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Western Mining in the Twentieth Century
Oral History Series

James V. Thompson

MINING AND METALLURGICAL ENGINEER: THE PHILIPPINE ISLANDS; DORR, HUMPHREYS, KAISER ENGINEERS COMPANIES; 1940-1990s

With an Introduction by
John F. Havard

Interviews Conducted by
Eleanor Swent
in 1990 and 1991

Since 1954 the Regional Oral History Office has been interviewing leading participants in or well-placed witnesses to major events in the development of Northern California, the West, and the Nation. Oral history is a modern research technique involving an interviewee and an informed interviewer in spontaneous conversation. The taped record is transcribed, lightly edited for continuity and clarity, and reviewed by the interviewee. The resulting manuscript is typed in final form, indexed, bound with photographs and illustrative materials, and placed in The Bancroft Library at the University of California, Berkeley, and other research collections for scholarly use. Because it is primary material, oral history is not intended to present the final, verified, or complete narrative of events. It is a spoken account, offered by the interviewee in response to questioning, and as such it is reflective, partisan, deeply involved, and irreplaceable.

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James V. Thompson, 1966

Photograph taken in Liberia
by Wolfgang Jacobs

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Education, Colorado School of Mines; WW II internment, the Philippine Islands, 1941-1945; research engineer, Dorr Company, 1945-1948; metallurgist, Humphreys Companies, 1948-1956: developing manganese mine, Blythe, CA; project engineer, Kaiser Engineers, 1957-1990: Tata Project (Jamshedpur, India), Bong Mining Company (Liberia), El Teniente Mine (Chile), DOCEGEO (Brazil), research on mischmetal, zinc batteries for electric-powered vehicles, tiles for space shuttle, burying nuclear waste, magnesium production in Norway; independent consulting; Powderhorn Titanium Mine (Colorado), Real de Buenavista Mine (Mexico), by-product gold recovery from gravel.

Introduction by John F. Havard, mining consultant

Interviewed in 1990 and 1991 by Eleanor Swent for Western Mining in the Twentieth Century Series. The Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

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PREFACE

The oral history series on Western Mining in the Twentieth Century documents the lives of leaders in mining, metallurgy, geology, education in the earth and materials sciences, mining law, and the pertinent government bodies. The field includes metal, non-metal, and industrial minerals, but not petroleum.

Mining has changed greatly in this century: in the technology and technical education; in the organization of corporations; in the perception of the national strategic importance of minerals; in the labor movement; and in consideration of health and environmental effects of mining.

The idea of an oral history series to document these developments in twentieth century mining had been on the drawing board of the Regional Oral History Office for more than twenty years. The project finally got underway on January 25, 1986, when Mrs. Willa Baum, Mr. and Mrs. Philip Bradley, Professor and Mrs. Douglas Fuerstenau, Mr. and Mrs. Clifford Heimbucher, Mrs. Donald McLaughlin, and Mr. and Mrs. Langan Swent met at the Swent home to plan the project, and Professor Fuerstenau agreed to serve as Principal Investigator.

An advisory committee was selected which included representatives from the materials science and mineral engineering faculty and a professor of history of science at the University of California at Berkeley; a professor emeritus of history from the California Institute of Technology; and executives of mining companies.

We note with much regret the death of two members of the original advisory committee, both of whom were very much interested in the project. Rodman Paul, Professor Emeritus of History, California Institute of Technology, sent a hand-written note of encouragement just a few weeks before his death from cancer. Charles Meyer, Professor Emeritus of Geology, University of California at Berkeley, was not only an advisor but was also on the list of people to be interviewed, because of the significance of his recognition of the importance of plate tectonics in the genesis of copper deposits. His death in 1987 ended both roles.

Thanks are due to other members of the advisory committee who have helped in selecting interviewees, suggesting research topics, and raising funds.

Unfortunately, by the time the project was organized several of the original list of interviewees were no longer available and others were in failing health; therefore, arrangements for interviews were begun even without established funding.

The project was presented to the San Francisco section of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) on "Old-timers Night," March 10, 1986, when Philip Read Bradley, Jr., was the speaker. This section and the Southern California section provided initial funding and organizational sponsorship.

The Northern and Southern California sections of the Woman's Auxiliary to the AIME (WAAIME), the California Mining Association, and the Mining and Metallurgical Society of America (MMSA) were early supporters. Several alumni of the University of California College of Engineering donated in response to a letter from Professor James Evans, the chairman of the Department of Materials Science and Mineral Engineering. Other individual and corporate donors are listed in the volumes. The project is ongoing, and funds continue to be sought.

Some members of the AIME, WAAIME, and MMSA have been particularly helpful: Ray Beebe, Katherine Bradley, Henry Colen, Ward Downey, David Huggins, John Kiely, Noel Kirshenbaum, and Cole McFarland.

The first five interviewees were all born in 1904 or earlier. Horace Albright, mining lawyer and president of United States Potash Company, was ninety-six years old when interviewed. Although brief, this interview will add another dimension to the many publications about a man known primarily as a conservationist.

James Boyd was director of the industry division of the military government of Germany after World War II, director of the U.S. Bureau of Mines, dean of the Colorado School of Mines, vice president of Kennecott Copper Corporation, president of Copper Range, and executive director of the National Commission on Materials Policy. He had reviewed the transcript of his lengthy oral history just before his death in November, 1987. In 1990, he was inducted into the National Mining Hall of Fame, Leadville, Colorado.

Philip Bradley, Jr., mining engineer, was a member of the California Mining Board for thirty-two years, most of them as chairman. He also founded the parent organization of the California Mining Association, as well as the Western Governors Mining Advisory Council. His uncle, Frederick Worthen Bradley, who figures in the oral history, was in the first group inducted into the National Mining Hall of Fame, Leadville, Colorado, in 1988.

Frank McQuiston, metallurgist, vice president of Newmont Mining Corporation, died before his oral history was complete; thirteen hours of taped interviews with him were supplemented by three hours with his friend and associate, Robert Shoemaker.

Gordon Oakeshott, geologist, was president of the National Association of Geology Teachers and chief of the California Division of Mines and Geology.

These oral histories establish the framework for the series; subsequent oral histories amplify the basic themes.

Future researchers will turn to these oral histories to learn how decisions were made which led to changes in mining engineering education, corporate structures, and technology, as well as public policy regarding minerals. In addition, the interviews stimulate the deposit, by interviewees and others, of a number of documents, photographs, memoirs, and other materials related to twentieth century mining in the West. This collection is being added to The Bancroft Library's extensive holdings.

The Regional Oral History Office is under the direction of Willa Baum, division head, and under the administrative direction of The Bancroft Library.

Interviews were conducted by Malca Chall and Eleanor Swent.

Willa K. Baum, Division Head
Regional Oral History Office

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

October 1990
Regional Oral History Office
University of California, Berkeley

Western Mining in the Twentieth Century Oral History Series
Interviews Completed, January 1992

Horace Albright, Mining Lawyer and Executive, U.S. Potash Company, U.S. Borax, 1933-1962, 1989

James Boyd, Minerals and Critical Materials Management: Military and Government Administrator and Mining Executive, 1941-1987, 1988

Philip Read Bradley, Jr., A Mining Engineer in Alaska, Canada, the Western United States, Latin America, and Southeast Asia, 1988

Catherine C. Campbell, Ian and Catherine Campbell, Geologists: Teaching, Government Service, Editing, 1989

James T. Curry, Sr., Metallurgist for Empire Star Mine and Newmont Exploration, 1932-1955; Plant Manager for Calaveras Cement Company, 1956-1975, 1990

James Mack Gerstley, Executive, U.S. Borax and Chemical Corporation; Trustee, Pomona College; Civic Leader, San Francisco Asian Art Museum, 1991

Helen R. Henshaw, Recollections of Life with Paul Henshaw: Latin America, Homestake Mining Company, 1988

Lewis L. Huelsdonk, Manager of Gold and Chrome Mines, Spokesman for Gold Mining, 1935-1974, 1988

Arthur I. Johnson, Mining and Metallurgical Engineer in the Black Hills: Pegmatites and Rare Minerals, 1922 to the 1990s, 1990

Evan Just, Geologist: Engineering and Mining Journal, Marshall Plan, Cyprus Mines Corporation, and Stanford University, 1922-1980, 1989

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Frank Woods McQuiston, Jr., Metallurgist for Newmont Mining Corporation and U.S. Atomic Energy Commission, 1934-1982, 1989

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Donald Dickey (Oriental Mine), in process

H. S. Pete Fowler (Kaiser), in process

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George Heikes (tungsten, zinc), in process

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Carl Randolph (U.S. Borax), in process

John Reed (rock mechanics), in process

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Eugene Smith (U.S. Borax), in process

Langan Swent (San Luis, Homestake, uranium mining), in process

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The Regional Oral History Office
would like to express its thanks to the organizations
and individuals whose encouragement and support have made possible
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INTRODUCTION--by John F. Havard

Jim Thompson is simply the best all-around mineral technologist I have ever known in my sixty-plus years in the mining industry. "Technologist" is not really the right word, but there is no such thing as a "mineralengineeringologist," which would more appropriately describe him.

Jim carries only an Engineer of Mines degree from the Colorado School of Mines, but he is a capable consultant in the entire mining field, including exploration geology, mining engineering, and extractive metallurgy. Along the way he acquired a penchant for chemistry and is a regular contributor on the chemical aspects of mining to chemical journals. Incidentally, he is convinced that the Colorado School of Mines is the greatest, and he frequently expresses this opinion, regardless of the hoots and hollers from us who have graduated elsewhere--"elsewhere" being "nowhere" in Jim's opinion.

Jim and I first met under circumstances which could be described as strained. Jim had been consulting in Chile in early 1963, working for Kaiser Engineers on the huge task of modernizing the Braden Copper operations, then owned by Kennecott. In his absence I was hired as manager of mineral projects with Jim and a handful of other engineers reporting to me. I had sold the KE management on the idea that I could pull together a Minerals Division that could be a major competitor in its field. But Jim, down in Chile, who had not been sold, considered himself the senior minerals engineer in the outfit and who the hell was this guy Havard anyway? (Good question.) As soon as he returned from Chile I invited him to lunch, and we have been staunch friends ever since.

Jim became a cornerstone of the new Minerals Division; I appointed him Manager of the Mineral Economy and Technology Department. Reporting to him were a group of bright geologists, mining engineers, metallurgists, and economists. This was just the right position for him, where he could actively participate in the most interesting aspect of our work--feasibility studies. He could select the right experts to work with him. He had no interest in business management as such but kept his people busy largely by example. When it became necessary to fire someone, a rare event indeed, he was too softhearted and I had to do the job.

He was creative in his own empirical, practical way. He could develop new processes for concentrating carbonatite minerals and he could dream up a method for manufacturing the crazy-shaped tiles that are applied to the outside of the space shuttles. His ingenuity was

boundless, aided by a phenomenal memory which kept all his past learning in an active file.

Jim was always fun to be around. He had endless stories to tell and he loved company. I remember one evening when he and I boarded a sleeper in Calumet, Michigan, for an overnight run to Chicago. It must have been close to the last passenger train to make this trip. No dining car was provided and the whole train was probably about four cars long. Jim and I had a compartment--the compartment--and loaded up with sandwiches, goodies, and a bottle of Jack Daniels, which, according to Jim, is the only thing to drink unless you can find Rebel Yell, which unfortunately is sold only south of the Mason and Dixon line. Anyway, Jim entertained me all evening, and as our glow intensified he told me how his Georgia ancestors prospered by bootlegging during Prohibition while his Florida ancestors increased the Georgia business by campaigning as rabid prohibitionists.

Jim Thompson is a huge man physically, always struggling to keep his weight down below some unspecified objective. His size made travelling in the coach section of a jet airplane a tormenting experience and either led him to skullduggery to somehow maneuver upgrading to first class, or caused him to take a train, which he preferred anyway. Now that he is retired he drives long distances to view the geology and visit the mines along the way, always tucking more information into his memory file.

He doesn't talk much about his most harrowing adventure. He was captured with his bride by the Japanese in the Philippines at the start of World War II. His Baguio group of about 500 men, women, and children wound up in the old Bilibid prison in Manila. They almost starved to death before they were rescued by American infantry. His written story, "Liberation, 1945!" is a thriller with agonizing suspense before the rescue.

The mining plants which he designed, the flowsheets he developed, the inventions he concocted, the many articles for the technical press he wrote--all these will survive him. But nothing will replace the big burly super minerals technician with the twinkling eyes, the parade of stories, his unique accumulation of knowledge, and his love and understanding of the old earth itself.

John F. Havard
Mining Consultant

September 1991
Nevada City, California

INTERVIEW HISTORY--James V. Thompson

James Thompson was selected for participation in the oral history series on Western Mining in the Twentieth Century because of his wide-ranging career as a mining and metallurgical engineer who has also written extensively for the journals of his profession. He is a Distinguished Member of the Society for Mining, Metallurgy, and Exploration [SME] of the American Institute of Mining, Metallurgical, and Petroleum Engineers [AIME]. He is a member of the American Association for the Advancement of Science, the American Chemical Society, and the Canadian Institute of Mining and Metallurgy.

Mr. Thompson graduated from the Colorado School of Mines in 1940 and took his first job with Baguio Gold Mining Company in the Philippines. On the ship going over, he met his future bride, the daughter of missionaries, reared in China and returning to Asia as a teacher. Shortly after their marriage a year later, the Japanese invaded the Philippines and they were interned. Mr. Thompson's oral history includes a powerful memoir of the more than three years spent as internees. At the end, they were in the Bilibid Prison in Manila, and spent a harrowing time as food supplies ran out and the American forces did not know of their existence. Mr. Thompson's dramatic account of their liberation is an important historical document.

After returning to the United States in 1945, Mr. Thompson embarked on a career with three successive companies, each of which was still headed by the founder: the Dorr Company, where he did research and secured many patents; the Humphreys companies, where he sold spiral concentrators and acquired mines; and Kaiser Engineers, where he did project development.

He represents a type of whom the profession is proud: brave, resourceful, adventuresome. He spent much of his career working out in the field, at mines in far-flung places: the Colorado Rockies, the California desert, Brazil, Chile, India, Liberia, Mexico. He continued his education by studying the journals and attending the meetings of four major professional societies. He has been chairman of both the Denver and San Francisco sections of AIME. He is a prolific writer and regularly contributes to the society journals, as well as Engineering and Mining Journal, Mines Magazine of Colorado School of Mines, and Skillings' Mining Review.

A letter inviting Mr. Thompson to be interviewed was sent on 9 November 1990, and the interviews were held on 10 and 17 December 1990

and 24 April 1991, in his book-filled study in Lafayette, California. Mr. Thompson was well prepared for the interviews, and provided background information from his voluminous files and many published articles. When the transcript was sent to him for review, he made few changes and returned it very promptly.

The final paragraph in the section on the Tata Project, Jamshedpur, India, was moved from the second interview and inserted on page 32 for better continuity.

The introduction to the Thompson oral history was written by mining consultant John Havard, an advisor to the oral history series on Western Mining in the Twentieth Century.

The tapes of the interviews are available for study at The Bancroft Library, University of California at Berkeley.

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

October 1991
Regional Oral History Office
University of California, Berkeley

BIOGRAPHICAL INFORMATION

(Please write clearly. Use black ink.)

Your full name James Victor Thompson

Date of birth April 27, 1915 Birthplace Atlanta Georgia

Father's full name James Victor Thompson

Occupation Small store owner Birthplace Lilly Pond, Georgia

Mother's full name Margaret Cox Thompson(Remarried Widow) Booth

Occupation Teacher Birthplace Danberg, Georgia

Your spouse Marie Elizbeth (Hanson) Thompson

Your children Rosemary Thompson, Josephine Thompson Fike,James Victor Thompson Jr.

Where did you grow up? In Georgia until age 9, in Denver Colorado to age 25

Present community Lafayette, California

Education Engineer of Mines degree, Colorado School of Mines 1940

Occupation(s) Always an engineer in some branch or function of the mineral industries.

Areas of expertise Geology,mining engineering,metallurgy, mineral economics hold engineering licence in one or more of these areas,in several state Some background in industrial chemistry

Other interests or activities Write a lot for publication in mining trade magazines. Write some satire which has been published. do much photography that has in the past illustrated professional reports and my magazine articles. Lutheran Church, Classical music Do a few hundred hours of consulting work each year in mining.

Organizations in which you are active Amer. Inst. of Mining,Met. & Petroleum Engineers, Twice chairman of big city sections, Distingushed Member, Legion of Honor. Canadian Inst. of Mining & Metallurgy, American Chemical Society (writer for local ACS magazine) American Assoc. Advancement of Science, Colorado School of Mines Alumni Assoc.

I EARLY YEARS AND EDUCATION, 1915-1940

[Interview 1: 10 December 1990]##[1]

Swent: Mr. Thompson, maybe you would like to start by telling where and when you were born and then we'll get into why you were interested in becoming a mining engineer.

Thompson: I was born in Atlanta, Georgia, on April 27, 1915. I lived in Georgia until I was nine years old. My mother was a widow and a brave and capable woman. We moved to Denver, Colorado, and I completed high school in Denver. Entered the Colorado School of Mines in 1934. Laid out a year or two and graduated with a degree of Engineer of Mines in 1940. I immediately left for the Philippine Islands, where I worked for the Baguio Gold Mining Company. On the way over, on the ship, I met my wife. We were married a year later in Baguio, Philippine Islands. About six months later the war broke out and all of the Americans in the Philippines were interned, mostly in Manila, but my group was interned in Baguio. Towards the end of the war, the Baguio group was transferred to Bilibid prison in Manila. I have written an article on the liberation of Manila by U.S Forces and that was published in Mines Magazine [October 1985], the alumni magazine of the Colorado School of Mines.

The reason I entered the mining industry was that, somewhere along the line in the National Geographic, maybe when I was twelve or thirteen years old, I read the story of the discovery of the dinosaur eggs in outer Mongolia, by Lloyd Chapman Andrews. He was a very famous paleontologist, curator of the Museum of Natural History. This brought about an interest in paleontology. But I soon found out there were only four paleontologists in the United States who got paid for it. So I changed my interest to geology and that ultimately led to

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[1]This symbol (##) indicates that a tape or a segment of a tape has begun or ended. For a guide to the tapes see page 111.

the Colorado School of Mines and a degree in mining engineering.

Colorado School of Mines

Swent: What did you study then in mining engineering?

Thompson: The curriculum at the Colorado School of Mines in the '30s--I graduated in 1940--was far different from what is used in colleges today, particularly at Mines. To begin with, let's take a person whose major is mining engineering, like mine was; that person is well grounded in chemistry. He takes chemistry for four solid years. He is well grounded in practical geology, not in the little sideline specialties necessarily. Of course, he is well grounded in metallurgy, at least extractive metallurgy if not physical metallurgy. I have carried on that broad interest, feeling that it was my duty to know everything I can that pertains to my profession, the mineral industries (rather than calling it mining engineering). To that extent, I have held jobs that used that kind of diversification. My own library at home shows that kind of diversification.

That's quite different from kids today. I would have young mining engineers assigned to me, and someone would bring in a young chap and say, "This guy has a mining degree from the University of something or other and he's a whiz kid in computers." And when they got through with that, my question was: "Well, can he break rock?" [laughter] But, let's face it, there's a lot more to learn today, and the broad diversification type of education that I had, has had to give way to more specialized areas. In a way, this is necessary; but in a way, it is also unfortunate. Because when I was in Kaiser Engineers, and as I say, we would hire younger men, I was often appalled at the fact that, well, they didn't know any chemistry; or they had a degree in mining engineering and they didn't know any geology; or they didn't have much of a background in metallurgy. But, as I say, there is just more to learn now and we have to just face up to the fact that that kind of diversification is difficult.

Professor James Boyd

Swent: Who were some of your professors?

Thompson: Well, of course, I remember with great fondness quite a few of them, not the least of which was Dr. James Boyd, who was my professor of mineralogy.

Swent: And we have an oral history of him in our series. [James Boyd, Minerals and Critical Materials Management: Military and Government Administrator and Mining Executive, 1941-1987, Regional Oral History Office, 1988]

Thompson: He was a great person. In fact, I saw him just a year before he died and had quite a talk with him. There's a photograph of him. He must have been about thirty at that time.

Swent: He was just a young man. He was on the faculty then.

Thompson: Yes, and he was later dean.

Swent: What's the name of this volume?

Thompson: This is the 1937 Prospector. This is the yearbook of the Colorado School of Mines. I talked to him about a year ago, and he, at that time, was in good health. We were sitting down at table at a convention in Denver and I talked to him for fifteen or twenty minutes. Not only was he a professor of mine in mineralogy, and a man of such broad scope; Truman appointed him director of the Bureau of Mines. He was at that time dean of the Colorado School of Mines. But he was a whiz kid in the narrowest of professions you can possibly think of: crystallography. He was an absolute genius in crystallography and yet, here's a man who ended up chairman of the board at one of the major copper companies before he retired. He was a man I had great admiration for.

Swent: Was he a good teacher?

Thompson: Oh, excellent. I mean, the subject's a little dull. I can't really go off the deep end on crystallography. He was quite a man.

Professor Merton I. Signer

Thompson: The other one was Merton I. Signer, who was a professor of mining engineering. A very capable man. He later became dean. Died suddenly on the streets of Golden, Colorado. He was quite a guy.

Professor James Underhill

Thompson: And, of course, one that I think of in fond affection is the one we affectionately called the "cueball," Dr. James Underhill. A string of degrees and associations and affiliations as long as your arm. And Dr. Underhill taught at Mines for years, refusing to teach more than three days a week. The other two days he lived in Idaho Springs, where he was a consultant. That's a mining camp in Colorado, about twenty-five miles from Golden. He continued with his consulting business, two days a week. He was what was known as a U.S. Mineral Land Surveyor. This was an appointment without pay. You prepared the papers and the survey to patent a mining claim, and that was the way you got paid. His usual fee, I think, was about five hundred dollars per claim. It was not a paid position. Of course, that has to do with the whole sorry story of the mining law of 1872. We won't get into that because we could talk on that for days.

But those were three very wonderful men that were teachers. There's just one professor that's still living. He was a professor of civil engineering. He must be in his nineties, Thomas Kelly. But of the old faculty, that's the only one.

Backing up a minute to Dr. Underhill, the beloved "cueball." Obviously, this man was a character. Occasionally, he would digress in lectures to expound on the virtues of the Stanley Steamer, which he said was the automobile of the future. He also built the first road over Floyd Hill to get into Idaho Springs from Jefferson County. He built it for three dollars a foot. Of course, it was nothing but a trough shoveled through the side of the mountain. The remains of it are still there. When I return to Colorado, I see that road.

