Ciba-Geig Pharmaceutical was the founder of the Zoo.

It was fantastic- lions, monkeys, tigers, giraffes and you name it. Then we had a lunch and ambled back to the tram station and found our way down to the ship. We boarded the MS Austria, dined and dreamed while our ship departed downstream at 3:30 AM for Heidelberg. We had hoped the stop there would be long enough for another visit to Wimpfen am Neckar, but that just didn't work out.

There was a side trip to Strasbourg but we opted to visit Heidelberg instead. Our ship docked at Neuburgweier for those on the Heidelberg tour. A coach took us into the city where we took a walking tour led by an arrogant little man who instructed us on what his whistles meant. Then he herded us with his sharp whistle. It was Sunday and Hans led us around repeating his patter in four different languages.

It was scenic and intriguing. All nations seemed represented. We even saw four Bolivians in native costume playing on their nose flutes. After a visit to the Rathaus and the plaza area we reboarded the bus and went up the Neckar, crossed and went up to the Schloss.

It was a remarkable place, replete with many statuary. It was built like topsy with each new ruler adding on willy nilly to the fortress. Wine was important there and we visited the structure holding the world's largest wine cask-221,726 liters. There was a statue erected in honor of one of the wine tasters. He reportedly drank 15 liters of wine a day. History has it that he died young of a petrified liver.

Back to the ship at Mannheim. Many vineyards with castles close by. No point in being too far from the source of supply. This was the Romantic Rhine with its numerous castles that seemed to flourish along the river north of Rudesheim. Beautiful Mauseturm on a mid river island was one of the first. It was built to impose tolls on river traffic.

Then, in swift procession, we saw Burg Rheinstein, Burg Reichenstein, Burg Sooneck, Heimburg, Furstenburg, Stahleck and Schonburg Schloss, all on the west bank above steep river side cliffs. Then we were at Remagen. The castles were on both sides now. Soon we passed the Drakenfels that we had visited on our honeymoon trip.

Downstream from Bad Godesburg, the valley widened and few castles were to be seen. But the Rhine Valley is deserving of more detailed visiting. How nice it would be to return and take several weeks to really see this romantic river and its interesting towns.

Breakfast was served with a variety of breads. I especially enjoyed the schwartzbrod, black, dense and coarse. Although my German was limited, I got along well with our waiter who was Spanish. He always brought us extra schwartzbrod when he saw how much I liked it. We docked briefly at Oberwesel but with time enough to see that charming medieval town with its well preserved town walls. We moved downstream swiftly past the Lorelei Rock.

We got to Cologne a bit late. Vern and I had planned to visit the Roman-Germanic Museum but it had already closed. But we did walk around and admired the Cathedral again and the several old structures from Roman days that had been unearthed nearby. After a visit to the shops on the Hohe Strass we rejoined the MS Austria.

Our three day cruise was coming to an end. We passed several nuclear power plants and some bridges of interesting design. We left the MS Austria at Nijmegen in the Netherlands. We arrived at Amsterdam at 4:00 PM.

Our hotel the Westropa wasn't much but it did have beds and a bar. We walked around and dined at the Dutch Cat. Vern and I had weiner schnitzel. Marijuana laced cookies were available and Lord knows what else. The next morning Vern and I took a walk around the city. It seems that Amsterdam is a wide open city. Every lamp post carried advertisements for female companionship. But that wasn't necessary as even in those early

hours we were accosted several times by young girls with a wide variety of offers. It must be the porn capital of western Europe.

Our taxi hit 85 mph and in nearly no time we were at the Schiphol airport. We checked in at MartinAir and then moved into the duty free area where shops abounded and Hilda unloaded what extra money we had accumulated. MartinAir does a splendid job and our airlines could learn a few things from them. Then into New York and on to BWI where our bus met us to takes us to Winchester. There was our little VW pickup that Connie had left for us and we were soon home.

AEC REUNION

In September 1986, there was a reunion in Grand Junction of the AEC and its subsequent organizations. I went alone as Hilda had little interest in such proceedings. It was good to see many old friends.

RETIREMENT LIFE

It seemed like we were busier than we wanted to be. I was active in the VFW running the Post's youth activities programs. This included the Voice of Democracy and an annual scholarship. I also arranged programs and publication notices for the AARP, put on two chili cookoffs a year and attended others. I was active in the National Defense Executive Reserve and consulting for the Defense Nuclear Agency and others. If this was retirement, maybe I should have kept on working and not been so damn busy?