Swent: And he was bald?

Thompson: Oh, like--. We accused him of polishing it, using wax on it. A fly couldn't stand up without falling down, it was so slick.

Entry-Level Mining Jobs

Swent: In addition to your schooling, of course, you had some practical training along the way.

Thompson: Well, yes. I guess I better confess the whole story. In the summer of 1935, I went to Georgia, where we came from ancestrally. I met a girl and I had the sweets for this gal. I didn't pay much attention to my books and so the dean provided me with "The Dean's Rest." I made the "Dean's List" and if you make the "Dean's List"--that's not the kind of list you're thinking of--it qualifies you for the "Dean's Rest." So I laid out of school a year. I worked, let's see--. The first job in the summer of 1937 was at the Arkansas Valley Smelter of American Smelting and Refining Company in Leadville, Colorado.

Mucker at the Leadville, Colorado, Smelter

Swent: Was it hard to get a job in 1937?

Thompson: This one wasn't particularly hard to get because nobody else would have it. [chuckles] At the smelter, the local Colorado manager was very kind to Colorado School of Mines students. I got this job at the smelter which was just a mucker's job. It paid $3.63 a day; a day, not an hour, a day! We used to get paid in little envelopes that had the exact amount of money counted in it; $3.63 a day for ten days would be down to the coins in cash. And that summer, social security came in, the summer of 1937. So the smelter started to pay by check so that there would be a voucher that showed your social security deductions. Well, the boys all took their checks into town and the grocery and the local saloon and the pool hall had never seen a check before; so absolute chaos was generated. The smelter had to send to Denver and get a cash payroll and cash their own checks. People don't realize. My mother never had a checking account before the end of World War II. People went all over town paying their bills in cash. Checks are a post-war phenomenon, largely. But the checks--. The merchants and the saloons and pool hall didn't know what to do with a check.

Swent: And, of course, for the company to get the payroll up to Leadville was something too, the cash.

Thompson: Well, of course, the merchants got used to it after a while because, not only the smelter had to do that, Climax [Molybdenum Company] had to do that.

Well, I left the smelter about midsummer and I went to work at Climax. At Climax I made $5.25 per day. If you look at that percentage-wise and compared to $3.63, that was a quantum jump. Climax is high altitude. The mine was terribly poorly

ventilated. It had great problems with powder smoke because they were always chute-blasting underground. Chute-blasting quite indiscriminately. While they had tremendous fans, all this did was just blow the powder smoke past you faster. It didn't reduce the powder smoke content. Well, about the first of September, I figured it was going to be awful cold in Climax, so I went on back down South to see my kinfolks. I got a job as a mine surveyor.

Swent: Could I stop you just a moment? As a mucker at a smelter, what did you do?

Thompson: Just cleaning up spillage off of ore cars.

Swent: Just shoveling?

Thompson: Yes. It was kind of on the clean-up gang. I was the only one on the clean-up gang that spoke English. They were all Mexicans except me. The foreman spoke English, but that was about it.

Swent: You were all paid the same?

Thompson: Oh, yes.

Swent: Were you? Because in some places Mexicans were paid less.

Thompson: Well, of course, ASARCO [American Smelting and Refining Company], at that time, had big operations in Mexico. They were the ones who brought these Mexicans into the country. Something I'm sure they would deny today, but maybe not, because none of those involved are still living anymore.

Swent: So you think they were paid the same?

Thompson: Oh, yes. They were paid the same.

Swent: Were there any benefits at all? Did you have medical care?

Thompson: Zero. If you got hurt on the job, they had a first aid station. Of course, workmen's compensation was in effect. They had to have workmen's compensation insurance. But when you talk about benefits compared to today, they were virtually non-existent.

Swent: Was there a company doctor?

Thompson: There might have been. There was a nurse, I think, in the dispensary at the smelter. And there may have been somebody in town designated as the company doctor, but he also was in

general practice. Funny thing about it was, you didn't expect it either.

Swent: And of course you were young and healthy.

Thompson: And those days you didn't expect it anyhow.

Chute-blaster at Climax, Colorado

Swent: No. And when you went then to Climax, you were working in the mine?

Thompson: Yes. I was working underground at Climax.

Swent: As a mucker still?

Thompson: Yes. to start with, but I graduated to chute-blaster, which is a job for idiots. [chuckling] I think about it now, you were engaged in practices that no safety engineer would tolerate today. We were forever tying a bunch of a dozen sticks of dynamite onto a long pole with a two-inch fuse and shoving it up into an ore pass and then running like the devil down the drift hollering, "Fire in the hole," waiting for the big bang. Well, it didn't take long with a two-inch fuse. Of course, I'm exaggerating, but it could have been about an eighteen-inch fuse. It couldn't have been much longer than that.

Swent: So you were not getting into the ore part of the mine, you were just keeping the chute straight?

Thompson: Just keeping the chute. The chute-blasters belonged to the muck train crew. The muck trains were run by a motorman and a whistle-punk and the whistle-punk was really the brakeman. The chute-blasters and the whistle-punk pulled the chutes, but when they would hang up the chute-blasters would keep them flowing. It's interesting to know who the safety engineer was at Climax in those days. He's still living, rather a famous person, James K. Richardson.

Swent: Oh, I know Jim, yes.

Thompson: He was safety engineer then.

Swent: He lives in Silver City now.

Thompson: Yes. I guess that's where he is all right. He was safety engineer. Most of the supervisors were very rough and tumble guys, as you can readily imagine, in a big mine in the late 1930s. But Al Dophky, the personnel manager, was a very compassionate guy. The shift bosses would get mad and lay off a whole bunch of people and the next morning they would be out in front of the personnel office rustling a job. Al Dophky would hire them all back again.

Surveyor in a Kentucky Coal Mine

Swent: So then when it got cold, you headed for Georgia?

Thompson: Yes. I went to Georgia and I got a job up in Kentucky in a coal mine. This was a very professional job. I was a mine surveyor. But this is another one nobody else would take. The coal was only forty-eight inches high. Now, it wasn't too bad for the people who were working at the face with a cutting machine or a breast drill; the coal they loaded by hand. But for the guy who had to cover dozens of working spaces and had to walk in that low coal, this was really something awful. You held the transit across your rump while you leaned over, and walked for miles in that low coal.

The coal mining industry, in those days, was not very technically inclined. We mined very high-grade Eastern Kentucky bituminous. And there was a premium on lump coal, because it was used domestically. This was before natural gas penetrated the eastern part of the country.

The man that was the general manager was another very compassionate guy. His name was C. B. Jackson. He was quite tall. He was a civil engineer, which is where most coal mining companies got their engineering talent, what little they had. Frequently a man in the coal mining business at the mine rose to the top from being the traffic manager. Dealing with the railroads was a very important function, and frequently those people would get to the top. But C. B. Jackson would see me--there wasn't any place in the little coal camp except the store and pool hall--he would see me in the pool hall; they had some bowling alleys, little duck pins. Duck pins are miniature bowling pins. And Jackson would see me and he would say, "Hey, Jim, come over and let's shoot a game of pool." Well gosh, the only people lower than me were coal loaders, so--.

The chief engineer was a weird cat. He had about a sixth-grade education and he had learned the surveying business from his predecessor. Now, this has always been one of the most amazing things in my memory. He name was Bige Napier [pronounced Napper]. The name was originally French, so it would have been [gives a French pronunciation] Napier. But in Kentucky it got simplified to "Napper."

Swent: And what was the first name?

Thompson: Bige. B-i-g-e. Bige Napier. I think the original name might have been Elijah and as time went on the hillbillies simplified that too.

But when he calculated a traverse--you are always extending your traverse; this is the mining plan--when he calculated a traverse, there are four calculations in a traverse if you are carrying elevations. And inasmuch as our mine was all flat, we didn't carry much in the way of elevations. He calculated his traverse using logarithms. I said, "Hey, Bige, you know there's a Monroe calculator there in the accounting department. You can calculate those traverses in a quarter of the time it takes with logarithms."

"Oh, no. That wouldn't be accurate." So he insisted on logarithms. So, when I calculated the traverses, I did it at night when he wasn't around, and used the calculator.

Swent: He distrusted machines? Was that it?

Thompson: Well, I don't think he knew how to use them and he didn't want to learn. That's the main reason. I don't think it was out and out distrust, but he just didn't want to learn.

But I left the coal mine about February of 1938, went back to Colorado. Got a job in a little mine up Kokomo Gulch in Colorado, which is about ten miles below Climax on Ten Mile Creek. The town of Kokomo is now covered with Climax tailings, probably a hundred feet deep. But we were sinking this little shaft up in Kokomo Gulch. And I stayed there for two months. The pay was a dollar a day and beans, and I mean, literally, beans. We had beans three times a day. Had this bunk house and the beans and a dollar a day. Things were pretty tough that spring, but I left about May and went back to Golden.

In June, I went to R.O.T.C. camp, which was part of the curriculum at Golden in those days. .Interesting to note that R.O.T.C. at the Colorado School of Mines became voluntary later on and just before the Persian Gulf hassle [August, 1990] it was

slated to be abolished, after, probably, nearly 60 years. Ever since about World War I there had been an engineering R.O.T.C. at Mines and that was up for cancellation. I doubt that will ever happen under the present circumstances. To begin with, it is so silly, the cost of maintaining that R.O.T.C. at Mines, compared to the defense budget, is so small it would defy calculation. There aren't enough zeros to tell what percentage that is of the national budget for military purposes. After R.O.T.C camp, I went back to school. Graduated in 1940 and I guess that brings it up to date on that.

Swent: Had this practical experience helped you in your studies when you went back?

Thompson: Well, I'll tell you where it helps. It helps when you start to seek employment after graduation. It's of very little academic use but it helps you. After all, a brand new graduate from college hasn't got much of a resume. So it helped to have that experience when you went looking for a job.

I got the job in Philippines because of my uncle, Colonel Louis H. Thompson, who was in World War I and World War II. He was stationed in the Philippines. He went up to Baguio and was hobnobbing around the country club and met Ward Graham, the superintendent--the manager--of Baguio Gold Mining Company. He said, "I've got a nephew who's graduating and would be looking for a job." And Ward said, "Well, send him over. We'll see what he's like."

[For the Philippine experience, 1940-1945, see pages 72-102, 105-108.]

II RESEARCH ENGINEER, THE DORR COMPANY, 1945-1948##

Thompson: When I came back from the Philippines in 1945 I went to work for the Dorr Company, which is now known as Dorr-Oliver, founded by Dr. J. V. N. Dorr, who I knew personally.

Swent: Had you known him personally before?

Thompson: Oh, no. I acquired a personal acquaintance with him while I worked for--I worked for the Dorr Company for three years. He lived in Westport [Connecticut] where we were living.

Swent: How did you happen to go to work for them?

Thompson: Well, I went to work for the Dorr Company because one of the people in our concentration camp, Charles Burgess, was the Philippine representative of the Dorr Company. He was a good friend of mine. And, of course, jobs were plentiful in those days.

I went to work for the Dorr company. I went to work in research. I was in research for a year and ddeveloped several patents. And, of course, all my patents have expired, but I got them in my name assigned to the Dorr Company. I think I got twenty-five dollars for each patent. The patents on a system that's used extensively today, the fluidized solid roasting of sulfide concentrates, and I obtained patents on those. The patents were a joint patent with Jim McKay, who managed to get himself clobbered in an automobile accident in Florida some years later. Then, I got a patent on the control of arsenic in cyanide solutions in gold mills. And later, on my own, I got another patent: the use of mixtures of vermiculite and magnetite in preparing oil well drilling fluid. But all of those patents have expired.

Swent: That's quite a spread of activities. Sulfides would be copper?

Thompson: I'll tell you, the pioneer use of that technique was on sulfide concentrates of arsenopyrite and pyrite that contained gold. The direct cyanidation of pyritic and arsenopyrite gold concentrates gives a very low recovery and takes an enormous amount of detention time and the roasting, of course, opens the individual particles so the cyanide can get to the gold more readily. The first of these plants went in at Corchineur Willans in Canada and later the next one, on this particular application of gold bearing pyrite, was at Golden Cycle in Cripple Creek, Colorado. Then, after that, they got widely used in pyrite burning for sulfuric acid. There was a fluidized solid plant at Rico, Colorado, making sulfuric acid from pyrite recovered from old tailings and this acid went into the uranium business. As I say, the patents on that have expired. The Lurgi in Germany has all but dominated the market. The Dorr Company was never very good at merchandising; they were superb in sales engineering, but when it came to peddling things off the shelf, that just wasn't their bag.

Swent: Did you enjoy doing the research work?

Thompson: Oh, yes. I have often said that my year in research at the Dorr Company is worth a master's degree in metallurgy anywhere. It was very worth while.

Then, after that, I went into field engineering and sales for Dorr. And in the Southeast, covering the phosphate industry in Florida and Tennessee; and coal mining in Alabama and various other--zinc in Tennessee. There were two very large zinc mines in Eastern Tennessee that predate the present zinc activity there by a good many years.

Swent: So you were working with a variety of minerals.

Thompson: Oh, yes. Always have. We did some work in the barite fields around Cartersville, Georgia. And the grinding of whiting--whiting is an industrial mineral product that comes from the grinding of marble and it is used for all kinds of fillers, in rubber and plastic and cigarette paper and various paper products.

I spent about six weeks in North Adams, Massachusetts, running the first fluidized solids lime-burning pilot plant. I worked twelve-hour shifts with another fellow. Later, that company installed a full-sized fluidized solids lime burner. Though that technique never really took off. Today, hardly anyone would consider using that method. It's just one of those things. It had its day and that was the end of it.

III METALLURGIST, THE HUMPHREYS COMPANIES, 1948-1957

Swent: So you left Dorr then.

Thompson: Then in 1948 I went to Denver and I worked for eight years for the Humphreys people.

Swent: How did you get that job?

Thompson: My ma got it for me. She knew I wanted to come back to Colorado and she saw an ad in the paper for a metallurgist for the Humphreys company. It was then called Humphreys Investment Company and the sister company was Humphreys Gold Corporation, and both of these were misnomers. The gold corporation didn't mine gold, and the investment company didn't deal in investments. What the investment company did: it promoted and sold the Humphreys spiral concentrator.

Now, I have written the history in two parts of the Humphreys companies. Part one was the Humphreys mining activities; this was in Skillings' Mining Review, 17 February 1990. Part one was the Humphreys mining operations, and part two, Skillings' for 24 February 1990, was the Humphreys Investment Company who later changed its name to Humphreys Engineering Company. Interesting side light there: in the state of Colorado, you cannot have the word "engineering" in the title of a company unless some corporate officer is a registered engineer in that state. Humphreys didn't give second thought to that, if they even knew it, when they changed the name. Well, Frank McKinley was a registered engineer, but Mr. Big [Judson Hubbard] wasn't, but Frank McKinley was a vice president. All together, the Humphreys spiral concentrator--there were about fifty thousand sold. I have been able to account for all except about two percent, where they were sold and where they were used. That's in that article that I wrote on it in Skillings' [24 February 1990].

Swent: Yes. That's a very interesting article.

Thompson: Also, I built the Humphreys ore dressing laboratory by a very sneaky way. I. B. Humphreys, with all of his virtues and his genius as an inventor, was pretty tight-fisted. But his brother Albert was very outgoing, and friendly, and hail-fellow-well-met. His brother was always interested in other mining activities and I got to be the guy that chased down other mining activities, among which was the manganese caper in Southern California on the desert. Well, when I wanted a new piece of equipment for the laboratory, I would know I'd never get it out of I. B., but Albert would go to the Denver Club and have a very lengthy lunch and when he came back he'd be walking about two feet off the ground, so I would hit him up for a new cross-belt magnetic separator or some other gadget that I wanted in the laboratory. Have a purchase order already filled out and slip it under him and he'd sign it.

Swent: Things you don't learn in college.

Thompson: Both of those guys were geniuses in their own respect. I'm trying to get them in the National Mining Hall of Fame in the Museum of Mining in Leadville. Engineering and Mining Journal every so often runs a little squib on new people that have been elected to this thing, and I'd like to get Albert and I.B in that, as well as an exhibit of pictures of Humphreys operations--there were many of them in my article there--and an actual spiral set up as an exhibit. Well, we'll see how that goes.

The Spiral Concentrator

Swent: Are they still used?

Thompson: Well, yes. There are a lot still in use. One big installation is in Liberia. Just how that's happening right now, I don't know. We'll talk about that later. They're still used, but after the patents expired there was much competition from other spirals. Because people would look at the spiral and say, "Heck, I can build one for half that price."

Swent: Was this a complete innovation, the spiral?

Thompson: Oh, I. B. Humphreys is the unquestioned inventor of that machine. I've said in print that it had no ancestors.

Swent: What did they use before then?

Thompson: Well, the Humphreys spiral is a gravity concentrator, and its nearest relative is a shaking table, a Wilfley or Deister table. Now, if the choice is between one or two spirals and one or two tables, I'd take tables every time because they are much easier to adjust and to see what you are doing. But, if the choice is between a thousand spirals and a thousand tables, no way. I mean, it would take all of one of Colorado's counties to hold a thousand shaking tables. But they were widely used in fine iron ore. I put a table of spiral distribution in that article I wrote. About 66 percent of all spirals were used in iron mining; that would be two-thirds. Half of that two-thirds, or one third, were used in Canada in three or four very large operations. Two of which Kaiser Engineers built after I came with them. Used spirals exclusively, almost.

The direct answer to the question: "Are they still used?"; there's no new ones being sold. One of the reasons is that that kind of iron ore is not being mined very much anymore. And, of course, the 1980s were not kind to the mining industry generally. Where there might have been other applications, the business was on the rocks through the 1980s.

Swent: What happened to their competitors?

Thompson: Well, the competitors were mostly Australians and off-shore people that had other things going. I don't think the demise of that particular market made any difference to them, particularly.

Swent: Is Humphreys still going?

Thompson: Well, the Humphreys brothers were very, very personal people. They had no heirs that gave any hoot about the business. So the attorneys for the estate were trying to sell the business. And in the late 1970s after the last Humphreys brother died, I went to Denver; I went to the lawyers and said, "I have a buyer for you." The buyer was Buttes Gas and Oil Company of Oakland, California. Buttes bought the company. They kept it for about ten years, and it was a consistent loser. Not because of any bad management, but because the spirals had had it. There weren't all that many new ones going into the market.

The last big spiral order that Humphreys got was Kudremukh in the state of Mysore, in India. I have been to Kudremukh twice. I went to Kudremukh for Kaiser Engineers trying to get the design and construction of that job. But that was the last big spiral order, and that would have come in the late 1970s. It was just before I retired from Kaiser Engineers. That job

was sold under Buttes management. But it ground down to about 1987 and Buttes themselves went bankrupt.

And Humphreys was sold to Coors Ceramics, who didn't know what they were doing. They kept it about a year and dumped it on to Carpco, in Florida, who made many machines that were used in the same plants that spirals were, particularly on beach sands. You see, Humphreys was big in the beach sand mining business. They ran two or three big mines, mining beach sands in Florida for titanium and associated minerals, titanium minerals being used primarily in the paint industry. So that was the ultimate demise of Humphreys. Of course, I came to Kaiser long before that happened. I came to Kaiser in 1957.

Swent: What led to that change?

Thompson: Well, I could see the handwriting on the wall for Humphreys; that exactly what would happen, did happen. They were making no effort to get into any kind of complementary or any kind of line of activity that would perpetuate the company. I knew they didn't have any heirs. I. B. Humphreys had a son, Putman Humphreys, who was famous as a rounder. Absolutely worthless. He had more wives than Liz Taylor ever had husbands. Altogether charming guy, but he didn't give a hoot about running the business. Interesting thing about Put, he lived overseas all the time. He was a U. S. citizen, but he had to have a visa to come home; not from the federal government, but from the Denver police department. [chuckles] He did many famous things. His old man was kind of the same way; I. B. in his youth was kind of crazy, too. Putman did such things as land airplanes on the golf course at the Denver Country Club, or fly under the Royal Gorge bridge. The only thing Putman Humphreys ever did that was worthwhile--he was a pilot in the navy. He flew many missions. Had all the decorations in the book. But after he got out of the navy, he went back to being a rich bum.

Swent: It's interesting that every company you worked for was a family company and you worked when the founder was still there. Dorr, Humphreys, and Kaiser.

Thompson: Yes. Well, the Humphreys was a very interesting organization and I forced the company, more or less, into diversity as far as I was concerned. I was not going to sit down in that laboratory and run ore-dressing tests day after day. Run Humphreys spiral tests on ores, nuts to that. So in this I had a co-conspirator, Albert Humphreys.

The Manganese Mine Near Blythe, California

Swent: So you gradually got into operations.

Thompson: Well, we started the operation in the manganese business near Blythe, California. We got that up to a break-even position. We weren't making a great deal of profit, but we got it up to a break-even position. The company said, "Well, break-even is hardly good enough." So they folded it. Actually, turned it back to the original owners, who continued to run it. But we wouldn't have done that if we had known something that was going to happen. The manganese purchase plan was run by the government and it was going to expire in about six months from the time the Humphreys pulled out. But it got extended for a couple of years. If we would have known that, we would have never left. Interesting why it was extended. The original program was to purchase six million long ton units of manganese.

Swent: This was in the 1950s?

Thompson: Middle 1950s. Well, I went to Blythe in 1955. We ran the thing for a year, 1955 into 1956. This program was administered by the General Services Administration. But it's interesting how the law got extended. The stockpiles were filling up with the six million units. There were three stockpiles. And the people who were in the manganese business were hollering, "Hey, we haven't had time enough to recover our investment." Then they brought up the question, and lobbied it in Congress, as to whether the law meant six million recoverable units in the ore, or did it mean six million gross units in the ore. Well, the congressmen finally, for political reasons, decided it meant gross units. So the program got extended until there were six million gross units. You see, the ore was bought on the basis of 85 percent recovery. Well, there was 15 percent more you could get in the thing if you could get a change in the interpretation of what was meant.

Swent: So six months made that difference?

Thompson: Well, it lasted another year, maybe a year and a half. I think it was almost to 1960, I'm not sure of those dates. I think the date was in my article that I wrote in Skillings' Mining Review, 8 October 1988.

Swent: Yes. You did have it in there.

Thompson: It was finally shut down. That manganese program should have been run like the uranium program. The manganese program

encouraged poorly financed people to build mills. The uranium program, if you recall, was based on--the government bought the ore at the mine, gave them six dollars a ton transportation money--and in those days that would have bought a hundred miles--that would get you to a buying depot. Now, if the manganese program had been run the same way, with the government contracting capable people like ASARCO, and Kennecott, and others to build mills, and then dealt with the miner like the uranium program dealt with the miner, and paid the milling people to mill the ore--it would have been more successful. Because the way it was, it encouraged poorly--. See, you got more money if it was milled, but then, the mill cost money too.

Swent: Do you think the government learned something from the manganese program?

Thompson: I don't think they did. I don't think they were in it for educational purposes. [chuckles]

Swent: But they did, at least, do the uranium program a little better?

Thompson: Well, the uranium program, from the very start, was based on that concept of paying for the ore at the mine and giving the miner, essentially, a hundred miles freight; because, in those days, trucking would have been about six cents a ton mile.

Swent: Well, actually, they overlapped though because the uranium buying program began before the manganese program.

Thompson: Well, the manganese program dated back to World War II and it had--see, I traced the history and I've written it in there--it had several revivals and ups and downs. I forget when the last law came in that covered the six million units. If you produced concentrates, if you produced ore, or mined high-grade [ore], either concentrates or high-grade that were plus 40 percent manganese, the government would buy them--it's called the car lot program--the government would buy that FOB railhead. So this encouraged people to build mills at railheads or truck the concentrates. The raw ore buying which had a floor of 15 percent was purchased FOB buying station; nobody got any freight allowance. If you didn't get a freight allowance, and you had 15-percent ore, you're going to say, "Hey, if we had a mill we could reduce the weight and reduce the freight." But that would encourage people who had neither the financial resources or the technical know-how to get into the milling business. It would have been a lot better if it had been run like the uranium program was.

The Teknik Club of Denver##

Swent: Before we leave Colorado, I wanted you to tell us a little bit about the Teknik Club.

Thompson: Well, the Teknik Club has become defunct now, so far as I know. It may have been resurrected; I haven't heard about it. But the Teknik Club originally claimed to be the oldest technical society in Colorado. It was originally something like the Association of Smelter Chemists. But over the years it kind of got to be a social thing. Very much anti-feminist. They would not hold joint social affairs with the ladies and the ladies were never invited to the meetings. Now, it wasn't because these meetings were so rowdy that the ladies would be embarrassed; they weren't. Every meeting time, in rotation your time came to give a paper or get someone who would give a paper, a guest. About half of the faculty at the Colorado School of Mines in the 1930s belonged to the Teknik Club. And of course while I was in college I barely knew what that was. But when I came back to Colorado in 1948 from the Dorr Company in the South, I got to know Charlie [Charles O.] Parker, a very famous assayer around Denver. Charlie Parker was one of these people that everybody knew and everybody loved; Charley invited me to join the Teknik Club.

Swent: Wasn't he also a dean at the School of Mines?

Thompson: No. You're thinking of Ben Parker. Ben Parker was a professor of geology and then became president. He left to take care of some family business that his family owned. Then he died a few years after that. He died in 1969.

But Charlie Parker was probably better known than Ben Parker, as far as his acquaintances go, because he sat in his old, run-down office in his assay shop, and he just met everybody in the business. But he got me in the Teknik Club. It was kind of, as I say, a very good social thing. It was kind of like Dad's night out at the lodge. You know, fraternal lodges kind of dropped off in popularity after World War II, but the Teknik Club took the place of the Elks Club, or the Moose, or something like that. It was a place to go to get away from home for an evening.

Swent: Where did you meet?

Thompson: We met at the old Oxford Hotel down near the Union Station on Seventeenth Street in Denver. The old Oxford Hotel, in those

days, was just kind of a rundown fleabag. But in recent years, somebody bought it and completely renovated it and antiquified it for the old days. I called them long distance looking for a room in Denver, and they wanted a hundred and five bucks. I said, "You've got to be kidding." [laughter] It was down in the old--pretty much near the wholesale district in Denver, but it thrived because it was right adjacent to the Denver Union Station in the railroad days. I remember on one side of the ground floor of the Oxford Hotel, the Colorado Iron Works had its office. The Colorado Iron Works were famous for Akins classifiers, and Skinner roasters, and they were in the heavy media business. They had their office there for many years.

Swent: How often did you meet?

Thompson: Once a month.

Swent: Well, that sounded like fun. You had technical programs?

Thompson: The programs were straight. We had a long happy hour before the meeting started, but the programs were pretty straight forward. I mean, very worthwhile speakers and papers. That part of it was on the up and up.

IV PROJECT ENGINEER, KAISER ENGINEERS, 1957-1990

Swent: So then you left all of that for California and Kaiser?

Thompson: Yes. It's interesting how I got the job at Kaiser. [chuckles] I told this story in one of my papers, I think the one I had titled "The Autobiography of a Mediocre Success," in Mines Magazine, January 1982. I told the story, while I was working--it was in the late fall or early fall--down at Powderhorn, which is a mineral property that I had been nursing along since 1951; it is now about ready to bloom and I'm still associated with it.

Swent: This is titanium?

Thompson: Yes, this is titanium. But I was working down there and Ralph Bates ran me down and got me on the phone at Youmans store--I had left that as a message drop. I called Ralph Bates and he said, "Would you be interested in doing development work?"

I say, "Yes. That's what I'm doing right now." So I went out one weekend on the airplane and I was interviewed. I remember it well. It was United [Airlines]; it was a DC-6.

He said, "We want you to do development work." Well, I never took the trouble to ask what development work was. But when I had been around for about a week, Ralph Bates says, "When are you going to get started?"

I said, "Started on what?"

He said, "Why, calling on the industry, you dummy."

I said, "About what?"

He said, "Selling Kaiser Engineers' services and designing construction." So then the lights came on; I knew what development work meant; it meant sales. And I didn't object to that because I had been a salesman all my life one way or the

other. Like the time for Humphreys, I sold those lots up in Aspen, Colorado, for four thousand dollars. And today they all got condominiums on them and there isn't enough money in circulation to buy it back.

Swent: Timing is everything, isn't it?

So you weren't developing ore, you were developing something else.

Thompson: Well, the way my career actually worked out in Kaiser Engineers was--and it's kind of the ideal way for any person at the project engineering level--when I wasn't working on a project, I was working in business development. Kaiser didn't like the word "sales." It seemed like it was beneath the dignity of an engineering constructor company to talk about sales. So it was business development. Between times, I made many trips on business development to call on clients to keep Kaiser's name in front of the industry. So however early on I got assigned to a project--. A lot of my projects were one-man consulting jobs, because as I have said without much modesty, that I was always highly diversified. So my first job was in India.

Swent: What sorts of skills were you now using that, perhaps, were different?

Thompson: The part of Kaiser Engineers that I worked in--now this is not Kaiser Engineers' total business at the time, but it was in the mineral industries.

Swent: You still needed your technical skills.

Thompson: Absolutely. The first job I had in India was strictly a mining-type of job. Again, as I say, because of my particular time in the past, and the way I was educated, and the way I've tried to work: I'm a geologist, I'm a mining engineer, I'm a metallurgist. Boys of my generation, graduating from the School of Mines, were all the same. You thought it was a pretty dumb geologist who couldn't figure out whether an ore deposit was minable or not. It was a pretty dumb mining engineer that didn't foresee unusual metallurgical or treatment problems. So that versatility I've always nurtured. This came in very handy in Kaiser. A lot of my jobs were one-man consulting jobs in Kaiser. I will say that there weren't many guys who had that particular assignment or were given that kind of flexibility.

Swent: What was the date when you went with Kaiser?

Thompson: Well, I went with Kaiser on January 20, 1957.

Swent: And one of your first jobs, you said, was this one in India.

Thompson: I made quite a few sales calls up until mid-summer. The purpose of those--I knew a lot of people in the industry--was just go around and say, "Howdy," to Joe and "Howdy," to Frank and say, "Well, I got a new job and yappity, yappity, yap."

But nonetheless, I early on got into preparing proposals. All business that comes to a company comes through the acceptance of a proposal, a written proposal. A proposal may or may not be a contract. Sometimes they're the same thing; sometimes they aren't. But early on I got into writing of proposals and this was something that came as a shock to Kaiser Engineers. They were just starting to try to get into the mineral industries. At the top level, Kaiser Engineers was a little--I hesitate to use the word conceited, but for example: the head man in Kaiser Engineers, at that time, his attitude seems to have been--this is not a direct quote from him--who needs sales? After all, if they're so stupid, haven't heard of Kaiser, why do we want to fool with them? And up till 1957 most of Kaiser Engineers' work was captive work from the other Kaiser companies--cement, steel, and aluminum were constantly expanding. So most of their work was captive work.

Incidentally, I have a new article right now--I'm just finishing it up--entitled "The Engineer Constructor Company" to be published in the September, 1991, E&MJ. But one of the things the powers that be didn't quite understand was the mineral industry--one of the things that didn't quite come across, was that a proposal cannot be written by some junior engineer--not even an engineer--with a degree in journalism. A proposal writer must understand the following: first, the nature of the client's business and its technology; and second, the nature of the engineer constructor business, how we plan to execute the job and the scope of the work, how to estimate our cost and prepare a budget for what we propose to do. Of course the proposal must be approved by our management and legal people. You see, it takes an engineer of some industrial and engineering experience, and junior talent cannot handle this. You can't have some kid write a proposal to ASARCO about building a new lead smelter when he doesn't even know what that is. So with the diversity I had, I could write proposals that just ran off me like water off a duck's back.

In fact, one of my proudest moments in proposal writing involved Louis H. Oppenheim, vice president and general manager. I may see him next week. We have an alumni luncheon at the Hungry Hunter [restaurant], retired people in Kaiser Engineers.

Louis H. Oppenheim was the vice president and general manager of Kaiser Engineers, and Lou was a guy that was highly respected. You never came in the presence of Mr. Oppenheim and tried to kid him. If he asked you a question, "no" was a perfectly acceptable answer. But if you had to kid him along, he'd detect it just like that. Well, one day--. We always had what we called the Friday night crash; proposals were always due in the mail on Friday night. They'd run up to seven or eight o'clock being rewritten and revised and hashed over and passed through legal; they had to go through the lawyers. Well, I was shepherding this proposal through; it was for a pretty good-sized job and it must have been about seven-thirty. I went into Lou's office to get him to sign it. Lou was obviously tired, but he paid me a compliment that I'll never forget. He said, "Jim, do you like it?"

I said, "Well, Mr. Oppenheim"--I never called him Lou--"Mr. Oppenheim, I think it's pretty good. We worked pretty hard on it."

He said, "Okay. I'll sign it." I mean, he didn't even read it.

Swent: That's a real compliment.

Thompson: I considered that a very great compliment.

Another time with a proposal of much less stature for a relatively small engineering assignment, I came in the office. Again, it was probably about seven-thirty on a Friday. And this time Lou said, "You like it?"

He said, "You sign it."

I said, "But I'm not a corporate officer."

He said, "It doesn't commit us to anything anyhow, so you sign it." [laughter]

Swent: Who were some of the other people you were working with in Kaiser at that time?

Thompson: Well, Kaiser Engineers had Lou Oppenheim as the number-one guy, and Jack Hughes in the second spot; all of these were old-time Kaiser men. They always wore cufflinks made out of twenty-year-service pins. The oldest generation in Kaiser were the dam-builders. They dammed the mighty Colorado; they tamed the roaring Columbia. The next generation, and the ones that I worked with mostly, were the ship-builders. They blackened the

sea with Liberty ships. But Lou was old enough to have been involved with Hoover Dam as a very young man. The big crop of Kaiser Engineers executives were the class of 1941 at Berkeley, who almost to a man were civil engineers, a few disgraceful types from that same class at Stanford. [chuckles] The class of 1941 were the ones. There was Jack Hughes, and there was Sam Ruvkun, and Vic [Victor E.] Cole, and Tim Bedford, who was related to the almighty. He was the nephew of Clay P. Bedford. That was pretty much the bunch. They pretty well were the ship-building crowd.

Tim Bedford went back to run the Kaiser-Frazier automobile thing. Of course, that was a disaster.

Swent: So they didn't have mineral experience?

Thompson: Well, not very many of them, nor was minerals the whole of KE's business. Tom Price, of course, was not an employee per se of Kaiser Engineers. I don't know whether Kaiser Industries had been created then or not, but I met him early on. I became readily accessible to him. Tom fancied himself as a mining type and he cottoned to me for being a mining-type guy. He would call me directly on the phone. Tom was not--. I think if he wasn't working for Kaiser Industries, which may not have yet been formed, he was probably, officially, in Kaiser Steel. He was a very high vice president. He was the second man--second or the third, maybe. He's the third man, I think, that Henry J. Kaiser ever hired. You see, he would be quite old if living today.

Swent: Was Jack Havard there?

Thompson: Jack came on board much later. Much later, about 1965. I was in Chile at the time on a rather extended stay when Jack Havard came on, about 1965.

You talk about mining people. Vic Cole, a civil engineer and one of the 1941 class at Berkeley, came with Kaiser Engineers from Kaiser Cement and from the gypsum company. I've always kidded and said Vic Cole thought the gypsum business was the mining industry. Of course, Vic is a good friend and I'm not saying that derogatorily at all.

Tata Project, Jamshedpur, India

Thompson: But, I was saying about my first assignment in India. John Hallett was the vice president in Kaiser Engineers International. Actually, it was the Kaiser Engineers Overseas Corporation. He was the titular head of the Tata project in Jamshedpur in India in the state of Orissa.

Thompson: The way Kaiser got the Tata job was that J. R. D. Tata, a big family of Parsis--. Parsis are Persians. There are about 100,000 of them in the world, and so far as I know, there is not a poor one in the whole 100,000. You would not be able to tell them on the street from any other Indian, but once you get to know them they make it very clear to you that they are Parsis and not Hindus. And the story is that Edgar Kaiser was riding on an airplane and his seat mate was J. R. D. Tata.

And Mr. Tata says, "I got a steel mill in Jamshedpur and I'd like to expand it.

"How much?"

"Oh, we'll start with double; we'll go from there."

Virtually without a contract--of course that's not really true, but the deal was signed right there between, in fact, Edgar Kaiser and Tata. Well, of course, it wasn't all that informal, you can be sure. But one of the agreements was to bring Indian engineers from Tata to Fontana to Kaiser Steel and train them, give them some advanced training.

Well, the Tata job was well under way when I came on board, but if you're going to expand the steel mill, you've got to expand its raw materials. All their limestone came from a place, a little town, known as Birmitripur. The company was Bird and Company, a British company, that ran these quarries. So I was sent to India to find out how to expand, double, the production of these quarries.

Now, in these quarries, the only mechanized things were a vast collection of antique pneumatic drills. And they blasted with military explosives because that's all they had in India. Then thousands of women picked up the rocks. Sorted the rocks by hand; the high-silica rock was thrown away. Put the rocks on their head in a basket and trotted over and dumped into a hand-pushed car. After studying this thing, coming back to the States, the first report I ever wrote for Kaiser Engineers--I've still got it. In fact, I've got every report I ever wrote for

Kaiser Engineers. They're out there in that outdoor book closet with a sign over the top entitled The Word. But my conclusion was, well, if you want to double production, put in twice as many Indians, simply because, at their costs, you couldn't justify mechanization. I did recommend a front-end loader and a small twenty-five-ton truck to remove the clay overburden. It hardly seemed necessary to dig up that clay by hand and have the women haul it off. But on stone you just couldn't compete with them. For the rest of the operation, just put in twice as many Indians. And that's what they did. I think they did get some front-end loaders. But one of the things was the requirement of the hand sorting. That pretty well left out mechanized loading. The limestone was streaky. And while I could look at the rock and not tell the difference, these women could tell the percent silica of the rock just by looking at it. They sorted the high-silica stone from the more acceptable stone for the steel mill at Jamshedpur.

There were three steel mills being built. We were expanding Tata. The Russians were building one, and the Germans were building one. Now, when I visited, it was their monsoon season. At Tata, all of our concrete was out of the ground. Construction men know what that means. We had backfilled and our concrete was all out of the ground; so the rainy season, the monsoon, didn't make much difference to our continued construction. But at Rourkela, where the Germans were building a mill, there was a circular lake and the sign on that said "blast furnace." There was a rectangular lake and the sign on that said "open-hearth furnace." Another rectangular lake said "coke ovens." The Germans had been caught in the monsoon with all their excavations open. So, they were having a heck of a time.

We had built a hundred houses at Jamshedpur. They were modern three-bedroom, two-baths--or even bigger--houses. We had about a hundred expatriates there; this was an enormous project.

There's a story which is possibly part legend. But you land at Dumdum airport in Calcutta. Dumdum is where the British had the Dumdum arsenal and it's where the Dumdum bullets come from. The ride in from the airport to the hotel is through the most intensified human misery that anyone can possibly imagine. So this guy's wife was catching up with him. She got on the bus to go to get on--I think we had a chartered airplane that flew from Calcutta to Birmitripur. But she went on a crying jag and she couldn't stop crying. Finally, they had to send her home and, of course, the old man had to go a few months later.

Calcutta is quite a mess. I stayed at the residence of the director--you know, British companies don't have vice presidents, they have directors.--at the head director's house in Calcutta. And every morning, you would look out the window and you would see four Indians trotting along with a litter and there would be a dead one on top of it. Somebody who died on the street. Well, this gal just couldn't stand that, and it was pretty rough all right.

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Thompson: Bird and Company provided their company aircraft for me and we flew to Rourkela. The pilot was an Indo-European, man of mixed nationality, a very charming guy. We flew to Rourkela, which was the nearest airport to Birmitripur where the quarries were. And all the time I had my movie camera going. I mean, I had made a trip around the world out of this. I went to Hawaii and to Tokyo. Then I visited the Philippines for the first time since I'd left in 1945 and on to the Malay Peninsula and on into Calcutta.

Swent: Incidentally, photography is a hobby of yours also, isn't it?

Thompson: Yes. Well, also it's good for documenting things.

Swent: Right. And you have some beautiful photographs illustrating your writings.

Thompson: I went on to Rourkela with my movie camera. I quit taking movies because you can't paste movies in a report. I had my movie camera going. I was sitting up in the front seat in the co-pilot spot with the pilot. I was shooting the approach to the Rourkela airport. I just took pictures all over Calcutta, street scenes. Calcutta was absolutely infested by the sacred cows. Out in front of the bank, there was this guy with a vegetable cart and the sacred cows came along and started grazing in his vegetables. I got a movie of this. The guy looks up the street and down the street and then he goes around and kicks the cow right smack in the rump.

But anyhow, I went on and I stayed at the house of the resident general manager at Birmitripur, a British-Italian by the name of Marcacelli. His claim to fame was he came from an old line of Italian stone cutters. That's why he knew how to run the quarry. Believe me, it took skill. The only men that would work in this place were called gurripuris. They are the gurkhas, the little soldiers that the British and later the Indians used; they come from Nepal. They were the only men that were willing to work in the quarry along with the women. They

were very gallant. They would help the woman lift the basket up on to her head. I thought that was real gentlemanly of them.

But, as I say, I took these movies everywhere. Went on from there to Iraq. I didn't go to Baghdad, but I was at Basra, which in that time was the only airport that would take commercial airplanes. Baghdad apparently didn't have a developed airport at that time. Then on to Istanbul and through Europe and back to this country, keeping this little camera going all the time.

Back in the States about two weeks, one of our guys, Ray Ware--he's still around, lives in LaFayette--he says, "Thompson, there is a man I want you to meet."

I meet this real grim type in his late thirties and he is a C.I.A. agent. His name was Greer Sugden. He says, "Mr. Thompson, we'd like to see your movies. We'd like to send them to Washington and copy them."

So I went over to San Francisco, an office where the federal offices are. Went to an office that had nothing on the door except the room number. Got in this office, there was nothing but a table, two chairs, and a little movie projector that would put the movies on the wall. Well, this chap took the movies back to Washington. Of course, I was very curious. "What do you want these movies for?"

He says, "Well, there are two reasons. One of them is, you took a lot of street scenes." This wasn't all that far after World War II, 1957. He says, "We always like to look at movies like that because we may spot somebody we would like to catch. Or, at least we know where they were on that date, some spy, or escaped war criminal, or something." He said, "That helps. Many times a tourist, just by accident, picks up somebody we'd been looking for." He says, "The other one was, you took magnificent pictures of the approach to the Rourkela airport." Well, it turns out that it's against the law in India to take movies from the air. Nobody told me that and this pilot didn't say one blessed word. So I gave them some pictures. If they ever have to invade India or anything, they know what the Rourkela airport looks like. [laughter]

It was an interesting assignment. I wrote an article about that. [Mining Engineering, August 1958]

Swent: Yes. I enjoyed that article and the pictures too.

Thompson: The interesting thing was, some years later I had occasion to go back to Jamshedpur. George Aiken and I--George lives here in Moraga; I hired him for Kaiser Engineering--we went to Jamshedpur on the night train from New Delhi. We went to the hotel. We got there quite late. The hotel had a veranda and it was raining. When we went through the railroad station, everywhere you could see on the floor there were piles of rags. I wondered, "Why don't they clean this place up?" Well, under each of these piles of rags was an Indian. No place to sleep except the railroad station. Well, we threaded our way through these people, trying to disturb as few of them as possible and got a car and went to the hotel. The hotel was surrounded by a veranda. It was late at night. It was raining. The sacred cows had decided they were going to sleep on that veranda that night. So we couldn't get to the door without climbing over the sacred cows. The door was locked, but there was a bell. We rang the bell. The clerk came out and ran the cows off.

We then visited a friend of George Aiken who was an Indian. While he was in training at Kaiser Steel, he married this American woman, probably a very middle-class-type person, but we met her. I have the greatest admiration in the world for this woman. She married this Indian man, engineer, and boy, she was playing the part right up to the hilt. She dressed like an Indian. She had beautiful saris. She said she had never been back to the states. She had three kids. She spoke Hindi. She said she didn't even own any Western clothes. I said, "Boy, there's not very many women that would be that devoted to--." So many women would have found out what India was like and said, "The heck with that." That would be the end of that. Well, they lived in one of these houses that we had built. However, our magnificent three-bedroom, two-bath houses housed at least three families. They had been cut up into small apartments. He was rather high up and I think they had, maybe, all of a house. I don't know. He said, "Well, the houses you built were just too fancy for Indians." They had two or three families living in each one of them.

Swent: Did you have anything to do with the iron mine or just the limestone?