Still, it was a good life. Somehow or other I managed to eke out enough time to have a garden. How good that fresh garden produce was. We canned our surplus tomatoes, green beans and other things and had mighty good eating in the winter. This work was made lots easier with the Power King tractor. The original one purchased second hand from Lancaster was a fine tool. But Steve Funkhouser had a much newer one that he wanted to sell. It had a mower deck so I bought Steve's outfit and sold my older machine. Don't see how we could have managed to live here in the woods without that tractor.

I had to cut about seven or eight cords of firewood each year. It seemed that the hot tub was a huge consumer to maintain its 104F temperature. But Hilda enjoyed it so that was the main thing. The tractor hauled all our wood, plowed our garden and mowed the small lawn as well. As I had to mow the dam and spillway as well, maybe it wasn't so small.

Working all that wood was good therapy! Every stick of firewood had to be stacked and covered. Then when it was time to use it, I had to load it on the trailer, haul it to the

ramp to the basement and transfer each piece to the small wood handler for taking it into the basement. There the wood had to be restacked until it was time to burn it.

Our huge Riteway furnace had a hungry maw. I could load it with logs up to 30" long and 13" in diameter. That sized chunk of wood is heavy and I seemed to get lots of exercise from our demanding heating unit. It automatically switched to burn oil, if I failed to keep up with its demand for oak logs.

SCOTLAND - 1987

July 12, 1987 found us beginning a tour of Scotland. We had so much enjoyed our previous tours that it seemed in order to visit bonnie Scotland. As Hilda helped keep the country afloat with her consumption of Scotch, this trip seemed more than fitting.

Again we arranged our trip with Unicorn Tours in Winchester through Ann Copenhaver. Her arrangements for our previous trips were well done and we saw no reason to change agencies. Also, we were to travel again with some of the same folks with whom we had traveled before. So, off we went on July 12th, 1987 headed for a fling in the Highlands.

We got to Dulles on our charter bus to make our 6:15 PM flight, but it was delayed. With Sue and Vern Racer we managed a drink and four hot dogs with only three rolls. But that was enough and it wasn't too long before we were aboard our 747 headed for Heathrow with a six and one half hour flight. It worked out to be ordeal that we had to pay for. At Heathrow a bit after 9 AM and eventually reached the Novotel in the Hammersmith district of London.

The Novotel was quiet and comfortable. That afternoon we took a double deck bus to Picadilly Circus and then took a tourist's sight seeing trip with a guide to tell us what we were seeing. Went by the Britannia Hotel on Grosvenor Square where we had stayed on a previous London visit. Saw the Tower of London, an old Roman church, an old Roman wall, crossed London Bridge to exhaustion. Back at the Novotel we had a good rest and were ready to travel early the next day.

Got a late start as there must have been ten different Globus tours originating at the Novotel. Then we were at Cambridge and walked around an hour to see some of the colleges and have coffee and scones. Saw punts on the river and visited King's College. Then we admired Belvoir Castle, pronounced "beaver." Beautiful rose gardens graced this spectacular place! It had something to do with the story of Little Lord Fauntleroy.

Then we went on to York where we stayed at the Viking Hotel on the south bank of the River Ouse. One could imagine Viking long boats moving on the Ouse as the invaders arrived from Europe.

We walked and crossed the river to the "shambles" where the butchering was once done. Walked around York and back to a fine roast beef dinner at the Viking. After dinner we took another walk through a park and on a wall that enclosed a large part of the city when the Vikings occupied the area. The wall was three miles long. Both the Romans and Vikings had lived in the area and proliferated.

York began as a fortress built by the Romans in 71 AD when the Roman 9th Legion was carrying out a campaign against the Brigantes tribe. It was named Eboracum and grew in importance. Constantine the Great, who later founded Constantinople, was made Roman Emperor there in 306 AD. The Vikings came along much later but gave the city its name derived from Yorwik. Later the Normans invaded and had a longer stay and made the city into a center for trade, government and religion. Then came the Plantangnet kings and in 1485 AD the Tudor reign began. They were responsible for the magnificent Minster that took 250 years to construct. There was much more to see in York than we had time for.