Thompson: No. Not until much later. Much later. I've been to India many times. Much later, I did a study in the state of Mysore for Mysore Minerals. Mysore is in the southwest tip of the Indian peninsula. You usually fly from New Delhi to Hyderabad then on to Bangalore. Of course, I got many pictures in India. By that time I had quit movies; because, as I say, you can't paste movies in a report. I did a study for the state of Mysore. They had many small mines and the Mysore Minerals, which is a

state-owned company, owned by the state of Mysore, wanted to do some development work. I had made a study. We got paid entirely in rupees, no dollars. That was quite acceptable because we had an office in New Delhi.

Swent: Kaiser?

Thompson: Yes. Which needed rupees. There was no problem with that at all. I was generating rupees to pay the cost of maintaining that office. New Delhi is much cleaner. Of course, it's the capital of India. It's much cleaner than Calcutta or even Bombay; big broad avenues. There's Old Delhi, the old city, but New Delhi was established for the British, like Embassy Row, where all the foreign embassies are. The United States has a compound in India. We have an enormous state department crew in India and people who elect to do so, can live in this compound and they would not know that they were not in the United States. Every week a big C-5A puts down in New Delhi, disgorging all sorts of Stateside goodies: Diet Pepsi, photographic film, all kinds of goodies, and booze, which you can't get in India for love nor money. But in this compound they have a country club.

Josiah Royce, who's still around with USAID, he was the one that got us into this iron ore thing anyhow. Josiah preferred to go it native and he lived on Embassy Row. He had a gurkha chauffeur and the gurkha chauffeur always had the meanest looking knife you ever saw right under the seat of his car. Of course, he wouldn't hesitate to carve somebody up that was trying to bother Joe. That's what gurkhas are, loyal.

Went to a dance at this country club. Sure is fun to dance with them Indian gals because there's always a big bare spot in the midriff in a sari and when you got your arm around them you can grab a little bit of that pudge. Of course, they're all very beautiful women anyhow, particularly the ones that can afford to dress nicely.

After I wrote that article on the small iron mines of India [Skillings' Mining Review, 18 February 1989], Joe Royce wrote me a letter and it was very complimentary, because he was there when I was doing the work. As I say, that came much later. That would have been in the 1970s.

Swent: At the time of the Tata thing, did you get to their iron mines?

Thompson: No. I didn't go to any of the iron mines during the Tata project. I was only concerned with the limestone. Actually, the iron ore for the Tata project does not come from Mysore, that's a thousand miles away. Mysore's ore is mostly exported

to the Japanese. Although there is a small steel mill in Mysore.

Swent: Where did Tata get its iron?

Thompson: From the state of Orissa. There are iron mines in Orissa.

Whenever I went to India, our agent always accompanied us whose office is in New Delhi. His name was B. K. Varma. Varma is a very common name in India like Smith. But B. K. was a short little fellow, most unassuming. Usually wore a white shirt and a pair of pants and sandals, but he was a genius. He could get you into any ministry. He could open any door in New Delhi. A skill that was very much appreciated. And he was traveling with me and he told me a story. Now, I've heard this story elsewhere, but the question was asked, "Why are there so many people riding these third class coaches on the railroads?" And the reply is, "Oh sahib, that is because there is no fourth class." I think the word is sahib. Though B. K. didn't use that. B. K. was a lot more modern. I was Mr. Thompson. He was so modest he wouldn't stay at the same hotel we did and that wasn't because of the cost, because the company was paying it anyhow. But he would always stay at some cheaper, native hotel.

Bong Mining Company, Liberia

Swent: When did you first go to Liberia?

Thompson: Well, I first went to Liberia in 1962. Kaiser Engineers had built Quebec Cartier in Canada and Wabush in Canada. These were huge iron ore projects that used autogenous grinding. The German company which was known as--well, it has changed its name. It's now call Gewerkschaft Explorazion. The Germans pronounce that word as if it was French. Their subsidiary, Bong Mining Company, in Liberia was building a big iron ore complex that would be very much like Quebec Cartier and Wabush. Quebec Cartier used autogenous grinding and Humphreys spirals, and, of course, both of these were my bag. I got in on autogenous grinding in the very beginning. So there was a two-man team sent to Germany. I was the technical man and Jim Foster, an old-time Kaiser man, was sent over there to be kind of a design coordinator.

Europeans do not practice engineering the way we do in this country. Most engineering in Europe is done by machinery manufacturers and that would absolutely horrify a Bechtel or a

Kaiser. So, the Gewerkschaft wanted someone as a design coordinator and me as a consultant. We got the plant designed and built, and constantly holding this machinery company at bay, that did the design work, because they would load it up with their machinery whether it was the best or not. I made a lifetime friend there, Wolfgang Jacobs. I later did work for them in South America in Belo Horizonte, an iron mine that Gewerkschaft ran.

But Liberia is a very interesting country. It's tropical but not really miserable. Liberia is the closest thing the United States ever had to an African colony. Its history is quite interesting. In 1848 there was an organization known as the American Repatriation Society, undoubtedly run by some God-fearing people, Yankees from Massachusetts. Don't forget I'm a Georgia boy. The American Repatriation Society chartered a ship and loaded it up with U.S. blacks. Well, the captain wasn't a very good navigator and he knew absolutely nothing about the history of slavery. Seventy-five percent of U.S. slaves came from Tanganyika. Twenty-five percent came from the estuary of the Congo River. Maybe it's sixty-seven, thirty-three, anyhow, those are the proportions. As soon as the sea captain spotted land, he dumped all of them. That happened to be Liberia. Over the years the Liberian emigrants had kind of a cowboy-and-Indian relationship with the natives. There have been many blacks emigrated to Liberia since 1848.

I was riding in from Roberts Field, the airport, out by the Firestone rubber plantation, and the driver said, "Where are you from?"

I said, "I'm from California."

He said, "I'm from Los Angeles!" You can tell the difference immediately, physically. The descendants as well as the recent immigrants are relatively tall people of a Joe Louis chocolate complexion. The aborigines are a very small people and just as black as a brand new .45 right out of the Cosmolene.

Liberia, the capital city, is named Monrovia for President Monroe. Roberts Field, which is a full fifty miles from town, is the international airport and that's named for Roberts, who was the leader of the 1848 group. The country emulates the United States in every respect. There's the senate, the house of representatives, the supreme court, the bureau of mines. The country is divided up into, it think, thirteen counties or fourteen counties. Absolutely the complete image of the United States with just one minor exception: the president is elected for life. It was really true, I think, Mr. Tubman was elected

for fourteen years. I'm not sure whether he died in office or not.

But I went to a party at the hotel, the main hotel in Monrovia which was owned by Israeli interests, to a party that was sponsored by Chase Manhattan Bank. I kind of guess I crashed the party; there were some other fellows with me. President Tubman came in. Tubman is more of a descendant of the aborigines. But I remember he had a cigar and it was about twelve inches long and it literally gassed the whole place. [chuckles] He came in and made a brief appearance and left. That hotel was really something. The Ducor Palace, that was the name of the hotel, the Ducor Palace. It was brand new, but every day something went wrong. Monday, the elevators didn't work. Tuesday, there was no hot water. Wednesday, the air-conditioning failed, and just right on down the line. [chuckles]

My friend, Wolfgang Jacobs, and I were having dinner in the cafe and the steward said, "Would you like to see the wine list?"

I thought, "Oh, we might as well live it up a little and see what the native wine is like." He brought out the wine list; it had two things on it: 1) red wine; 2) white wine; please order by number. [laughter] Wolfgang got a big laugh out of that.

Swent: How was it out in the field there?

Thompson: The field wasn't too bad. I took a little side trip. The main river is the St. Paul river. There's a lush coastal band there along Liberia. Liberia is right where the continent starts to turn east, at the bottom of the skull, if you want to look at Africa as a skull. And there's a tropical belt and after that you start to get into arid desert country. But the St. Paul is quite a lush river.

I went up to a missionary station which was run by some Swedish Lutherans. I introduced myself as a good practicing Lutheran. This young couple had just arrived. On the compound of the missionary station there was a grave. Also on the missionary station was a very old woman, white woman. She kept some chickens and some goats and a little garden patch. She was kind of senile. Of course, I immediately asked who she was. The young missionary says, "Well, that's her husband buried out there." He died of the black water fever--whatever that is--and she had remained. The mission station had gone to pot pretty bad and there was a native preacher. He was preaching a blue

streak--you know, the Liberians speak English--and boy, you can call it English. They have native dialects like many countries, like India and the Philippines. In India, English is the common language. He was preaching a blue streak, but the mission had completely gone to pot. All the stuffings were coming out of the mattresses in the dormitories, but this young Swedish couple, they were devoted to fixing it up. I guess they did. Walking through the bush there along the river, I hear some jazz music and I wonder where that is. Here comes a native girl down the path, and on the top of her head there's a ten-dollar Japanese transistor radio. [laughter]

Swent: What were they mining there?

Thompson: Iron. Iron ore. Their processes were very much related to what we had done at Quebec Cartier and Wabush. But it's a sad story how Liberia, a stable country, a little bit crooked, but really devoted to the welfare of the people--

Swent: How did this affect you, the crookedness? Did have to pay bribes?

Thompson: Well, I mean small, petty graft.

Swent: For what?

Thompson: Well, actually, I was not exposed to any. But I know that you had to make under-the-table arrangements. It was like it was in the Philippines and Mexico.

Swent: To do what?

Thompson: To do anything. Like in the Philippines I wanted to get a marriage license. I went up to city hall ten times. Every time I got the wrong form. I brought it back, "This form is out of date."

"Oh, we gave you the wrong--. That was an error."

Finally, I went to Carl Eschbach, the minister of the local community church. (Marriage licenses were free.) Carl says, "Well, I'll get you a marriage license." So he takes me up to the city hall and he gives the clerk a ten-peso note and that got the marriage license right now. I was too dumb to know that. I mean that kind of petty graft.

Swent: So, in Liberia?

Thompson: As I say, I personally was very much sheltered by the Germans. I was there during the exploration period before the plant was built. I went back in 1966, after the plant was operating. The guy that succeeded Tubman was an ordained Baptist minister. In a few years, the army revolted and they knocked him off and it has been that sort of thing ever since, to this present situation. The Germans have pulled out. They just walked off from the property. They made millions of dollars worth of investment. They just left the head Liberian boy in charge and says, "When this settles down, we'll be back." In 1967 I wrote the Bong Range story in Engineering and Mining Journal. Later, for the same German company, I did a little job in Belo Horizonte, Brazil.

Professional Accomplishments

[Interview 2: 17 December 1991]##

Society Memberships

Swent: This is beginning our second interview.

Thompson: I made some random notes during the past week. I wanted to mention something simply for the record about my professional activity. I joined four major professional societies. The American Institute of Mining, Metallurgical, and Petroleum Engineers: I have been twice a past chairman of a large metropolitan section, Denver and San Francisco. I have written papers and contributed this to books of the society. I was made distinguished member of SME (at that time it stood for Society of Mining Engineers of AIME) in 1984, and member of the Legion of Honor in 1989. You get to be a member of the Legion of Honor simply by living long enough; it's fifty-year membership. I belong to the Canadian Institute of Mining and Metallurgy; I have been to a couple of their conventions. I belong to the American Chemical Society, which I write for frequently in the Northern California section magazine entitled The Vortex. I'm also a member of the American Association for the Advancement of Science. And all of these memberships date back to--quite a few years ago. I think 1947 for the American Chemical Society and 1953 for the American Association for the Advancement of Science.

Secretarial Assistants

Thompson: When I retired I had the usual retirement dinner, but the retirement function that I treasure the most was the luncheon given to me by my four secretaries. In twenty-five years in Kaiser Engineers I only had four secretaries, whereas most people would have had one a year on the average. I'm very proud of that fact because they all turned down promotions at least once to stay in my department. Because in Kaiser Engineers you had a dog-eat-dog system of promoting secretaries; a certain grade of secretary worked for a certain grade of man. This was ridiculous because, in my case, we turned out voluminous reports which required the very best of secretarial help, whereas to get promoted they worked for a vice president who wrote memorandums to some other vice president.

Swent: Would you like to give the names of your secretaries?

Thompson: Well, I'll give you the first names only. The youngest one was Renee Adriaga. The next one was Betsy Sharp. I still give Betsy a little work now and then. She's retired. The next one was Josie, Josephine Law. And the next one, in fact the last one I had, was Lillian Plumly. I finally beat the rap on the promotion thing with Lillian. I found out that there was a trick I could get around that. I took her out of the secretary pool and had her made a department business manager and that ended the squabble over pay raises based on secretarial rank. But, as I say, I'm very proud of the fact that I had so few secretaries over that period of time. I think three of the four are now retired. Renee was quite young so she's probably still working.

Swent: That's a testimony to you as a boss, I would say.

Thompson: Well, I thought it was ridiculous having secretaries that would get used to the department, used to the other fellows, used to my way, and then they're transferred out in order to get a silly little raise in pay.

The only frustrated ambition I've had in my career is that I often daydream that it would have been nice to get an advanced degree. But in the 1940s you couldn't put an economic advantage on that. If you look at starting salaries today for bachelor's, master's and doctor's degree, you'll find there is an economic advantage. The doctorate will bring a much higher beginning salary.

Engineer of Mines Degree; a Silver Diploma

Thompson: I might mention something about the degrees given at the Colorado School of Mines. I received what was known in those days as a professional degree, Engineer of Mines. It is not bachelor of anything. After the war, the organization that rates colleges, the Midwest Association of something or other, insisted that the Colorado School of Mines professional degree was invalid, that it was really only a bachelor's degree. Well, that's not true, because for three out of four summers at the Colorado School of Mines everybody went to summer school. So I would say it was at least twenty percent more academic time involved in these degrees. Nor was it exclusive with the Colorado School of Mines. For example, the professional degree was encouraged at the military institutes; particularly, graduates of West Point and Annapolis would go a year after graduation to a civilian college and obtain a C.E., civil engineer, or an M.E., mechanical engineer, in the navy particularly. About half the faculty at the Colorado School of Mines had these professional degrees, but the school more or less acquiesced to the desires of this rating organization and dropped the professional degree, though there has been some agitation to reinstate it.

Swent: What did they give then instead, a bachelor of engineering?

Thompson: Yes. Nowadays they have gone back to a bachelor of mining engineering or bachelor of science in mining engineering. But the professional degree, for one thing, it was respected in the military and about half the faculty had this type of degree, perhaps along with a higher degree of a doctorate also.

Swent: Tell about your diploma there, please.

Thompson: Well, the diplomas through the 1930s and into the few years into the postwar years were made out of solid silver. A plaque made out of, certainly, a 90 percent silver with some small amount of alloy. It was about four and a half by six inches and they were made on the campus electrolytically. They looked just exactly like a diploma that might be on parchment. They were signed by the president with an electric pen.

Swent: The president through most of those years was Dr. Coolbaugh.

Thompson: It was Melvin F. Coolbaugh. The demise of the silver diploma wasn't because of the price of silver particularly, but it kind of timed with the elimination of the professional degree, within a year or two of the elimination of the professional degree.

Swent: And this, you said, was your second diploma.

Thompson: Yes, this is my second one because the first one was lost during the war in the Philippines. When my mother found out that I was going to make it back to the States, she went out to Golden to the School of Mines and asked them to make a new one and Dr. Coolbaugh signed it. Of course, they were very happy to make a new one. And Dr. Coolbaugh signed it, but he passed away some years after that. I obviously treasure this very much simply because they're not given anymore. There has been some agitation to start that again, too, but there are too many graduates nowadays and the costs of producing one today might be pretty high.

Swent: I don't suppose you can make a Xerox copy of it very easily either.

Thompson: Oh, yes, I could make a Xerox copy of it. Do you want it?

Swent: No, I was just thinking that that might be one practical reason why they no longer made them if they weren't copyable.

Thompson: Well, I think that one would Xerox. We might try it before we leave.

Timna Copper Mine, Israel

Thompson: Well, I might add one last remark here and that was in 1962 when I went to Israel. I went to Israel as the guest of the government and the purpose was to prepare a proposal for some expansion work at Timna which is about twenty miles beyond the head of the Gulf of Aqaba.

Swent: This is for Kaiser Engineers?

Thompson: Yes, this is for Kaiser. And Timna was a copper mine alleged to have been operated by King Solomon. I kind of doubt that because there was great trade in Solomon's day with the Phoenicians, who mined copper on Cyprus. I actually think those Timna mines may date from more recent times, and my reason for that is the slag that I found around the property. The slag was obviously made at high temperature. It was quite fluid. I somehow doubt that the Israelites could have done that. I don't think they would have had the fuel, though in ancient times trees for charcoal were much more common in Palestine than they

are today. But I flew down to the Gulf of Aqaba. Elath is the coastal town at the head of the Gulf of Aqaba. Everybody in Elath, including girls and young boys, all carried their little machine guns. The Jordanians were only across an imaginary line, not a water border. But the Israelis had utter contempt for the Jordanians and the only thing they protected was the underground power plant, which was within shelling range of the Jordanians. They just figured the Jordanians weren't about to start anything, but they played that one safe.

My guide was a descendant of a very famous person in the mining business. His name was Callow. In the old mineral dressing handbooks you will see various devices, I think there was a Callow flotation cell and a Callow cone. He was a very charming guy. His wife is buried in Israel and I have presumed that she was Jewish though Callow himself, while he had learned to speak a little Hebrew, I don't think was. Years later I hired his son, Ian Callow. They're British, but he was in Australia, and I hired Ian. He told me more about his father. His father was a charming man. But even still I think Ian is in the Bay Area working for Bechtel, but Kaiser Engineers kind of shrunk to the despairing point and he left.

I went to Jerusalem and it was at the time of the Eichmann trail and security was very, very tight. I went to Joppa and I went to a few other places, but always on a fast run. I never did see the traditional tourist places in Israel and I wouldn't particularly care to go there now. Well, I think that covers all the catch-up things.

Braden Copper Company, Chile

Swent: I think that possibly the next item would be Braden and El Teniente.

Thompson: Well, we'll talk about Braden Copper Company a little. Kaiser Engineers did three expansion studies for Braden Copper in Chile. Braden is south of Santiago. The three expansion studies were 1957, 1963, and 1965. I was involved in all of them. In 1965 I was project engineer in charge of all production facilities: mine, mill, smelter, lime plant and everything including tailing disposal, which was quite an operation in itself. Everything related to productivity.

Swent: How many mines were there?

Thompson: There was just the one big El Teniente mine.

Well, the Braden Copper Company belonged to Kennecott and we did various expansion studies. For political reasons which I'm not even sure I know all the ins and outs, Kaiser did not get the construction work. Others were selected. The one selected was a joint venture between Bechtel and what was the old Western Knapp Engineering Company in San Francisco. As I say, it doesn't matter how we lost it. The final plan was pretty much the way we had designed it. But Braden, they now call it Sociedad El Teniente, S. A., and of course it is run by the government. The government under Allende expropriated all the of copper companies and it is run by what is known as CODELCO. As near as I can tell, CODELCO does a fairly good job of running these mines. It's the direct descendant of the old copper department. Braden had to get a lengthy permit to import anything. It was always considered a tragedy when somebody went into manufacturing something in Chile because they would have to use it and it would be of inferior quality. But Braden had its own shops, its own foundries, and they were very ingenious in making a lot of stuff on-site.

Swent: Were you there over a period of several years?

Thompson: Off and on, but my longest stay in Chile was only one six-week stay. Usually I went down for three weeks.

The Braden complex was fascinating. If we go straight south of Santiago we come to the town of Rancagua, famous for the battle of Rancagua and General O'Higgins, an Irish name but a great Chileno hero. The story goes that he wasn't really there; he was back in Santiago with one of his girl friends. [chuckles] That's beside the point.

Rancagua is the place where the Braden railroad terminal is. The railroad is a 30-inch gauge railroad. If we move on east from there, we come to Coya. Coya was another operating center. The headquarters of the resident general manager, who was Buck Grant. Later became manager of Peabody Coal Company while Kennecott owned it before the government forced them to divest the property. Also it was the headquarters of the local engineering department and two of the power plants.

The Pangal power plant was further up stream on the Pangal River. It was a Pelton wheel plant. Pelton wheels were invented right here in San Francisco. On down very close to Coya was a power plant that operated on Francis turbines. The river always carried a high turbidity and the turbine blades and the buckets on the Pelton wheels wore very rapidly.

We go on up the mountain now, we're gaining elevation. The next place we come to is a place called Barahona, on the railroad. This is the site of one of the original tailings ponds which in an earthquake gave way and sent x-million tons of tailings down the river and caused great distress. That has since been abandoned for a low-level tailing pond somewhere between Coya and Rancagua. But Barahona is a very interesting place.

We go along the railroad, and we come to the smelter at Caletones. We're now up about, oh, I would say, five thousand feet elevation. Caletones is actually out on a little branch line. The railroad continues to climb and it goes past a place called Sapos; in Spanish that means frog. There was a moving landslide, a creeping landslide at Sapos, that moved the railroad. Every year they had to drag the railroad back up on the side of the hill to start over again.

Then we went on up to Sewell; that was where the mine and mill was located. The mine was rated at about 35,000 tons per day. It was a block-cave mine. The block-caving was all through gravity or transfer chutes. There were no lateral hauling systems till you got to the main hauling level at Teniente 5. Teniente 5 hauled ore out to Punta Rieles where it was dumped into the crushing plant and on through the mill. Whether they got 35,000 tons a day depended entirely on precipitation. They were limited by water for the power plants. They bought some power from ENDESA, the state-owned power plant, but it was limited in the same way. So if you had a dry year, your production couldn't be maintained. In fact, in the late 1960s, early 1970s, they had very bad droughts and brought in portable diesel engines. CODELCO would do that, but I doubt that Kennecott ever would have done that. That would have been too expensive a power, but a state-run thing can kind of overlook look those things.

Swent: Is it extremely arid country?

Thompson: It's somewhat arid; you get some winter snow. Also, the power plants were river-run. There were no storage reservoirs, because in earthquake country like that everybody would be scared of a reservoir. So you took what you got out of the river, silt and all. The reservoir would have taken a lot of the silt out of the water and it would have been less wear on the turbine, the blades and the buckets of the Pelton wheels. The tailings were not thickened. They went right on down a 60-kilometer flume to a place called Parone, which was the big tailings disposal area. The water standing on the tailings pond

was deep blue because of soluble copper. There were some oxides in the ore; the milling process added copious quantities of sulfuric acid, and this would dissolve the oxide copper. Kaiser engineers designed and built a plant to treat that water. We treated it either with burned lime or with raw, ground limestone. If you treated it with burned lime, the sludge was higher grade; but the economics dictated raw, ground limestone, and the sludge from that ran about 11 percent copper, and it was sent back to the smelter.

Swent: Was the limestone available there?

Thompson: Yes, the limestone was available in the immediate vicinity. They had a lime plant anyhow, because the milling process also required lime.

Swent: Did they do anything about the acid?

Thompson: No. The acid was necessary. Braden's metallurgy is a little different than most copper metallurgy in the United States, in the milling process. They dosed the incoming ore with acid to float all sulfides, including pyrite, and produce a bulk sulfide concentrate. In most porphyry copper properties, they put in lime to begin with to depress pyrite, but you couldn't do that at Braden because the copper, the chalcopyrite, was middling with iron pyrite, and you would have lost copper if you had gone that route. So the bulk concentrate was then reground, and then the lime was added after the regrind to depress pyrite, which, incidentally, went to the acid plant at Sewell before an acid plant was built at the smelter.

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Swent: Had they already developed all of this before you came on the scene?

Thompson: Oh, this metallurgy had been in place for many years, ever since flotation was invented.

Swent: You weren't changing anything there?

Thompson: No; people would come through Braden on a fast trot and say, "Why do you do that milling so stupid?" Not realizing that this middling problem existed. So there was no way to change Braden metallurgy; it worked pretty good anyhow.

Swent: Nowadays one of the big problems in some places is birds being attracted to tailing ponds. There are a lot of birds in Chile; was that ever a problem?

Thompson: The bird problem primarily is where cyanide is being used. But the birds, I never heard anyone mention anything about the birds in Chile.

Braden is a fascinating complex, and you must call it a complex. In 1946 they had one of the most disastrous mine fires in the world. [For an eyewitness account of this disaster, see the interview with John Reed conducted in 1991 for the Western Mining in the Twentieth Century series, Regional Oral History Office, University of California at Berkeley.] A fire got started and there was an exhaust fan at Teniente C level, which was very high up in the column. The haulage level, Teniente 5, was about 7,800 feet. Pictures of Sewell would make you think that it was twenty thousand feet high, but most of the vegetation has been killed by smelter gases in the past and it just has the appearance of being way above timber line when, as a matter of fact, it isn't. But this fire killed nearly a thousand people. They hired a man after that as safety engineer that I knew in the Philippines. His name was Stanley Jarrett.

Swent: Had they had a safety man before then?

Thompson: Probably they did, but the new safety man was given much more authority. He did a fine job. He died just recently. He retired--well, actually, he left Braden as everybody else did when the government took over.

One of the major schemes in the expansion of Braden--. Well, they were trying to get up to 200,000 tons a year of copper. One of the problems called for a deep-level tunnel beginning at Colon on the railroad, which is just above the smelter. This deep-level tunnel would have been Teniente 8 and the tunnel was driven and it went right through that Sapos slide. But fortunately, it appeared to be in competent ground as it passed through. The slide wasn't a problem, but if you'll visualize the mine as a great cone with nothing but gravity transfer and no lateral collection down to Teniente 5: when then put in Teniente 8, it meant there would have to be lateral collection. There would have to be lateral hauling systems because you had exceeded the limits of that cone configuration.

Well, just recently in the mining press, Braden has been experiencing rock bursts. In all the ten years that I knew Braden, more or less, the word was never mentioned, a rock burst. Well, the theory is that they had gotten into the seismically active zone. You see, that coast of South America is seismically active. In fact, it comes right on up to San Francisco and into Alaska because the various Pacific plates are

subducting under the continents and the Andes are the result of this subduction process with uplift. And they believe that the mine has now entered a zone where the rocks are under tremendous stress from the subduction process, from plate tectonics, and that when pressure is released--when an opening is created--you create a zone of weakness. A rock burst is kind of an explosion. There have been fatalities from it.

But I always treasured the experience with Braden. Made a lot of permanent friends. Send Christmas cards to some of them to this good day. And it was a very great experience.

I might add something here. Probably I know more about the Braden complex than most people who worked there simply because I saw it all. If you hired out at Braden, you were in the mill or the smelter or the mine and you didn't see the whole picture. Only a few engineers saw the whole picture. Wes Driver, who later came to work for Kaiser Engineers, and others probably had the whole picture. But during our work we were given access to costs. You see, our work was partly economic. We had to justify this plan, plan "A", versus plan "B". So we needed to know everything in the way of costs. Boy, that was reluctantly given. The controller at Braden did not report to the highest level of management in Chile. He reported directly to New York, and he put up a big fight about giving us that information. But "Big Mike," in New York, Charles Michaelson, approved it, and we were able to get all the information concerning the economics.

Let's see, at Kennecott there were two Michaelsons: Stanley D. Michaelson, the chief engineer in Salt Lake City, and Charles D. Michaelson, the president in New York City.

Swent: Maybe this is a good time to talk a little bit about the skills that you needed. At the end of your time on the Kaiser Engineers projects for Braden, you were project engineer for the production facilities.

Thompson: For all the production facilities. There was a man over me. There was also a project engineer for the ancillary facilities, power plant, water supply, and that sort of thing. But I wrote or edited all the reports for everybody. I wrote or edited the reports for both of the project groups.

Swent: What sorts of skills did you need that you had not needed in a lower sort of position?

Thompson: Well, I don't think there was anything, particularly, that I hadn't done before. Like I say, you had to be able to read and write geology. Read and write metallurgy and so on.

Swent: Were there more personal relations involved rather than just technical knowledge?

Thompson: Well, we certainly got along great with all the people in Braden. As I say, some of them have become life-time friends, they're on my Christmas card list. The Kaiser Engineers team that we had, they all got along great together. It was kind of a happy ship all the way around. There's some politics in why we lost the big job, which very well might not have been worth having, because the big job was completed under the Allende regime. It might have been harder to work. We might have been blessed by not getting it.

Swent: Had your academic training entered in?

Thompson: Well, like I told you before, my interests have always been from driving the first stake in the ground to pouring the ingot. My library demonstrates that fact. I've always said, "Well, I am a geologist. I am a mining engineer. I am a metallurgist." Incidently, I have various state licenses in--I'm a licensed geologist in the state of California, a licensed metallurgical engineer in the state of California, and at one time I was a registered engineer in sixteen states and the province of British Columbia. I dropped all of them except Colorado and California. To begin with, the curriculum for a mining engineer at the Colorado School of Mines was probably the broadest of all. You had a considerable dose of geology, a geology course every year for four years. A considerable course in metallurgy, both ore dressing and pyrometallurgy, as well as mining engineering. The mining engineer usually has the broadest background, but that doesn't mean much if he doesn't keep up. If he doesn't keep up in his profession, being an avid reader of the journals, and participating in adding to his own collection of knowledge and references, and being professionally active.

Interesting story about that. I had a friend of mine, who has now passed away, a graduate of the class of 1939. He got a job in the Bureau of Mines in Salt Lake where he stayed until he retired and then died. I visited his house one day and we were having cocktails. His wife was a secretary for a federal judge; both of them were eating out of the federal trough all right. And I said--we got into some kind of technical discussion--I says, "Wally, you can find that in Taggart. Get me your Taggart and I'll show you just exactly where that is."

He says, "I don't have any."

I says, "You don't have Taggart's Handbook of Ore Dressing?" I said, "What did you do with it? You had one in school."

He said, "I threw it in the trash." And he never joined any professional organizations. He was a forty-hour-a-week man for the government, and that was it. So, it depends on how interested one is in keeping absolutely current in their profession and in adding to their skills. So, as I say, I had a broad background to begin with; I've always maintained it.

Swent: Which journals do you think are the best? Is there one you'd like to single out?

Thompson: In the past, in the historic past, one of the best, if not the best, certainly the one of the greatest historical significance, was Engineering and Mining Journal [E&MJ]. I have bound copies of Engineering and Mining Journals since 1947 out here in the shed. The other one was the Mining Engineering published by SME of AIME. There are some problems I've always had with that particular journal. I've written a lot for E&MJ, but not very much for Mining Engineering.

Then there was Bulletin of the Canadian Institute of Mining and Metallurgy. Now, they do a superb job. They have a historical metallurgy section that runs almost every month and that's absolutely fascinating. It's written by a professor in one of the colleges there in Canada. The Mining Journal of London I never cared for very much. There was nothing wrong with it, but it just seemed to be one more journal I didn't need.

Of course, I've always like Skillings', which is a weekly. I write very often for Skillings'. The last three or four years I've written over a half dozen articles for Skillings'. I have one coming out probably the end of this week. It will be entitled "The Old Braden Copper Company; The Way It Was."

Skillings' is a weekly. It's interesting to note one thing about Engineering and Mining Journal. Before the great Depression, it was a weekly. I remember it as a weekly around the fraternity house when I was a freshmen. I was a member of Sigma Nu fraternity, something I don't carry on the outside of my sleeve for sure; I just never considered college fraternities to be all that important. It was a good place to live for the time I was in Golden.

Swent: The meetings of the mining associations--were they of educational use to you? We know they're a lot of fun. Did you learn from them also?

Thompson: Well, that is something--now, if you're talking about national conventions or regional meetings, those are usually dedicated entirely to delivering papers on various subjects. They're fairly well organized. I've contributed several papers that become part of the literature. They usually get published in the transactions. But local meetings, as I have said in print, people come to local meetings to see other people. The speaker is not of very much importance. Though there are good local speakers from time to time, but, as I say, that's not the primary drive for going to a local AIME meeting. The primary drive is social and professional contacts.

Swent: How important was it to know something about Chile, or the Philippines, or Liberia, when you went to these places?

Thompson: Well, you learned pretty quick after you got off the airplane. I mean, boning up on it in advance was hardly necessary. For one thing, you weren't there alone. You were always being guided and taken care of and quartered and fed by your client or your own local representatives in the country, as in the case of India.

Swent: Did you ever know the local language?

Thompson: No. I know quite a few Spanish words, but I can't string a sentence together in Spanish very well. In fact, I do a lot better in French simply because I had two years of academic training in it. I can read almost any sign in Paris or in West Africa, in the former French colonies.

An interesting thing about when I was in Algeria. Algerians had to become super Arabs. So when the French left, they took down all the signs in French and put up every sign in Arabic. This was kind of silly because 60 percent of the population is literate in French, but only about 35 percent are literate in Arabic. Kind of cut off your nose to spite your face.

When I was in the Philippines I did learn Ifigao, Ifigao dialect. I can give a whole speech in Ifigao. Of course, it would sound very much like English to you because there are only ten Ifigao words. (That's a joke, son.)

Swent: Was this a work language?

Thompson: No. All the Filipinos were bilingual; some of them are trilingual. They know English, they know their native dialect, and they know one of the two more common languages, Tagalog and Ilokano. There is some Spanish spoken in the Philippines, but even when I was there in 1940 the Spaniards had been gone for forty years. A few old people knew Spanish. And some names existed in Spanish.

Swent: So it was no disadvantage in Chile, for example, not to know Spanish?

Thompson: Well, you were primarily dealing with the English-speaking staff, but you would be better off if you knew some Spanish.

Swent: All their staff at that time were English-speaking?

Thompson: All their staff were English-speaking and I would suspect that all the CODELCO staff to this good day are English-speaking, simply because that's where the literature is.

Swent: Were they all trained outside the country?

Thompson: The staff in Chile, in Braden, over the years changed. In the pre-war years it was just about 100 percent United States citizens. In the postwar years, the staff were still gringos but there was a scattering of British and a few Italians and a few other nationalities involved, including an ever-increasing number of Chilenos.

Swent: But still dealing in English?

Thompson: Oh, yes. Still speaking English, at least before 1966.

Swent: Were there Chilenos who had, perhaps, studied in the States and gone back?

Thompson: Well, there were some Chilenos that had studied in the United States. I knew one who had gotten a master's degree at Stanford. There were Chilenos in fairly high positions, but let's face it, it was just like it was in the Philippines. There was an unspoken upper level for Chilenos. The chief engineer was Dutch, but there was an upper level for Chilenos. Middle management was about it. I think had the situation continued without the expropriation and the Communist interlude, that would have shifted further and further towards more and more Chilenos. Nothing wrong with Chilenos, intelligent as anybody in the world. I think that would have shifted as time went on. But there was that obvious stratification.

Swent: Was there technical training available in Chile? Did they have a mining institute?

Thompson: Oh, yes. They had a very good college, the University of Concepcion. In fact, a fellow that worked for me, Guillermo Borquez, still lives around Lafayette here somewhere, he was a Chileno. Educated in Chile and later got a master's degree at in the United States. However, he left Chile because he couldn't stand Allende. But we used him extensively in South America because he was good in English and Spanish both and, of course, anyone who speaks good Spanish can speak to educated Brazilians who speak Portuguese. Anyone who knows Spanish can learn Portuguese fairly rapidly if the necessity is there.

Swent: Is that about all on Braden then?

Thompson: Yes. I think that's about all on Braden. It was one of our most personally rewarding assignments because it had so much variation, so much diversity. I've still got the reports out there in my outdoor locker. They were all about two inches thick. Well, the last report was about five volumes.

Special Research Projects

Swent: So, where would you like to go next from Chile?

Thompson: Let's talk about those jobs for Gulf General Atomic.

Swent: That I have as 1968.

Thompson: Yes. We did two jobs for Gulf General Atomic and the one we did for Lockheed was of similar nature. These jobs had very little to do with the traditional mining industry, but they required somebody who could use a lot of imagination and wasn't afraid of being wrong. Gulf General Atomic had two projects. I'll talk first about the mischmetal alloy.

Grinding mischmetal

Thompson: Mischmetal is a mixture of rare earth metals, mostly cerium and lanthanum. When mischmetal is struck it produces sparks. Mischmetal is used in cigarette lighters and in the strikers that welders use to light their welding torch. Well, Gulf

General Atomic, which was--General Atomic belonged to General Dynamics before they sold it to Gulf Oil Company. Gulf was taken over by Standard of California and I think the thing has been dumped by Standard. But at any rate, when we worked for it, it belonged to Gulf. Their main line of business was primarily research and developing various aspect of nuclear energy. But they had little side jobs. They had a contract from the air force to produce this alloy of mischmetal and zinc. This alloy had to be ground very fine. And in the finely divided stage it was pyrophoric. That meant if you had the powder in a fruit jar, close together, it would just oxidize a little on the surface, but if you tipped that over and the powder fell through the air, it would go up in a big flash. Catch fire immediately. Well, there was some munitions use for this. It was highly secret. I suspect it was to be used in some kind of munitions that made a big flash and consumed oxygen over wide area, but we were never told what it was used for.

Our job was to find out a way to grind this stuff. Obviously you couldn't grind it in a tumbling mill, because it would catch on fire immediately. They had been grinding it in kerosene and washing it in gasoline. Why diesel oil would not have done, I don't know. Of course, they would burn the pilot plant down once a day. They wanted our help. It was a one-man job--I was the only one that worked on it--to devise a way of grinding this that was safe. So, I devised a scheme and made plant drawings--I had drawings executed. I can't draw for sour apples myself. But we had designed a little plant that was totally enclosed and operated in an atmosphere of nitrogen. But we still made it strictly a fresh-air plant so the workers could dive for the outdoors without having to bother with opening a door. It was in Southern California. It was going to be built out in the desert. But then the plant got scrubbed. The air force canceled it out and it didn't happen.

Applying a Zinc Battery to Electric Vehicles

Thompson: The second little job we had for them, Gulf General Atomic who contracted for the Edison Institute or some such trade association in the power field, they were developing a battery, a special battery. And this battery operated at relatively high temperature and under pressure. And what it was, the battery used metallic zinc as one electrode, that would have probably been the anode, and some other inert cathode. It was a variation of the energy cell; it also required oxygen. In the process of discharging, the zinc was converted to zinc oxide,

and there was a little pump that continually circulated the electrolyte. The electrolyte was sodium hydroxide. It filtered out the zinc oxide continuously in a little cartridge filter. That was the discharge cycle. It had all the advantages of high storage capacity, low weight and volume. It could be built in sizes that would fit an automobile or it could be built in sizes as big as a house. The charging cycle was simply taking the zinc oxide out of this filter cartridge and electrolytically redepositing zinc metal.

But the people at Gulf General Atomic wanted an independent study by someone who just had some imagination of how you could apply this battery to electric vehicles. So I set up a model for the study using a medium-size post office where all the vehicles would be powered by this device. Well, it would carry enough power in a single charge for the post-person to cover their beat and return to the post office, where these cartridges of zinc oxide were removed and sent to the regeneration plant, the electrolytic plant that converted it back into metallic zinc anodes. These anodes would be reinstalled in the batteries overnight. All of this would require a great deal of standardization. Of course, this was pure, unadulterated imagination on my part. But I put a price on it, the capital and operating costs, based on very thin information, and the final conclusion was that this battery was just a little too complicated.

Swent: What year was this?

Thompson: This would have been in the late 1960s, early 1970s.

Swent: Before the oil shortage.

Thompson: Yes. As a matter of fact, air pollution was more the drive here than energy. The fact of the matter, it's not particularly highly conservative of energy, because the energy went into the electrolytic plant that redeposited the metallic zinc. The energy output was what was essentially from the corrosion to zinc oxide.

Swent: But they were trying to get away from the lead. Was that the incentive?

Thompson: Well, lead was not really the drive. This was a more efficient battery. The drive behind it was that it was a more efficient battery. Higher energy storage capacity per pound of weight per cubic foot of volume and all the good things.

Swent: Higher than--what was the alternative?

Thompson: Well, the alternative is the lead-acid battery which, to this good day, for vehicular propulsion hasn't been beaten. There are other batteries, mercury batteries, cadmium batteries and so on, that have their application in space and exotic things like that. But this thing was just a little too complicated.

But, again, that was an interesting job. One that, as I say, mostly required imagination and guesswork, but the client was very satisfied. The economy wasn't too bad. It was just that it was a little too complicated. In the cost per vehicular mile the direct cost wasn't all that bad. I've forgotten what the numbers are, but it just didn't quite measure up in the total scheme because of complexity. But it would have to be for fleet use. Individuals couldn't use it. But I never heard any more about it after that.

Producing Tiles for Space Shuttles

Thompson: But for Gulf General Atomic those were two jobs of the weirdos. The third one was for Lockheed. I always joke when I refer to it as the brick airplane. This would have been in the 1970s. Lockheed bid heavily and competitively for the space shuttle, and they lost. I forgot who got it, but they're headquartered in Los Angeles. Maybe Rockwell International. Lockheed did get the contract to make the insulating bricks, tiles, that keep the shuttle from burning up when it re-enters. And they wanted an estimate of the cost for producing these bricks. Well, this was like the mischmetal and the battery, you just had to have a lot of imagination.

Well, I visited their laboratories and saw how they made these bricks. It required a silica fiber, a fiberglass silica that at that time could only be obtained from France. It had to have extremely high purity. This was, as I recall, treated with sodium silicate also of super high purity. And through a lot of different processes, always x-ray analysis at every stage. Then the tile had to be machined to fit the exact--every tile had a number and it fit in a certain place on the shuttle. You couldn't stand the slightest impurities, particularly iron, because that would be a burn-through point. That would be a point that would have a eutectic and would burn a hole through it. Well, what actually happened with the shuttle, the bricks came out perfect. I made an estimate of what it cost to make these bricks, and believe me you never saw a more expensive brick in your life. [chuckles] I've forgotten what the number

was but anyhow, Lockheed built the plant and made the bricks. That's what makes this space thing so expensive. You just couldn't go to a lumber yard and buy some bricks and stick them on the shuttle. These were very special tiles.

But the problem never was with burn-through. The problem was with the darn things blowing off. Every time you would see a picture of the shuttle in the early days there would be a bunch of vacant places where some of these tiles had blown off. The matter of making the adhesive to hold them on, the method of affixing, became far more important than the quality of the tile. I don't recall that they ever--of course, my only information after that was the public press--I don't recall that they ever had a problem with burn-through, but they would blow off. Fortunately, they blew off, apparently, after the shuttle had slowed down to such a point that a burn through the metal hull of the shuttle was no longer a threat.

Swent: I do remember once when they were landing and some tiles had blown off and they were very, very nervous about that.

Thompson: Yes. That was the problem, sticking them on.

Swent: What was the reason for Lockheed not doing this kind of investigation in-house?

Thompson: Well, first of all they wanted--I've forgotten the man's name that I worked with. First of all, he, himself, had had some background in the mining industry years and years ago. He thought that developing this had to be with someone that had a process orientation because the people who were making these tiles experimentally were all Ph.D.'s, very highly scientific people, that couldn't very well visualize this as a continuous industrial product. So we got the job, primarily on the basis that Lockheed wanted an outside opinion from someone process oriented, to put this as much as possible on a continuous basis. As I say, everywhere along the line of production a brick got x-rayed to detect any contamination that had crept into it. Whether the plant that was built was what we scoped and priced, I don't know. It couldn't have been too different. What you end up there with, you had to have something that at one stage of the game was moldable. I think I showed some picture of that in here. I'm not sure whether I did or not.

Swent: I think so. This is your Kaiser Engineers project book.

Thompson: Yes. You had to have something that was castable, and moldable, and machineable, and light weight, and it had to essentially be pure silicon. The real bugaboo was iron and base metal

contamination. As I say, I've forgotten all the technical details, but it was a fun job. Kind of off-beat.

Swent: It's interesting that they didn't just turn to somebody like Corning.

Thompson: Well, again, we're looking for someone who had a continuous production outlook. And they were satisfied with our work. No doubt about that. There is another fellow that worked with me on the job and we stayed with them right through till the plant was built. I didn't, but others did. I mean, after that first report was finished, I bowed out on it. They never questioned the numbers or the process. They gave us what their concept of the flow sheet was. We differed only in minor details where we thought it could be improved on, more mechanically than process-wise.

Swent: I have a note here that says AEC [Atomic Energy Commission], burying nuclear waste.

Thompson: Oh, that was really great. In 1970 we did the first job for the AEC in Oak Ridge, Tennessee.

Swent: Did you have anything to do with getting these contracts?

Thompson: Oh, yes. I was frequently involved in the proposals work.

This job came under Phil Bush, who lives in Orinda. I see Phil once a month over at these alumni meetings, retired people meetings. Though I did not work directly for Phil.

Burying Nuclear Waste

Thompson: I was just assigned to the thing because it essentially involved a heavy input from mining engineering. But they were going to bury the nuclear waste in salt at an abandoned salt mine in Lyons, Kansas. Now, this salt mine you could enter; it had a single shaft about a thousand feet deep, and it scared me no end because I don't like mines a thousand feet deep with just one two-compartment shaft. It had a hoist and this mine had been--I think it belonged to the Leslie Salt Company.