Heading north we stopped briefly at Hadrian's wall built by the Romans to restrain the bothersome Picts. It was bleak chill day and, as we walked along the wall, we could imagine the blue painted Picts assaulting the entrenched Romans. The ruins of Jedburgh Abbey were on our route but we merely paused en route to admire this place where Mary Queen of Scots was once held prisoner.

En route to Edinburg via the Border Rock where we had to pay the piper that welcomed us. Visited Abbotsford, a fabulous place once the home of Sir Walter Scott. It seemed he collected almost anything he could get his hands on. Then our travel plan changed due to the large number of golfers in Edinburgh for the tournaments. Tours were only allowed one night in the city. So we were diverted to Glasgow and its Hospitality Inn. After a fine dinner we took a walk to George Square replete with monuments to Sir Walter Scott, Queen Victoria, John Peel, Prince Albert, Kelvin, Watt and others. In the morning we were on our way for the one hour trip to Edinburgh. Saw Edinburgh Castle that commanded the entire area of the fortress. Then to Holy Rood castle where Mary Queen of Scots once resided. Lunch at Abbotsford pub - sixteen pounds for lunch for two of us! Back to the Mt. Royal, the least comfortable of all the hotels we stayed in.

Jamie's Scottish evening was delightful. It was complete with Haggis. There was the manhood test- lift the manhood stone; pipers, singers, highland fling and the sword dance. Jamie invoked the maximum of audience participation. The fine roast beef and ample wine added to our enjoyment of the evening.

We were supposed to end up at Inverness. Had a splendid visit to Balmoral Castle. Saw several of the wild deer of the North country and then went to the Glenlivet Distillery.

Free samples. Many who didn't drink scotch gave me their sample. This distillery dated back to 1824 right after Distilling Licenses were permissible following an act of parliament in 1923. We went through the plant that was quite small. Outside some long haired highland cattle were grazing. I wondered if they prospered on the distillery residues. I, for one, was ready to visit more distilleries.

We crossed many single lane small stone bridges. It was cold drizzly and windy when we visited Culloden Moor where the Scotch suffered a surprise attack by the English and were badly defeated.

At day's end we were housed in the Abbeymore Stachis Hotel at Colum Bridge about 26 miles south of Inverness. The hotel had everything you could want including sauna and hot tub. One particularly interesting feature of this hotel was a huge crossbow mounted on an exterior wall. The heavy steel bow was over eight feet long and the bolts it fired were six foot steel shafts as big as a crowbar. We learned that it was an actual piece of armament and was once used to assault castle gates.

We visited Inverness and Hilda bought a Loch Ness Monster tee shirt made in Portugal. I looked for camgorn, the rare, smoky quartz but found none.

As we drove by Loch Ness, we were unrewarded in our search for its monster. Over a barren historic pass we heard the tale of two warring clans that for generations persisted in efforts to decimate each other. Then one clan decided to relent and invited its enemy in for days of carousing. When their guest were sufficiently inebriated, they were burned to death. Guess the Peruvians didn't invent this method of achieving neighborly peace.

Down to the Kyle of Lochalsh and took the ferry for the short ride to Kyleakin on the Isle of Skye. It was bleak and cold as we rode down the coast to the Clan Donald Center. This forty acre preserve on the lovely Sleat Peninsula was well manicured. The view across the Sound of Sleat to the Scottish mainland was breathtaking. Its museum told the story of 1300 years of the Clan Donald's history when the Gaelic nation flourished under the Clan's leadership.

Back across the Kyle of Lochalsh we drove south past Loch Oich and Loch Lochy. We slept at Fort William on the shores of Loch Linney beneath the rounded bulk of Ben Nevis. We reached Glencoe, a wild and lonely place, where the MacDonald Clan was treacherously murdered by the Campbells in 1692. Then crossed the barren wild Rannoch Moor to Loch Lomond. As we passed by its bonnie banks and braes we were reminded of Rob Roy MacGregor. Stopped at the Tartan Tweed mill in Moffat, perhaps our last chance to acquire Scottish goods that didn't come in a bottle.

Then to Gretna Green where the blacksmith was wont to wed runaway couples. We passed Carlisle Castle, another place where Mary Queen of Scots was once held. It seemed that there were many who either held that Mary or aspired to. As we moved further into the lowland we came upon the tranquil Lake District truly a beautiful area. We saw a bridge with a house built at its middle. In this way the owner evaded land taxes Visited Grasmere where the poet William Wordsworth once lived.