It had been leased out for various things. It was a great place to grow mushrooms. And at one time it was a mushroom farm underground. And then some guy leased it to raise chickens. He

only gave the chickens four hours of darkness and that kept them laying more eggs, or something like that.

But the salt mine was taking a lot of pressure and there was a lot of floor heavage. Salt under pressure flows and there was floor heavage; in places it was quite severe. It was difficult to climb over the heaved blocks. We designed systems for burying both high-level waste and low-level waste. The high-level waste would have been such things as spent fuel rods from nuclear power plants and some other classified waste from weapons-grade material. You see, a salt mine is a room-and-pillar mine and it was already dug for them. They would have had to have done some correction of the places of high floor heavage. We devised special machinery to transport the rods. It had to be a vertical lead chamber with walls two feet thick.

Swent: Was this robotic?

Thompson: It was cable controlled. The operator could control it a few hundred feet away by cable. But the rods, incidentally, the rods unshielded were deadly for hundreds of feet around, and their half-life was a hundred thousand years or something. A very long half-life. They were lowered down about a three-foot shaft. They were lowered down this shaft unshielded. The transporter locked on to the bottom of the shaft much the same as a diving bell locks on to a sunken submarine, a gasketed connection. Then the spent fuel rod was loaded into the vertical transporter. The transporter moved to the burial room where a special drill had drilled a hole and the transporter centered itself over that hole and lowered the fuel rod into the hole and then it was back-filled with salt.

Well, this thing got studied and studied and studied. And I was mostly concerned with the mechanical parts, the drill, the transporter. I devised a method of horizontal burial in the pillars. It was a very complicated ventilation scheme and very complicated filters on the surface to filter the air that came out of the mine. But there were an awful lot of calculations on heat flow. We had a guy in our company who I always figured would be making heat flow calculations on that right on through his retirement if the money held out.

One of the criteria on the Lyons thing was that it couldn't cost more than $25 million. Of course, there were in addition very special railroad transporters to bring in the fuel rods. You know, what's still happening now and was happening then, the rods are simply stored under water near the power plants. This facility had to be built for $25 million. I think the current

price tag is probably $25 billion. We kept holding it to that, but what finally sunk it--and this still goes on and it annoys me to no end--thousands of man hours of highly-trained engineers in the AEC--and at that time Union Carbide had the contract for running Oak Ridge--highly-trained engineers from the AEC, from Union Carbide, from Kaiser, practical men as well as theoretical men, put in thousands and thousands of man hours on this and along comes some college professor who says it won't work and that scuttles the whole thing. He's given it all of fifteen minutes thought.

Now one of the things they discovered at the Lyons site, which they did not know, and of course, they lived in holy terror of ground water penetrating these burial chambers. They found out that at Lyons there were a lot of unmapped oil wells, dry holes that had penetrated the salt. Well, that was used as ammunition to shoot down the Lyons thing. Oddly enough, the local people seemed to have no particular protest against it. It of course would create employment and make quite a cash flow in the community. This thing went on and on. In fact, when I retired from Kaiser, we still had a job known as the BWIP [Basalt Waste Isolation Project].

And now we're getting so that we're going to bury this in lava up in Hanford, Washington, five thousand feet of lava or something. Now the hardness of that lava compared to salt is hundreds of time greater. So the cost increases exponentially when you start talking about burying it in hard rock. Well, again thousands and thousands of man hours get spent and again comes the college professor that says it won't work. Mind you, I'm being a little facetious here, but I object to the fact that these things get shot down by people who have put in nothing like the time of very competent people who have studied the thing.

Swent: And where do they come into the picture? At a public hearing?

Thompson: Well, they're vocal anyhow.

Swent: At what point do they have the power?

Thompson: Well, before the thing gets started. Of course, the state of Washington got up on their high horse too about it, "not in my backyard." Usually at a public hearing these things come out. It got to be a joke around Kaiser Engineers that these projects should be called "Engineer's Welfare." They go on forever.

Well, then later, of course, there were some studies being made in the salt beds around Carlsbad, New Mexico. Potash and

salt beds in that area. The most recent thing is at Yucca Flats in Nevada, which is government ground, has been nuclear testing ground for decades. That's the latest site. The rock there is a tufa. A tufa is a--it's called indurated--it's volcanic ash that landed hot and welded together. In fact, it's called welded tufa. This is an easier rock to drive in, to excavate, but that seems to be stalled too. As I say, we did an awful lot of work on these projects and the solution isn't in sight yet. I've always said that people do not consider the hazard of not doing something. That's where the hazard is. I don't think anything you could do would be as hazardous as the possibility that five thousand years from now we have some kind of civil war and some crazies get a hold of these rods and expose them.

One of the things, also, that happened in the criteria--the criteria changed, and this annoyed me again. It didn't exist at Lyons, but later on you had to devise a scheme where this material was retrievable. And I said, "Why? Once you've got it buried, forget about it. Why do you want to retrieve it?" I haven't got a straight answer to that yet, but it's still in the criteria. It has to be retrievable. For what?

Swent: That must immensely complicate things.

Thompson: Well, let me point out what also happened; here is a change in government philosophy. The fuel rods can be reprocessed by dissolving in acid and recovering fissionable material and recycled. Now, there have been a few recovery plants, recycling plants, built,and they have been a mess. I mean, they have been dreadfully expensive, environmentally unacceptable, dangerous places. I think General Electric decommissioned one, and this was very costly. Not only that, the recycling--I'm not sure of this and I'm not sure which--I think it was Jimmy Carter that put a stop to any recycling and just buried the spent fuel rods. But when you recycle them you can produce weapons-grade material. There was some objection to that. I'm not all that sure of that, but I know it was by a presidential order that any thought of recycling was dropped. The fuel rods would be buried as is. They usually let them cool for about five years or ten years in the water before they considered disposal by burial. But right now, the first fuel rod that was ever made is still in the water. There doesn't seem to be--they don't get anywhere on the thing. As I say, to me the danger is not doing something. Nothing you could do would be as dangerous as not doing anything.

Swent: Just leaving them where they are now is sure to cause trouble.

Thompson: That's right. Just leaving them where they are now. You don't know what kind of nut could get loose in a place like that and the stuff would all be exposed to the public.

What else have we got on the docket?

Swent: Which comes first, magnesium in Norway or Powderhorn titanium?

Thompson: Well, the magnesium thing is pretty short. I'll discuss that. That was a job I did for Kaiser Engineers after I'd gone through the theoretical retirement phase. I mean, I worked full time for Kaiser Engineers and had an office for three years after I retired. I went to the office nearly every day.

Swent: When did you retire?

Thompson: December 31, 1979, but in 1980, 1981, and 1982 I had an office at Kaiser.

Swent: Sort of changes the definition of retirement a little bit, doesn't it?

Thompson: Yes, it sure does. I never drew any social security until I was seventy. The social security that we draw now is more than my salary was after I was with Kaiser ten years. That's because we didn't draw any before we were 70. See, it's an actuarial thing. So it's substantially greater if you wait until you're seventy.

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Thompson: After I had retired we had jobs from the Bureau of Mines in Denver. They were put out by the commodity. We did one on titanium, which I was very much involved with. This was identifying world sources, identifying costs. We also did one on magnesium metal.

Determining the Cost of Producing Magnesium in Norway

Thompson: Well, at first I wasn't involved in that. The guy that was involved with it, threw up his hands and dropped the thing when it came to determining the cost of producing the magnesium metal in Norway. Well, the Norwegians weren't about to tell you, and I don't blame them--they're not going to tell you any more than Dow Chemical would tell you-- how much it cost them to produce magnesium. But I said, "Well, there is a way to find that out,

and you don't have to be an espionage expert to do it." First of all, the technology is readily available from such books as Mantell's Handbook of Electrochemistry. I have a copy of that. This technology tells you quantities of refractories and electrodes and that sort of thing. But I said, in the various publications of the Department of Commerce and other places, you can find out what the wages are in Norway. And you can also find out what the Norwegian fringe benefit package is, about one hundred percent; it's a kind of cradle-to-the-grave economy. And you can find out exchange rates in terms of dollars. Magnesium is produced by hydroelectric power, and it's very simple to figure the costs of hydroelectric power. Then you do what I do at every project I've ever done, you set up a model. Here's a model Norwegian magnesium plant. You put people on it and you put materials on it and you put capital money on it. And you know what certain Norwegian labor costs are; they are public information. Then you turn the crank. Well, the Bureau of Mines never objected to the figures, but as I have said before, my biggest complaint against some people that I would work with at Kaiser Engineers, is they often haven't got any imagination. I mean, if the Norwegians won't tell you the cost, you're dead. Well, that wasn't so at all. You just have to set that model up, because all the information is there and you won't miss it 10 percent. The Bureau of Mines was not interested any closer than plus or minus 10 percent.

Swent: Why didn't Bureau of Mines do this with their own people? Why did they come to Kaiser for this?

Thompson: Well, they went to many engineering companies. This was a commodities survey of every thing you can think of. We got some of them.

Swent: But they have most of that information already in their files, don't they?

Thompson: Well, as a matter of fact, they didn't have. They really didn't have it. Some of this was extremely hard to get. Some of it, I figured, you stand a good chance of getting shot. I mean, I'd hate to go to Russia and say, "Hey, how much does it cost you guys to produce steel?" The Bureau of Mines didn't have the manpower. Not only that, they wanted it blessed by outside sources, which helps a lot in the credibility thing. That was the case of the magnesium thing. It was just a matter of doing what I had done over and over again.

Clients come to us--they've got this copper property, like in Argentina. And they want to know all the economics of producing this copper. Well, you set up a model. You set up a

James V. Thompson at DuPont Adit, Powderhorn, Colorado, 1970.

model of what this operation is going to be like. Then you just plug in the numbers. The greatest doubt in the magnesium study was just exactly how Norwegians charged themselves for their own power. If they charged just direct costs, that was one thing. If they had in their formula writing off the power plant, that was something else again. Now, typical of a socialistic government, they probably would not include the write-off of the power plant. All that was done with taxes and only the direct costs of power went into it. But we've got volumes of information on hydroelectric or any other kind of power.

Swent: What was their reason for doing this at all? Does America produce magnesium?

Thompson: Oh, yes. Dow Chemical Company produces magnesium. But the reason for wanting to know this had a strategic background. I think the real client behind the Bureau of Mines was the C.I.A. They just wanted to know the world-wide potential of everybody to, say, produce titanium metal or titanium pigments, or magnesium, et cetera. So, as I say, the real client may have been the C.I.A.

Swent: Just for information?

Thompson: Yes.

Swent: Did you go to Norway?

Thompson: No. Wasn't necessary. They wouldn't tell you anyhow. [chuckles] I've seen Norway from thirty thousand feet several times. I've been in Sweden, but I've never been on the ground in Norway. But it wouldn't have been any use going there, they weren't going to tell you.

Powderhorn Titanium Project, Colorado

Swent: What about titanium? Should we go to that?

Thompson: Yes. Well, I was talking about this property in Colorado that I followed down to just maybe the day before yesterday.

In Southwestern Colorado in Gunnison County there is a large alkalic stock and an associated carbonatite. Now, these are geologic formations and I've got two books on the subject. But the alkalic stock contains titaniferous magnetite and titaniferous augite and titaniferous mica, but it also contains

the mineral calcium titanate, perovskite. Perovskite is named for some Russian. Perovskite can be made into a titanium pigment.

Let me diverge here for the moment. In the titanium business, pigment is where the action is. Titanium metal has the glamor, but it's about a fifty-thousand-ton-a-year business, whereas titanium dioxide pigments are a million tons a year. So most titanium minerals go into pigment.

I first examined the Powderhorn deposit in 1951. It is near a small ranching community known as Powderhorn, Gunnison County, Colorado. I was working for Humphreys at the time. We had a good laboratory and I did some laboratory work on recovering perovskite from the ore. It was very fundamental work and time rocked on. Humphreys was very much connected with the DuPont Company because in Florida, Humphreys mined titanium minerals under contract for DuPont. I wrote about that in a recent E&MJ article [May 1987]. Well, we got DuPont interested in the property. The property has two distinct parts: the alkalic stock containing the titanium, and in the middle of that there is a big plug called a carbonatite. The carbonatite contains pyrochlor, which is a mineral of columbium, and it also contains apatite, a phosphate mineral, and barite.

Well, E. I. DuPont de Nemours and Company got interested in it and they sent Dr. Robert M. Grogan, who was DuPont's geologist, and later was president of SME of AIME. Dr. Grogan met me at Powderhorn and we got in the jeep and we started up one of the roads that went by the carbonatite. Well, Grogan said, "Let's stop and look at this." He never got any further. He was interested in the columbium and the carbonatite. He scampered up the hill through a small arroyo. He came back with several slabs of rock in which were imbedded little pyramids of pyrochlor. Grogan had just come from Africa for DuPont where he had been searching for columbium minerals. The chemical people call it niobium. The mining people call it columbium. Well, we took the rock down to the Colorado School of Mines research institute and we made an x-ray examination of it. It turned out to be pyrochlor. The film strips varied only slightly from African pyrochlor because of a small content of strontium in the Powderhorn type. Well, Grogan was ecstatic and we transferred the property. Humphreys never did own the property; we leased it. But representing the owners, we sold it to DuPont. DuPont did a magnificent job of exploration work on the carbonatite. They drove a long 365-foot adit into the mountain. I've got all this extensively documented in photographs over the years. They ran each carload of muck that came out of the little adit

through an automatic sampling plant. They developed a scheme for recovering the pyrochlor.

Well, about 1966, DuPont had a--like many big companies--had a dynamic about-face in company policy. DuPont had spent--the rumor has--hundreds of millions of dollars. I don't know anything firsthand. Had spent much money on exotic metals. They were going to go into titanium metal and columbium and they spent a lot of money on it. But they had this management reversal that says we're not going to do that any more. Their property people started disposing of property. At an AIME convention, I think it was in 1967, Dr. Robert M. Grogan came up to me and he says, "Jim, Powderhorn is up for sale."

And I says, "Well, I have a client in Kaiser Engineers that may be interested in this." So I contacted Buttes Gas and Oil Company of Oakland, Mr. John Boreta, president. He immediately bought Powderhorn.

Now, there always was a land problem in Powderhorn. Mining claims involved a great deal of the mining law of 1872 and the various hassles of placer claims versus lode claims. I became something of an expert in mining law because I had to. So Buttes bought the property and they paid $500,000 for it. I know that this was all cash in one piece. Well, when I first went back to Powderhorn after we had made the deal with DuPont, why, there was an old-time claim-jumper who had given us trouble for years. His name was Aaberg, a Norwegian name. The locals called him A-berg. But he camped on the property and he had been fighting with the other people from Minnesota who owned the property when Humphreys first came in, and he was still there. He was a notorious claim-jumper. He would form companies and he was always a swindler. He particularly loved to swindle Texans and church groups. Well, if it was a Texas church group, that was a double whammy. But anyhow, he swindled a guy in Austin, Texas, an oil man. His name was Hill.

I got on the phone and I called Mr. Hill in Austin, Texas. I says, "You don't know me, but I'm a registered engineer and a land surveyor in the state of Colorado, and Mr. Hill, you don't own anything at Powderhorn." I didn't get any play back from the other side. I said, "Now, you're in the oil business. You may even have a land department of your own. If you don't, you've got consulting land men. Why don't you go to the court house in Gunnison County and you'll find out that this man Aaberg doesn't own anything."

The guy said, "Thank you." And that was the end of that.

About three weeks later, he calls John Boreta and he wants to lease a big part of Powderhorn for mica. Aaberg had swindled him into believing you'd make mica a commercial product. I've studied that many times and mica is not all that hard to come by. Hill built a mica plant on the property, something that looked like a mica plant. Well, John Boreta, with my help, we wrote a contract for this guy. We excluded every mineral under the sun, except mica. Gold, petroleum, everything was excluded. Mr. Boreta says the price will be $500,000. That's exactly what he paid DuPont. Hill paid it. John showed me the checks. He paid it on two banks, $250,000 each. I handled the paper. So Buttes got the property for free. Aaberg did two years in the slammer for swindling Hill and others.

Well, why would Hill do this? From now on, this is speculation. But I figure that one day at the petroleum club in Dallas, Mr. Hill was having a drink with a bunch of petroleum cronies. Business was always done on an informal way, you know. "I'll take an eighth of that," and no paper was exchanged. And I think Mr. Hill had sold various cronies at the petroleum club on a piece of the fabulous action at Powderhorn. If he had taken their money and drilled a dry hole, they wouldn't have said a thing. But taking their money for a property he didn't even own would have gone awful bad for Mr. Hill. That's why he put up the $500,000 dollars to Buttes. He built the mica plant. It ran four hours and never turned another wheel. Of course, he turned the property back, $500,000 poorer, but his reputation at the petroleum club was saved. I'm adding a narrator's license to some of this. But something like that must have happened. Because you wouldn't part with that kind of dough if there wasn't something at stake that was very painful for him.

But later, a friend of mine in the junk business in Grand Junction came in and bought the mica plant. In the meantime, Buttes paid the company that Hill had founded, it was called Ti Inc., he paid them $35,000 for a quit-claim deed to get all these totally invalid claims off his back. The guy that staked these claims was a hireling of old Aaberg and he was so stupid, he put claims on patented land. He overstaked our patented land with lode claims. We had patented placers. Well, I think in his ignorance he may have thought that a lode claim was somehow more sacred than a placer claim. This is only true when both of them are in the location stage. After they're patented, well, forget it. But if there is a lode within a placer, that lode carries precedent. But this is before it's patented. Well, we paid him the $35,000 for a quit-claim deed. I screamed bloody murder about that because I says, "Why are you paying a guy for something he doesn't own?" I think by that time John was feeling a little tenderly about that $500,000 bucks. [laughter]

He wanted to pass a little of it back. Anyhow we got rid of that guy. But I had had trouble with him back in the 1950s. But, you know, in the end old Aaberg did the decent thing; he died. [chuckles]

Swent: A wealthy man?

Thompson: No. He was always kind of a bum.

Swent: So did it turn out to be a good titanium mine?

Thompson: Let's go on with the story.

After that, we spent a lot of money and research at Hazen Research in Golden, at various places. The Bureau of Mines took on the project. Most of this research wasn't in mineral dressing to recover perovskite; it was in converting perovskite to pigment. And Hazen, with my coordination, developed a hydrochloric acid leach that worked very well. The Bureau of Mines developed a sulfuric acid process that worked very well. Now this perovskite mineral carries 1.5 percent rare earths. And all the rare earths are present, all of the series. In addition to that, it contains yttrium, which is usually classed with the rare earths but is not actually a rare earth. It contained a half a percent of columbium, in the concentrates.

I made several economic studies, again, setting up my model. A model operation in pricing it out. My model operation was based on sixty thousand tons per year of pigment which would be some million tons a year of ore and so on and I priced all that out. My figures always showed that if you didn't recover the rare earths, it was certainly marginal. But the Bureau of Mines after they completed their studies on the sulfate process--. They have a group known as risk analysis or something like that, but anyhow they do economics. The Bureau of Mines claimed that Powderhorn could stand on pigment alone. I'm still not convinced of that.

Well, many, many people looked at Powderhorn. Many of the big mining companies looked at Powderhorn with an idea of becoming involved, and several got to be pretty hot prospects. One of them was Anaconda, but Anaconda was only a few years away from oblivion. Things in Anaconda got worse by the day. Another one that was very much interested in it was Cleveland Cliffs, because the mining and milling of perovskite had in it everything that Cleveland Cliffs knew how to do. And they were interested. But the chemical part gave them trouble.

But nobody did anything until about two years ago when Teck, Incorporated, of Vancouver, came along. Now Teck is a

very large Canadian Company; not only that, rather a feisty one. Teck comes along and buys a controlling interest in Consolidated Mining and Smelting Company. Just sheer guts. That was owned by the CPR, the Canadian Pacific Railroad. Well, that was about like going to Rome and buying the Vatican. They're very courageous people. So they have gotten interested and they have signed a contract. They are proceeding. They have done a lot of additional drilling. And their drilling that they've done only increased confidence; it's not going to increase the size of the ore body, because the ore body is very well delineated. But they did a lot of additional drilling this summer, in 1990. They've done a lot of addition mineral dressing work and they have been very successful in one area where we didn't do so good. They have developed a flotation process. We always recovered perovskite by gravity and electrostatic means and magnetic separation and so on; we knew about the flotation scheme and we did some flotation tests. But I had one objection to it; it puts chemicals in the water. And nowadays you're going to have enough environmental problems at Powderhorn anyhow. Only five miles away there is a wilderness area. So, I kind of downplayed it. I never did price out a plant with flotation. Another thing was, it would require finer grinding.

But Teck, through a Canadian--I guess it's Lakefield Research--in Canada are doing great things in flotation. They are getting about a 50-percent recovery of the chemical titanium. Now, you've got to stop here a minute and understand something. All mineral species in this deposit contain titanium at the molecular structure, the gangue minerals included. Well, no amount of grinding will grind down to molecular size. So what you have to do is think of recovery in terms of perovskite. Now, 50-percent recovery of all the chemical titanium contained is going to be about a 90-percent recovery in the perovskite. That's big news. And that's what counts. It kind of relates to iron ore on the Range. The Iron Range has always talked about weight recovery, in the old days, plus 51.5 percent iron.

Swent: And this is where Cleveland Cliffs was operating?

Thompson: Cleveland Cliffs knew all about the iron business. If you looked at any iron ore operation and measured recoverability--I'm talking about the old-time wash-and-jig ores, not the taconites--and measured recoverability on the basis of total chemical iron, some of the best of them would have been producing 35 percent recovery. Because they threw away enormous tonnages of paint rock and cherty ore and all containg iron. Everything had iron in it, but everything wasn't 51.5 percent. But you had to look at Powderhorn in the same way. Any time someone got tangled up with total chemical recovery they would

walk away from the thing. Well, that's the wrong way to look at it. The right way is weight recovery at plus 50 percent titanium dioxide. And if that recovery makes a profit, forget about unit recovery of chemical titanium. It didn't mean anything. Well, Teck grabbed that idea much quicker than anybody else did. Some people never could see that. Cleveland Cliffs could see it, but they had been in the iron business and the thing was a parallel situation. All of the tailings or waste rock, stripping waste, on the Iron Range contained enormous quantities of iron. But it just isn't ore, nor could it be upgraded to ore. But we think if anyone is going to go ahead with Powderhorn, the Teck people are it. It's a funny thing. Years ago I predicted the only people with the guts enough to go into titanium at Powderhorn are going either be Canadians or Australians. And that's the way it turned out.

I still represent Buttes and I'm going to go to the AIME, the SME meeting in Denver in March of 1991 and plan to hold a meeting with the Teck people at that time. Kind of a round-robin discussion of progress.

By-Product Gold Recovery from a Gravel Plant##

Thompson: About in 1985 I got a call from Granite Construction Company. Granite Construction Company is the fourth largest construction company in the United States. They're exceeded only by Bechtel, Peter Kiewit, and Morrison Knudsen. And this rating is in terms of assets, not work on the books. They own quite a few sand and gravel plants. They are in the readymix business and they take a lot of freeway contracts, construction contracts, public-works type of contracts. They've built quite a bit of the Central Valley Canal, the big water project that takes water to Los Angeles. About 1985 I got a call from a Mr. Randy Kremer who wanted me to give them some help in by-product gold recovery.

Swent: Was this through Kaiser?

Thompson: No, I was independent then. This was independent consulting in 1985.

They were planning a new plant in the Sacramento area, sand and gravel and readymix cement and a hot-mix plant where they made asphalt paving materials. This was known as the Bradshaw plant in Eastern Sacramento, well out into the east there. All these gravels in that area contain a little gold. What they

would do, they screened at a quarter inch and treated the minus-quarter-inch for gold recovery. You don't have to worry about any big nuggets and the quarter-inch is a feasible screening size. Well, at their Perkins plant, which they were abandoning off Power Inn Road, they had used riffles. And in the riffles they had placed metallic mercury. And while they have never been jacked up on this they realized it was a no-no and in the new Bradshaw plant they ought to play it safe.

Well, I got in right at the beginning. I supervised the taking of the samples. They were huge samples. I sent them to Hazen Research. We did the recovery work. I then designed the plant and specified the machinery and helped them start it up. I also did other work for Granite at other plants, but the Bradshaw plant is the most important.

Swent: This was a plant specifically to produce gold?

Thompson: The plant is specifically to produce aggregates. The minus-quarter-inch is where they treat for by-product gold. Well, we put in some three stages of jigs. Followed by a magnetic separator of my own design to remove the so-called black sands which are magnetite and they're not gold bearing. I wrote the magnetic separator up in Engineering and Mining Journal for June 1989. The final product at the aggregate plant is a third-stage jig concentrate with the magnetite removed. That reduces the bulk of the jig concentrate by about a half. This third-stage jig non-magnetic material now runs about one ounce in gold. Though there were only a few thousandths like .005, though it varied over a wide range, ounces in the minus-quarter-inch. Well, this concentrate is now up to stealable grade, about an ounce per ton. So we designed and built a three-stage table plant to further concentrate the gold. By now, you're getting so that you can see a streak a half an inch wide of gold coming across the tables. We then take that table concentrate and amalgamate it in an isolated place. The refinery amalgamation part is adjacent to the table plant, but totally isolated. So the waters from the refinery, which are not of large volume, go through several traps before they're discharged so that we don't get any mercury into the environment. All together, I guess I made fifty or sixty thousand dollars out of that job. And as I say, I did others.

It's interesting to know how Granite got on to me. A former employee of Kaiser Engineers by the name of Rex Guinevere went with Homestake to be a vice president in charge of engineering while the McLaughlin plant was being built. Well, Granite--in this way, very similar to foreign operations, when they wanted to know something about gold, well, you go to a gold

mining company. Thought never entered their head to go to an independent engineer or an engineering company. Well, Rex recommended me and that's how it all got started. I remember when the Mexicans wanted to build a steel mill. Who did they go to? They went to Kaiser Steel, not Kaiser Engineers. Foreigners never think of engineering as a merchantable thing.

But at any rate. It was a happy ship. I examined several other operations that never had sufficient gold, but I also got involved with two other plants around Sacramento. Unfortunately, I got involved after the plants were built, because they were all full of mistakes. The one we built at Bradshaw for Granite just works like a top. But these other people had done various dumb things before I consulted for them. In fact, one of my magnetic separators that was developed for Granite went into the plant of Pacific Coast Building Products Company owned by a wealthy man in the Sacramento area.

Then another plant that I did some work with and helped it a lot in a little change in the flow sheet, was Sacramento Aggregates. So those were interesting jobs.

Do you have any questions on the gold jobs?

Swent: I think it is interesting that we used to think, probably, of aggregates as a by-product of gold mining, but now they're producing gold as a by-product of gravel.

Thompson: Well, the Bradshaw plant puts out about twelve thousand tons a day of aggregates. It's really big.

Swent: It's a big business.

Thompson: And about twenty-five percent of that goes through the gold recovery section.

But later on, in fact just this past year, I got called by two operators in the Mother Lode county who mine serpentine rock for aggregates. Now, both of these are poor-boy jobs. They're nothing fabulous. They crush and size serpentine and sell it for road dressing where pavement isn't involved, country roads and parking lots where they're not intended to be paved. Well, all of California serpentine contains asbestos.

The EPA [Environmental Protection Agency] got up on its high horse about asbestos in these road dressings. They came up with some ridiculous conclusion that if a certain person of a certain age sat by this road for seventy years and an automobile an hour went by, he had a five percent chance of dying of

cancer. It was ridiculous, and of course they know it's ridiculous. All of this goes back, I think, to what is known as the Delaney Act in Congress. That anything that is shown to be carcinogenic must be removed. So they're trying to shut down these quarries.

The state air pollution people have set up an arbitrary standard of 5 percent asbestos in the rock. Now asbestos is awful hard to assay. The method used commercially is to measure the width of stringers over a sixteenth of an inch wide over six feet, or some such figure, add those all up and with a little formula you convert that to percent asbestos. Well, the method the EPA and the air pollution people have come up with to me is quite ridiculous. They take the sample and grind it to 100 percent through 200 mesh and then make a microscopic slide and count fibers. Then the assay that they give you is totally ridiculous. No businessman could possibly live by it. The assay will come back 5 to 10 percent. Well, if the limit is 5 percent, how does a man know where he stands?

So, in the hearing held before the county commissioners in Placerville (and the EPA and air pollution board people were there), I squawked loudly about the assay method. For one thing, why not go back to the method used commercially, which has been pretty good. Milling results checked it. Five percent is the lower limit of commercial asbestos ore. So why not go back to that method? My claim was, well, if you don't do that, then only grind to the mean length of the fibers, twenty mesh. Grinding to 200 mesh is making more fibers. It's similar to the guy that says, "The rat population increased 30 percent." How do you know you didn't count the same rats twice? [chuckles] I couldn't see that method. If you're going to use the point count method, counting fibers, limit your grind to the mean width of the stringers. Incidentally, the stringers are a result of weakness, and minor internal faulting always occurs along these stringers of asbestos. Smears the asbestos along the slickenslide. I've got a rock out there in the patio that I picked out of one of the quarries that shows that. Well, the way we left it was that officially, we protested the analytic method and the powers that be said, well, they'll take under advisement. Which means they'll stall.

But I just couldn't see how any businessman could accept that kind of assay. Suppose you were buying lead concentrates at the smelter and the smelter says, "Oh, this runs between 50 and 60 percent." You just can't take that kind of stuff. But again, I enjoy it. That's been quite recently. The people involved are nice; they are small-timers. I also asked if there was one shred of medical evidence that anybody in the state of

California outside of a commercial asbestos plant had ever been bothered by asbestos in serpentine rock lying on the road. Well, there isn't any such data. You know, there were a couple of asbestos plants in California making short-fiber asbestos for transite pipe. But that's been outlawed and so on.

Swent: There are lots of different kinds of asbestos, also, aren't there?

Thompson: Yes. But the ones we have in the serpentine in California are the "baddies". So far as I know, they're the bad ones.

V WORLD WAR II: PRISONER IN THE PHILIPPINES

[Interview 3: 24 April 1991]##

Working for Baguio Gold Company

Swent: We're going to talk today primarily about your experience in the Philippines, which we didn't touch on in depth before. And this was your first major job out of college, wasn't it?

Thompson: Yes, I graduated in late May of 1940, and I went to the Philippines on a ship. It was a Japanese ship, the 17,500-ton Nita Maru, and it was on its return maiden voyage to Japan. On the trip over, I met my wife, Marie, and we were married in the Philippines a year later. But I worked a year in the Philippines, bachelor status, and I worked for Baguio Gold Mining Company. I have written about the Baguio Gold Mining experience in Skillings' Mining Review for December 3, 1988.

Baguio Gold was a more or less conventional underground gold mine in the Philippines, having about the average grade of ore. It was one of the smaller mines; we had nine or ten expatriates on the staff. And on July 8th in 1941 my wife and I were married in Baguio, Philippine Islands.

Swent: Baguio is an American company, is it?

Thompson: Baguio Gold Mining Company is--or was--a publicly-held stock company. It was incorporated in the Philippines but otherwise didn't have much nationality. The president was a Dutchman, and ten of the staff were Americans, with one Canadian. There were a few high-ranking Filipinos on the staff. The business manager was Filipino, and the master mechanic was Filipino. But it really was--you could hardly pin it down to have any nationality. Probably the majority of stock-holders were Americans, probably resident in the Philippines.

It was a profitable company. The stock paid four cents a year dividends. Now that doesn't sound like much, but the stock sold for sixteen cents. So that was a twenty-five percent return on your investment. Most stocks in those days were penny stocks.

Swent: I think you said you had a connection--that your uncle worked there?

Thompson: Well, my uncle was in the army, Colonel Louis H. Thompson in the army in the Philippines, and he used to go to Baguio on vacations. Baguio is a high-altitude, cool place, the country club, golf course. The military had a country club post there, and the high commissioner to the Philippines had a residence. And my uncle would come up there and he'd met Ward Graham, who was the general manager of the Baguio Gold, and they got into a conversation. He mentioned that he had a nephew that was graduating as a mining engineer from the Colorado School of Mines, and he would be looking for a job, and Ward Graham said, "Well, send him over."

Incidentally, I didn't have a contract. I went to the Philippines at my own expense, or rather, my mother's expense. Contracts were beginning to be phased out about that time. There were a lot of expatriates in the Philippines without contracts. It was just getting to the point where it was hardly necessary any more. The people were there and that was it.

But the war started on December 8th, not 7th. Pearl Harbor was December 7th, but the International Dateline made it December 8th in the Philippines.

8 December 1941, Japanese Invasion

Swent: Did you have any anticipation of this?

Thompson: Well, not really, not really. We were--the entire country, ourself, and everybody else were kind of overconfident. We just couldn't conceive of such a thing. But the Japanese made landings on that very day. And the morning of the 8th, they bombed, kind of a small-scale bombing of Baguio, only a few hundred-pound bombs. It didn't make any particular mark on the area.

The Japanese started the invasion of the Philippines and it was primarily an infantry invasion. Now the reason I'm saying

that, I am going to tell you some things later on that have a profound bearing on recent history. The Japanese had a few light tanks, but it was essentially an infantry invasion--unopposed landings, and ultimately, they crowded American and Filipino forces into the Bataan Peninsula on the north shore of Manila Bay and the anchor fort of Corregidor Island. And of course, they lasted until April, and the rest of that's history. But we were rounded up. My wife--

Swent: I'd like to be a little more specific. Where were you actually, when these bombs fell?

Thompson: Well, we were in the mining camp. We were in the Baguio Gold camp where we had staff houses.

Swent: Were you in your house?

Thompson: Oh yes, I was in the house, but the bombing was some distance away--eight, ten kilometers away.

Swent: Did you have radio communication with anybody that told you what was going on?

Thompson: Well, there was the radio. We had radio, and we had stations in Manila. But the Japanese immediately crowded those frequencies with Radio Tokyo. So almost anywhere you turned, you picked up Radio Tokyo. That was a highly distorted--well, there was more truth in it than we like to remember, but it was nonetheless kind of a distorted source.

Swent: Because otherwise, if you just heard those booms eight kilometers away, you wouldn't--

Thompson: Now that, we heard it immediately on the radio.

Swent: That it was the Japanese?

Thompson: Yes, we were just getting up for breakfast. We heard it immediately that Pearl Harbor had been bombed, but the final defeat of American forces was in April. The women and children all around the vicinity of Baguio, out at the mines, as far away as forty kilometers, came into Brent School, and more or less self-interned themselves, feeling that it was safer to be in numbers than to be caught individually.

Self-Internment of Women and Children at Brent School

Swent: Who was the boss of all this? Was there a leader in this?

Thompson: You mean among the American people?

Swent: Right; who were you taking orders from?

Thompson: That developed later and I'll tell you about it. They gathered at Brent School, which was an Episcopal church school maintained for American and British children all over the Far East. People in Shanghai and Hong Kong, expatriate British, American, and so on, Canadians sent their children to Baguio for school. It was a very pleasant climate compared to a rather miserable tropical climate elsewhere in the islands.

Well, the women and children gathered there, but it wasn't until about February 2nd that I was rounded up. In fact the Japs didn't invade Manila, didn't invade Baguio until somewhere mid-early January.

Closing Down the Mine

Swent: What were you doing in the mine?

Thompson: Well, we were in the process of closing it down. We closed it down.

Swent: Did you hide the machinery?

Thompson: No, we didn't make any attempt to do that. We had a large fuel oil tank, and we emptied that into the river, which was--the environment hadn't been invented in those days. Nobody considered that to be any great crime. We didn't want the Japanese to get all that fuel oil, not that it would have made any difference in the outcome of the war, and we cleaned the presses and melted the bullion we had on hand.

Swent: Were you working as a metallurgist?

Thompson: I was mill foreman. I was mill foreman at the Baguio Gold Mill, the all-slime cyanide plant of the Baguio Gold Mining Company. Well, we decided that only one person--we were caught with a month's bullion on hand, and we refined it to what we call "cones," which were gold of about 750-fine, and the rest was

silver and copper and base metals. But we didn't finish it all the way to our usual 900-fine gold bricks.

We decided that only one of the staff members should hide the gold, and that was Frank Delahunty, class of 1925 of the Colorado School of Mines, now deceased. In the dark of night, Frank hid the cones--he told us this a couple of years later, while we were in the concentration camp--hid some of the cones--these cones weighed about 1,000 ounces. And he buried some of them in the pre-mix flux box, which was a rather large bin, flour-bin type of thing, in the assay lab, and he threw the others into the agitator. In time, when the mill was shut down, the pulp and the agitator would clarify, and the solids would sink to the bottom, and the cones would be buried.

Well, as it turns out (and this is some of my rhetoric from articles I have written), in the Philippines, the night has a thousand eyes, and the gold was found by the Filipinos before daylight came. [laughter] So that was kind of a false effort.

I wrote another story about another mine, that threw their gold down the shaft, and pulled the pumps, and the shaft soon flooded. But that's another story.

Internment at Camp John Hay

Thompson: I was rounded up, as were the rest of the men at Baguio, in early February, and by that time, the Brent School people had been moved to the barracks at Camp John Hay.

Swent: Did you have children?

Thompson: No, no, we didn't have any children. No, we'd only been married less than six months. Remember, it takes nine months.

Swent: Did you make any contingency plans for communicating if you might be separated?

Thompson: Well, no, we just didn't know what to do. But at any rate, the people had been moved to Camp John Hay, which was a U.S. Army post, and the troops there were Philippine Scouts. And you have to know what Philippine Scouts are. Philippine Scouts were different from the Philippine constabulary, which was a police force, and later a part of the Philippine army. Filipino Scouts were Filipino soldiers in the United States Army, always stationed in the Philippines. They were officered by American

officers, who were Philippine Scouts officers, and they were always stationed in the Philippines--no rotation to the States, except to attend various service schools: the artillery school, the infantry school, and so on.

Camp John Hay had two companies of Philippine Scouts. they were Igorot companies. I think one was a Bontoc company, and the other was an Ifegao company. Igorots are mountain people--very colorful and very primitive. One of the main things the Philippine Scouts did at Camp John Hay was put on native dancers for the benefit of vacationing officers from the lowlands. Officers came to Camp John Hay to get out of the heat of Manila, Fort Santiago, Fort Miles, and places like that...Cavite.

Well, we were moved from Brent School (this is only a mile or two away) to Camp John Hay. I never was in Brent School. I arrived with the rest of the men from Baguio Gold at Camp John Hay.

Swent: Were there Japanese soldiers?

Thompson: Oh, yes, the place was guarded by--it was entirely a Japanese deal by then. The Igorot company simply disbanded and took to the hills, and became tribesmen again. They just vanished.

Swent: How did the Japanese actually come into Baguio?

Thompson: They just marched in.

Swent: There was no resistance?

Thompson: No, there was no one putting up any fight. They just came up the mountain trail, which was the main highway, and into Baguio. They had some trucks and other vehicles, but there was no fire-fight or anything.

Swent: Did they mistreat people at that point?

Thompson: Well, there was a peculiar situation in Baguio, which accounts for some of the consist of the people interned. In Baguio there was a Chinese language school. And this Chinese language school was run collectively for missionaries coming out to go to China. There must have been fifty or sixty families in Baguio, missionary families that were studying Chinese at this Chinese language school. In addition to that there were a scattering of local missionaries. So this made the consist of the Baguio internment group about one-third church people, even a little more than that because of all these people who were temporary residents in Baguio going to this language school.

The Japanese distrusted that language school. They thought it was a spy training center, though they got off that kick after a while. They pushed a few people around, but sooner or later they were made to understand the nature of it, primarily when more intelligent Japanese showed up. The initial group of course were peasant infantrymen Japanese. So that was one reason why the consist of the camp was about one third missionaries and their families. But we didn't stay at Camp John Hay very long.

In April about the same time the Bataan and Corregidor fell, we were moved to Camp Holmes.

Swent: Were you separated from your wife by this time, or were you still together?

Thompson: We were separated. After all, it was barracks living. So to preserve the niceties, you almost had to separate the men and the women, but that changed later on. But not by any great distance.

Swent: She went to the school. Did she go with that school group at first?

Thompson: Yes, yes. All the women went up to the school shortly after the 8th of December. Probably pretty much around Christmas.

Swent: And then in February you were--

Thompson: And early in February we were brought to Camp John Hay, and in April the whole bunch were moved to Camp Holmes. Camp Holmes was outside of Baguio about five kilometers.

Swent: Now all this time did you have to provide for your own food?

Thompson: No, no, we brought in--everybody brought in all the canned goods they could haul. And those canned goods were dumped into a common kitty. The canned goods were pretty much saved for the infants, and sick people, and old people who had special dietary problems. But we had a lot of vegetables, and some meat provided by the Japanese, who simply went out in the countryside and stole it. That was all there was to that.

Camp Holmes

Thompson: Camp Holmes was a Philippine constabulary camp. Now the constabulary were the national police of the Philippines, and they were a military organization. The constabulary was established in 1904 or thereabouts, and its officers were U.S. Army sergeants that remained in the Philippines. One that I knew quite well, Colonel Dosser, a colonel in the constabulary, was a corporal or a sergeant in the army in the early 1900s. But the Philippine constabulary was a police group, and just before the war they were merged with the Philippine army, which was a mistake. But that's neither here nor there. The constabulary was a much more competent bunch of people.

This was a constabulary camp, and it had three barracks buildings. It had two two-story barracks buildings, and one one-story barracks building, and some outside houses which had been former offices and officers' quarters. That's when we began to get fairly well organized. The Japanese did not come very often into the compound. You could have walked out of that place anytime you wanted to. They had a guard post at the entrance, and for a while, they patrolled the perimeter, but they got too lazy for that after--you could have walked out anytime you wanted to. But there was no place to go. You were a lot better off staying where you were.

Swent: Did you take any possessions with you from your house?

Thompson: Oh yes, you took clothing, and took everything you could wrap up in a sheet and a bunch of pillow cases, and any canned goods, and whatnot.

We established a hospital in one of the buildings--

Swent: Going back to your dumping all your canned goods into a common pool, and deciding who got the best food. Who made this kind of decision?

Establishing a Camp Government

Thompson: Well, I was about to tell you that. We had an elected committee. We had an elected committee, elected by popular vote. I think there were five committee members, and one was chairman. The chairman rotated I think every three to six months or something. We elected committeemen, and these

committee people were--some were the more forceful among the missionary group. One was the local Protestant preacher who incidentally married Marie and me. We saw him a couple of years ago.

Swent: Now this committee emerged--when did that begin to function?

Thompson: Well, actually, it started at Camp John Hay. It started from the very beginning.

Swent: Even before December 10th some leadership must have emerged.

Thompson: Elmer Harold, who was head of the local lumber company--I mean the leadership kind of fell to the people who were executives and leaders in the community. Ward Graham, the superintendent, the general manager of our mine, he was on the committee; and Lewis Robinson, the general superintendent of the Itogen Mining Company, he was on the committee; and Carl Eschbach, the pastor of the local Protestant church, was on the committee, and people like that.

Nellie McKim, who was a Japanese missionary, that spoke fluent Japanese. She was always on the committee, and the principal interpreter. The Japanese had respect for her that almost amounted to fear. They couldn't quite understand a woman in authority, particularly one that spoke perfect Japanese, and was obviously herself not Japanese. So that was the committee structure, and those are the people that organized things. But the organization really started to click after April 1942.

Swent: Were there any American army people there?

Thompson: Not that the Japanese knew about. There was one guy that was an enlisted man in the army, who stayed with us the full time simply because nobody squealed on him. What his job was, he was really the caretaker at the high commissioner's house in Baguio. And not much of a threat to the Japanese militarily. As a matter of fact, I don't think many people knew that. I mean, I think people knew he was a caretaker at the high commissioner's house. They didn't realize he was an enlisted man in the army.

Swent: Were there any U.S. government officials, the consul or anyone like that?

Thompson: No, no, they wouldn't have been kept anyhow. If they were consul officers they wouldn't have been kept anyhow. But there were about five hundred people.

Swent: Were there any people of other nationalities? Dutch or German or..?

Thompson: There was a scattering of British. And there were two or three Belgian brothers; a Catholic order of Belgians in Baguio that ran the printing plant in Baguio. That was the way they supported their missionary work. And the missionaries went the whole gamut, from Catholic through every denomination you could think of. A third were missionaries, a third were people from the mines, and a third were businessmen from Baguio. There were a few people who just got caught there on vacation, and some old retired people that had been in the Philippines for years on end. And that made up the total consist of about five hundred people.