This area is probably the outstanding national park of England. The English used it. We saw water skiers stacked in a pyramid and much sailing activity. Stopped at Windermere at the Hydro Hotel, a charming place. Then back to London via Chester close to the border of Wales. Had a walking tour of the city. At Stratford on Avon visited Ann Hathaways cottage and many Shakespearean mementos.

We went to dinner at a nearby pub, the Queen's Head. Our entire group joined us. We were then en route for home on an uncomfortable crowded noisy flight back across the Atlantic. It was rough flight with seat belts on all the time. It strange that people pay to be subject to such torture.

There were more days of consulting work with UTD and then it was time to put up the winter's supply of firewood. The addition of the hot tub seemed to require at least another cord of wood a year to maintain it at 104F.

CANNON

Back in the early 80's I proposed to VFW Post 621 that we should attempt to get a war surplus piece of military equipment for display in front of the Post. The penalty for speaking out was that I was named chairman of a committee to obtain a suitable item. I pursued various sections of the Defense Department for years with no success. Several offers of equipment were made but the combined transportation and demilitarization costs were too much for our Post.

About 1988 I moved that we acquire several replicas of the Civil War Ordnance cannon. We purchased a pair of these from the Coeur d'Alene, Idaho foundry and had them mounted and installed within our \$1400 budget. Then along came the opportunity to obtain a 24 1/2 ton Duster from a Virginia location. The demilitarization and freight costs were about \$2400. Thus in 1991 our Post home was graced by an outstanding piece of history. The Rev. Wilton Thomas dedicated the Duster "to the memory of all those willing and brave souls who have served our nation in all wars to the present."

My preoccupation with cannon led me to want to have one for myself. Ken Hulse, a neighbor, proved to be a kindred soul. We discussed how we might obtain or build a cannon on many occasions. Finally the means arose. Boyd White, a nephew, worked in

maintenance at O'Sullivan in Winchester. He obtained a damaged 4" diameter injection mold tie rod.

Ken had a huge lathe more than a century old but adequate to do the job. He, and a retired machinist Bob Stafford, turned out two 2/5 scale Napoleon 6 pounders. I built a carriage using an oak trail built by Ken. Friend Gordon Sims and I decided that it should have authentic wheels. Arlis Frymyer sold me some well seasoned oak. Gordon cut fellies with his band saw and turned oak spokes with his lathe. He obtained two old wheels with iron fittings for the hub and iron tires. We cut down the tires to size and got Garnet Beaver to weld them.

Borrowed a forge from Garnet, made a tire puller and we were ready. The Foxfire books were a lot of help. Hilda and I built a tripod to hang the tires above the forge. Then slowly and with an enormous amount of twisting of the blower handle, we brought the tires to a dull red heat and pulled them onto the wooden wheel. We doused the smoke and flame with cold water and the job was done.

That cannon has been a source of pleasure and considerable noise ever since. Holidays and Chili Cookoffs are the principal reasons for firing it. New Year's Eve 1992 we fired it ten times from the Sims deck at their mountain aerie. It made a lovely thunder as the sound reverberated back and forth across the mountains. Could this have anything to do with my hearing loss? Actually I believe the principal reason for my impaired hearing was the time spent in running rock drills underground.

SEA TRIP TO ALASKA

In August 1988 we embarked on another adventure. Although it had been my good fortune to see much of the southern Alaska panhandle from small float planes and helicopters, I was eager to see it from a cruise ship. So we flew to Vancouver, British Columbia and boarded the Holland America Line Nieu Amsterdam for our journey to Alaska.

In what I had been growing accustomed to, my luggage was left somewhere on shore. It was quite a stunt to wash my traveling jeans so that they were somewhat less offensive. Fortunately a sauna adjoined the clothes washing area so I was able to work out a system to clean both me and the duds.

The first day was something else. We sailed out of Vancouver about 5: PM and, but for the long day, would have seen but little. As it turned out, we did have a few hours of daylight as we began the scenic trip north via the Inside Passage

As we sailed past Vancouver Island we could see the plants of several mines on it's east coast. Finally it was time to go to bed. During the hours of darkness we passed through Seymour Narrows blissfully unaware of the gruesome history of Ripple Rock.

For more than a century the twin peaks of Ripple Rock, about ten miles north of Campbell River, B.C., had been a navigational hazard. It had wrecked some 114 vessels and claimed more than 100 lives. The treacherous fangs of Ripple Rock were blown away about 1954 in what, up to then, was the largest nonatomic blast on record. There were several unsuccessful attempts to drill the submarine rock in 1942 and 1945 by working from anchored barges. In 1953 a diamond drill hole was put down from Maud Island, on the east side of the Narrows, under the channel and up into the peaks of Ripple Rock.

A 550-ft. shaft was sunk on Maud Island. From the bottom of the shaft a 2370 ft. drift reached directly under Ripple Rock. Two main access raises were driven into the two peaks. A series of sub levels, dog holes and coyote raises were driven. These openings were loaded with 1375 tons of explosive that hurled spoil and water 1000 ft. into the air in a column 800 ft. long and from 50 to 200 ft. wide. Ships would no longer have to queue up and wait for slack tide to pass the killer rocks. Small craft no longer feared the giant 40 ft. diameter whirlpools that could suck them down.

We had excellent views of the south shore of Revillagigedo Island as we approached Ketchikan. By 8:AM we had docked at Ketchikan where my luggage joined me.

We walked all over Ketchikan and up Water street to Dolly's house. Her place fronted right on the stream. It was often said that this was the only place around where both salmon and men went upstream to spawn. Dolly almost always operated with herself as the only pro. She is reputed to have said, "I don't want any other woman around. I like men, not women!" In any event Dolly's house is the only one of its kind where women have to pay to get in.

There is a museum not far from Dolly's place that is well worth a visit. In addition to numerous items of Indian origin, it also displays informative data on the salmon fishing industry so important to the area

We said good-bye to the Nieu Amsterdam at Juneau. John Mulligan was on hand to greet us. Had a good visit around Juneau and was brought up to date on mining ventures. Stayed at the Baranof. Enjoyed the salmon bake with many old friend and ended up with Hilda, her sister Clara Belle and I at the home of Dave Carnes high up the hill on Douglas Island.

A visit to Mendenhall glacier on our ride to Yankee Cove and we boarded the MV Fairweather for a magnificent trip to Skagway on the Lynn Canal. This 60 mile long fiord

presented one awesome view after another of waterfalls, rugged forests and both coastal and mountain glaciers.

Skagway entranced the ladies and both Sue Racer and Cookie Minno purchased fur jackets made by the Indians of a nearby tribe. The town was replete with places and things reminiscent of the days when the gold seekers of 1898 based there for their trip over the White Pass.

We drove over the White Pass in great comfort but we could see parts of the old foot trail and the railroad that preceded highway construction. The trip to Whitehorse was entrancing as we passed many large lakes, old mine structures and saw the salmon steps south of the town. That night in Whitehorse we were entertained with the Frantic Follies that relived some excitement of the gold rush stampede. Visited the stern-wheeler Klondike that still operated when I was a child. Now it's a piece of history.

The flight back to Vancouver was dazzling as we flew over the ever snow capped ranges of British Columbia. After an overnight at Vancouver, then came the let down as we flew back to Dulles after a thoroughly exiting, but all too brief trip to Alaska.

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EPILOGUE

In 1991 Greens Creek produced 7.6 million ounces of silver, 37,000 ounces of gold, 37,966 tons of zinc and 15,330 tons of lead from 345,000 ton of ore milled. At the same time mineable reserves were increased to 12.5 million tons, enough for a 30 year mine life. A few years ago the only evidence of this important ore body was a cold mud spring that scarred a mountainside in the northern part of Admiralty Island. Had it not been for its timely discovery, Green's Creek would have been included in the reserve that has made most of Admiralty a favored home for the black bear.

Red Dog in the far north of Alaska near the Kelly River and north of Kotzebue in the western part of the Brooks Range has become the Nation's largest zinc producer. In 1992 the Red Dog produced ores containing 250,000 tons of zinc. Just 14 years ago it was a stained hillside with the risk of being contained in the Gates of the Arctic National Park. Had its discovery been deferred a matter of months, that significant contributor to new National wealth would have been locked up in the Gates of the Arctic National Park.

East of Ketchikan in the Misty Fiords region, Quartz Hill remains to be developed. Its silver stream is still a salient feature of its discovery. Here again, had not an enterprising geologist made the discovery when he did, the Quartz Hill molybdenum deposit would have been locked up in the Misty Fiords preserve.

How many more important mineral deposits lie within National lands where mineral entry is forbidden?

ASI ES LA VIDA !