Work Assignments

Thompson: The thing was organized so that unless somebody was sick and in the hospital, there was a job for them to do two or three hours a day. If nothing else, the rice that the Japanese brought in, in very large gunny sacks, was always full of rocks. So the rice was spread out on the table in the mess hall in the morning, and women with nothing else to do picked the rocks out of the rice, and they gossiped and chewed the fat; you know, it was kind of a social event. So if you had nothing else to do you could do that.

We had a hospital. Our principal ailment was a nagging diarrhea-dysentery. We actually had that under pretty good control. That wasn't really something that--nobody ever died from it. We had about a half a dozen or more doctors, and a few nurses. Oh, one military person was Second Lieutenant Ruby G. Bradley, Army nurse from Corregidor. The army sent her ashore, and she went up to Baguio to Camp John Hay. I saw Ruby in 1989 at a reunion, and she is a retired major.

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Thompson: She led a full career in the army. So we had a pretty good hospital.

Swent: What was your wife's training?

Thompson: Oh, Marie graduated from Drake University in Iowa with a teacher's diploma. Bachelor in Education.

We organized church services. At first the Japanese didn't want to allow that, but sooner or later we had church services.

Organizing a School

Thompson: And we organized a school. We had--you remember--the population of this camp was straight across the board percentage-wise of Orinda or Lafayette. There were babies, there were teenagers. The population had the normal spread. So we organized a school, and we got equipment and textbooks, and a little laboratory equipment out of Brent School--the Japanese let us go get that. We set it up in one of the buildings, and we had a school, and I taught chemistry. And every one of my chemistry students were admitted to college on my credits.

Swent: Wonderful.

Thompson: One even to the Colorado School of Mines: Buck Parfet, graduated in 1949, and he was one of my chemistry students. When the school challenged his credits in chemistry, he says, "Well, it was taught by a graduate of this school." So that was the end of that. Mind you, they had to be somewhat lenient in those days.

As I say, we had to cut wood to cook with, and there was a lot of trees on the hillside adjacent to Camp John Hay. There was the wood crew, and the garbage crew, and the school teachers, and the hospital crew. Everybody had a job, unless they were sick.

Swent: What was your water source?

Thompson: Camp Holmes had a water source. To begin with, the barracks buildings all had galvanized iron roofs, and there was a system on the roofs of all buildings in Baguio, even private homes, to collect rainwater. There was also a stream source up the valley that water was piped in, but these rainwater cisterns were quite large. Even our house at the mine had a rainwater cistern. For one thing, what happens--the Philippines is a slash-and-burn country, where the natives burn the ground before they plant camotes and other crops. When the rains come, and they start to wash this ash into the water supplies, the ash starts to run high alkalinity from potash and the ashes. And this can be unpleasant, and that's why everybody kept a rainwater system. The rainwater was quite soft, great for washing your hair in, and I don't think that there was any building anywhere that

didn't have a rainwater tank. Mind you, it filled after the first rain usually, because the first rain you took the spout out because you wanted dust to get off the roof. It was the second rain that you put the spout back in the tank.

In September of 1944, we saw the first return of any evidence of American forces.

Swent: You went in there in April 1942.

Thompson: We went in--actually, I went in in early February of 1942. Marie was there three weeks before me, sometime in January of 1942.

But this was simply an air strike, from carrier aircraft that flew across that part of Luzon, and attacked the Japanese oil storages on the Lingayan Gulf. Now if you've got twenty minutes, I'll let you listen to tape that describes that period from then on, from December 28 until the liberation. Want to listen to the tape?

Swent: Sure. I'm confused, because you jumped up to 1944.

Thompson: The rest of that time was simply this everyday organized activity. I mean school, and church, and picking the rice, and cutting the wood, and tending the hospital. I mean nobody had time on their hands, there was a job for everybody.

Swent: Did you get any contact ever at all from the Americans?

Thompson: We got one Red Cross shipment that came up from Manila, and that was it. There was a Red Cross shipment that came in on a Swedish vessel or something to Manila, and the Japanese with some guards and some of our people let us go down to Manila with a truck and bring back this one shipment.

Swent: How did you know it was there?

Thompson: Why, that was pretty common knowledge. The Japanese must have told us. I mean I don't recall it was any great secret that it was there.

Swent: Did you continue to have radio?

Thompson: I'll tell you that in the tape.

As I say, the period in between there was just exactly that: picking rice, teaching school, tending the hospital, cutting wood. Oh, the garbage crew was always--the garbage crew

had a wagon, and we pulled the wagon up the road to dump the garbage. There was where the garbage crew got a lot of contact with the Filipinos. They only sent one Jap guard, and he was usually kind of stupid. So the garbage crew people would talk to the Filipinos and get a lot of news, and frequently get little foodstuffs brought in. There were little packages brought in to people by Filipinos, and the Japs tolerated this for a while, but they ultimately shut it off.

Anyhow, we've got to get up to December 28, 1944. There really isn't much to fill in that time but to say we had an organized life, and nobody had time on their hands as far as something to do was concerned.

Swent: And you did have enough to eat most of the time?

Thompson: Well, we got down to a low of eight hundred calories a day. But we usually had about twelve hundred. Everybody one way or the other had a little extra grub. They had some of that--you hoarded that Red Cross shipment, which was mostly canned meats. You hoarded that very carefully, and a lot of people got in a little bit of stuff, and for a while we had a little store that sold--. I mean everybody had a little money of sorts, and it sold native things, like crystallized brown sugar, or something of that nature. But the lowest it ever got--and this wasn't many days--was around eight hundred calories. We raised a few pigs and a few chickens, and a few camotes. Camotes are a degenerate sweet potato. It is a degenerate sweet potato because it's inbred. It's quite a common starch food. It looks like a sweet potato or a yam. But it does not have the quality.

We knew a lot about what was going on, and in this tape, you'll find out how we knew it.

Swent: Okay, I think that we should just listen to that. Where did this tape come from?

Thompson: I made it. Of course, the content of this tape pre-dates this kind of tape recording. This tape is essentially a verbal presentation of an article I wrote. I wrote this very shortly after we came back from the Philippines, while it was fresh in my mind. We got back to the Bay Area on May 10, 1945, and I wrote this up that summer because otherwise it would slip your mind. It takes about twenty minutes, and I think you'll--

Incidentally, you'll pardon some of the rhetoric in this tape. It may sound a little corny. But in this tape there's a secret, and you'll find out what that secret was. The secret in this tape is why we won in Iraq. Listen to it.

[recording]

After graduation from the Colorado School of Mines in 1940, I sailed for the Philippines, to take my first job as a mining engineer for a Philippine gold mining company. My passage was by ship, booked for Yokohama, Shanghai, Hong Kong, and Manila. Those were the golden days of travel when getting there was fun and not a grind. The slow voyage by ship to the Far East was not uneventful. I met my wife-to-be among the passengers. The following year we were married in Baguio Mountain Province, Philippine Islands, but the honeymoon was short. Pearl Harbor was to come, the Philippines were invaded, the mines were shut down, and we were placed in a Japanese concentration camp.

We were first interned at Camp John Hay, a United States Army Post in Baguio, in January of 1942. Baguio lies about 126 miles north of Manila on the island of Luzon. In April of 1942 we were moved to Camp Holmes near Baguio, and on December 27, 1944, we were moved to Old Bilibid prison in Manila.

The Baguio group, numbering about five hundred men, women, and children, should not be confused with the people interned in the College of Santo Tomas in Manila. The Santo Tomas camp contained thousands of people, and is much better known because it was liberated first, and received better press coverage.

It is not the purpose here to recount the difficulty of life in Japanese concentration camps, but rather to relate the events that led to the liberation of Bilibid prison and the Baguio group by the armed forces of the United States. Little has been written about the liberation of Bilibid. It was not as spectacular as Santo Tomas, but it was an encounter with harrowing suspense. Bilibid, only a few city blocks from Santo Tomas, was not relieved until twenty-four hours after Santo Tomas, and during this period, the Japanese still held most of Manila.

When Bilibid was finally discovered quite by accident by a patrol in the Thirty-seventh Infantry Division, we became shockingly aware of the fact that the U.S. Army intelligence did not know the Baguio group had been moved, and furthermore did not know that Bilibid contained about eight hundred military prisoners. If such intelligence were available, it was not in the hands of forward commanders, because if it were, Bilibid would have been relieved at the same time as Santo Tomas.

It was the policy of the Japanese to keep the internees totally uninformed about the events of the war. For the first

Hospital at old Bilibid Prison, Manila. Through this gate the Thompsons walked out in freedom escorted by the U.S. Army, 5 February 1945. Photograph taken January 1968.

six months they would let us listen to broadcasts from Tokyo outside their guardhouse, but as the fortunes of war turned against them, they discontinued even this distorted source of news. However, they were unable to keep from us the news of major events of the global conflict. Until we were moved to Manila, some were able to get a note from a Filipino now and then, and from time to time an English-speaking Japanese guard officer would drop some war news. Until the summer of 1944, there was a hidden short-wave receiver in the camp hospital, but it had to be destroyed because of increasing Japanese surveillance.

While still at Camp Holmes, in September of 1944, we saw the first evidence of the return of United States forces to the Philippines. One clear morning, we saw a flight of aircraft coming low over the mountains to the east, and streaking for the west coast of Luzon. They were clearly marked, but we did not recognize the markings. The last United States aircraft we saw in 1941 were marked with a blue star, with a red dot in the center. The new marking was the present two white bars on either side of a white star. The change of insignia was just one of the many small details we did not know about. However, a lack of identity lasted only for a moment. From the parade ground in Camp Holmes, elevation about five thousand feet, we could see a strip of the west coast of Luzon. As the black smoke rose from the coast, and the dull "whump" of bombs could be heard, we knew that the Japanese oil storage facilities on the coast were under attack.

Transfer to Bilibid Prison, Manila

Thompson: A few days after Christmas in 1944 the Japanese informed us that we were to be moved to an undisclosed location. Many feared that it would be Japan. At this late date, we doubted that the Japanese were able to get many ships past United States submarines, and an unmarked ship would surely be sunk. At the time we did not know how tragically real this speculation was. It was a time for prayer, and many prayed, "Oh God, be with us on this journey to an unknown destination. In Jesus name. Amen."

On the morning of December 27, 1944, we were loaded tightly into Japanese army trucks, permitted to take only a few of our meager belongings, and started on a journey to an unknown destination. It soon became apparent that our destination was Manila. Progress was slow, and there was little opportunity for

personal relief. About noon, the convoy was halted at Binalonan in Pampanga province north of Manila. The women and small children were told to cross the plaza and go into a convent building. The older boys and men were told to dismount and line up along the street. At first it appeared that we were to be separated and perhaps the men sent to Japan, or executed on the spot. No one openly spoke of this at the time, but the thought must have occurred to many. After about forty-five minutes, the women and children, who had been given some refreshments in the convent, returned, and the convoy was again on its way.

The trip from Baguio to Manila, a road distance of not more than 160 miles, required sixteen hours. The trip was guided by the hand of God. That this convoy of Japanese trucks moving in broad daylight on a clear day in late December of 1944 was not attacked by United States aircraft can only be attributed to divine intervention. The people in those trucks could not have been identified at a hundred yards, to say nothing of several thousand feet. Why were there no U.S. air strikes over northern Luzon? There had been air strikes the day before, and there was massive air action on the 28th. At the time, many were of the belief that military intelligence knew about our movement to Manila, and therefore, no air action was to be undertaken in our area. But alas, we were to find out later that the military knew nothing about our being moved to Manila.

We arrived at Bilibid prison about 3 a.m. on the morning of December 28, 1944. It was an ancient and filthy prison that had been abandoned by the Philippine government before the war. It was a conventional prison of the maximum security type: enclosed with a high stone wall, electric fence on top, and with guard towers at strategic intervals. Inside there were many cell blocks, open on three sides and resembling the cages of a zoo. The prison was divided into two compounds: the rear, or north, compound was the former prison hospital area, which was to be our quarters. It contained one large three-story concrete structure from which all windows had been removed, a number of outbuildings, and two very open toilets.

When we arrived, the compound was empty, and only a few dim lights were burning. Light globes had long ago run out in the Philippines, and the Japanese imported no replacements. In the dim light of the early morning, we explored the compound. Along the north and east wall, there were many graves, about 160 in all. Each was marked with a wooden cross, and were the graves of Filipino and American soldiers who had not survived Bilibid. The Japanese had used Bilibid as a military prison since the fall of Manila. Come daylight, we were to learn that we were not alone. The other compound contained about eight hundred

American and other POWs. We could see them over the dividing wall from the top of the hospital building. These were the living dead, men too sick or disabled to be worth the effort to ship to Japan. Between December 28th and liberation, many of these men died. Every night we could hear the able-bodied among them as they dug a fresh grave along the wall for a comrade that did not make it.

At daybreak we began to move into the main building to look for a soft spot on the concrete for our new home. No one had a mattress. There had been no room for them in the trucks. There was a stack of filthy hospital mattresses in one corner of the building, many with large moldering blood stains. But we elected to remove these to an isolated part of the compound, and cast our lot with the concrete.

Bombardment of Manila, 28 December 1944

Thompson: The 28th of December was a day to be remembered for a lifetime. As the sun rose over the hills east of Manila, the sky began to reverberate with the roar of mighty engines. From the decks of carriers at sea, and the island airstrips to the south, American aircraft mounted a massive attack. Gone was the fear of the day before, and the despair of the night. No longer was the war to bypass us. Let the eagle scream, let his eye be sharp and his talons bare. Let him drive the invader from the land. All day on the 28th, and for several days to come, navy, marine, and air force planes in countless numbers racked the earth with fire and bomb. The Japanese airstrips north of the city were under never-ending daylight attack. Fighter bombers would come in low over Manila, headed for the Japanese airstrips with their 50-caliber machine guns blazing as they strafed their targets before dropping their bombs. After dark, a few hidden Japanese aircraft would go aloft, only to meet American night-fighters, that like cats could see in the dark and destroy them.

On January 9, 1945, a Japanese junior officer came to some of our leaders and said, "On January 6 (that was three days ago), the armed forces of the United States landed in considerable strength at Lingayan Gulf north of Manila. They are advancing on Manila without much opposition." There is no explaining the Japanese. That was all he said. Shortly thereafter he disappeared, never to be seen again.

We had good reason to believe that an invasion was imminent. On the night of January 3rd there had been a big

naval bombardment off the coast of Batangas Province south of Manila. A few days later, the Eleventh Airborne Division landed in this area. We could see the flash of exploding shells and hear the sound from the roof of the main building, but January 9th was almost a month away from liberation. Food had always been in short supply, but now there was almost none. After January 9th it seemed that the air action was all but stopped. No longer was there the sweet music of screaming dive bombers and the rattle of machine gun fire. No more naval bombardments, only what seemed to be sure starvation.

Little did we know that the navy and air force could no longer find worthwhile targets around Manila. The deep-rooted pessimism born of three years of bitter disappointment began to creep over us. What if our advance were bogged down? What if Manila is to be bypassed? If they are coming, it must be quick, for we cannot last long now.

Two Bags of Soybeans and Four Bags of Rice

Thompson: Sometime during the third week of January, another miracle happened. This time it was caused by the Japanese supply sergeant attached to the guard detail. We were at this time quite obviously facing death by starvation. If you had a little canned goods saved over from the one Red Cross shipment that got through two years ago. But this would not last long. It seems that the supply sergeant was concerned about our situation, and on his own initiative, commandeered a truck for which there was precious little fuel, and found his way to a supply dump. Here, either by forged requisition, or outright theft, he obtained two large bags of soybeans, and four large bags of rice. Somehow he managed to get the loot past his own people into the hands of our cooks.

The rice was cooked in the conventional cast-iron cauldrons. But the soybeans proved to be refractory to the temperatures obtainable in boiling water at sea level. However, there was an old steam sterilizer left in the hospital compound, and with some minor modifications, it was converted to a pressure cooker, which was successful in tenderizing the soybeans. Dinner was late that night, but we ate in the dark, and felt better. Some broke out long-hoarded packs of States-side cigarettes for a good smoke. This was of course long before "the Surgeon General has determined...."

During the last week in January, we could see great fires and hear loud explosions from the roof of the main building. The Japanese were destroying fuel and ammunition dumps, and this was the only indication that they were being pressed. Around the first of February, 1945, the tension began to mount, as the Japanese increased their terrible din and destruction that was to methodically reduce Manila to rubble. The night of February first was one of red skies and shooting flame, the first of many to come. One February second, the mad destruction was accelerated. Wild explosions from hastily placed charges tore the air around the city. Bridges and public works were being destroyed. Power and water failed in Bilibid, and bits of steel and stone landed in the prison yard. From our rooftop we could see in every direction.

[recording continuation]##

Thompson: Nothing moved. The streets were deserted.

Mid-afternoon of February third was hot and dry. The Japanese no longer set off explosions. The silence was broken only by the buzz of the ever-present flies. It was the kind of silence that makes your ears ring. I got up and went to the third floor north windows to catch a stray breeze, or perhaps hear something: voices in the street, a dog barking, anything. For a while I was alone, but others joined me. We all knew that this must be it. The air was charged; you could feel it. The sands of time were running out. Soon we would be free or dead. A few blocks across the city we could see the tower of Santo Tomas, where thousands just like us waited for the end.

Now there was sound, the first for hours: small arms fire far to the north, then silence again. After the passage of another half hour, we began to hear the distant drone of aircraft. Soon we could see them: three twin-engine low-level attack bombers flying very low, flaps down, wheels down. They were so low and so close we could see the faces of the crew, and there could be no doubt as to the identity of the aircraft. It could mean only one thing: air cover for an armored column. Half an hour we passed. We waited casting anxious eyes toward the north along Quezon Boulevard. Our Japanese guards toured their beats in disinterested silence.

Thompson: The building seemed to tremble a little now. Looking up Quezon Boulevard, we could begin to make out the details of a long column of armored vehicles moving towards Bilibid. Soon the column was abreast of Bilibid on Quezon Boulevard to the east. It consisted of tanks, armored cars, tank destroyers, personnel carriers in endless numbers so it seemed. There were many men in strange battle dress wearing strange helmets that made them look seven feet tall. They were magnificent. The United States Army in 1945, when its only goal was victory. [recording stopped]

That's why we won in Iraq. Don't send American forces into a war you don't intend to win.

[recording continued] We were transfixed and utterly dumbstruck at the sight of such a powerful armed force. In truth, we hardly recognized American ground forces when we saw them. Again, like the aircraft markings, it was the little things we did not know about. We did not know that the old World War One washbasin helmet had been discarded, and that the new battle-dress was a dark green loose-fitting coverall type of garment. We had never seen a Sherman tank with its large-bore cannons, some fitted with bulldozers, and some with flamethrowers.

South and east on Quezon Boulevard was the telephone building. It had been sand-bagged, booby-trapped, pill-boxed, and otherwise converted into a formidable roadblock. It was here that this element of the First Cavalry, United States Army, was to engage the enemy in a sharp little action within sight and sound of Bilibid. For about twenty minutes they laced the telephone building with cannon fire and with ear-splitting fire of every 50-caliber machine gun that could be brought to bear. Meanwhile, there was trouble with snipers in the rear of the column. Tanks with flame-throwers were detached, and again and again liquid flame leaped into the hiding place of the enemy. Indeed, the cleansing fires of vengeance burned bright that late afternoon in the streets of Manila. By dark, the action across the street from Bilibid was over, and the column moved on.

No one slept very much on the night of the 3rd. Yet as I recall, no one worried very much either. On the morning of the 4th, we were asking ourself, "Did we really see a battle just over the wall last night?" Our guards were still with us, and we were still very much in the slammer. We had not established contact with the First Cavalry which had fought the battle of the telephone building and liberated Santo Tomas on the night of

the 3rd. By now the terrible truth began to dawn on us: the United States Army did not know about Bilibid, or surely they would had set a force to relieve Bilibid on the night of the 3rd.

The armored column now in Manila was by no means in control of the overall military situation. Only infantry on foot could accomplish this. During the morning of the 4th we could hear, and some said they could see, those tanks as they probed enemy strong points in the city. The tempo of destruction was again increased by the Japanese after the lull of the day before.

About 11 a.m. on the morning of February 4th the Japanese commander of the guard called a meeting of our leaders and said in effect, "We have been called to other duty, and we are leaving. Do not leave this compound for your own safety. Goodbye, and good luck." There is no explaining the Japanese. Considering what they did to others in Manila who weren't even their enemies, this was indeed a miracle.

We were now without guards, and still without contact with U.S. troops. The Japanese withdrawal had been orderly, and apparently planned. But there was no assurance that other Japanese bands would not enter Bilibid in search of loot or a position to defend. In general, everyone agreed that the best thing to do was to stay put and try to attract the attention of U.S. forces without leaving Bilibid.

The afternoon of the 4th was again quiet, except when the prowling tanks found something to shoot at. Most of the men were under cover on the third floor roof looking to the north and east to see what would happen next. About 3 p.m. we begin to see those tall men in green battle dress, this time on foot, moving in short dashes from cover to cover. We waved. We dare not shout for fear of attracting sniper fire to them or to ourselves, but they did not see us.

It was dark again on the night of February 4th, 1945. Santo Tomas had been relieved twenty-four hours ago, and still Bilibid was in danger. And no contact had been made with U.S. troops. Perhaps tonight someone must go over the wall and establish contact. But this was never necessary.

Rescue by the Thirty-Seventh Infantry Division

Thompson: About 9 p.m. the military prisoners heard a loud pounding at the side gate and called out their identity. The gate was broken down, and contact was established with a strong patrol of the Thirty-Seventh Infantry Division. Two by two they entered our compound. They were not sure that the Japanese did not have us covered. In the dim light, we saw our first GIs face to face. They were magnificent big fellows, armed to the teeth with automatic weapons. There was not much shouting, but they soon became friends with everyone around them. They were amazed to find American civilians including women and children.

In a short time the patrol commander entered the compound and stated that he had no advance information about civilian or military prisoners in this area, but that he would radio division headquarters and request relief to be brought up by daylight. We marvelled at the casual manner in which he would "radio division headquarters." The patrol was dog tired, but they mounted a strong guard into daylight.

At dawn on the 5th, trucks began to roll into Bilibid. Some were loaded with food, some pulled field kitchens and water tanks, and some carried the gear of a medical detachment. Army cooks prepared breakfast for 1300 ex-prisoners. There was bacon and eggs, oatmeal, fruit juice, coffee, cigarettes for the smokers, candy bars for the kids. This was the most food since the soybeans.

By midmorning, special service units were stringing wires for loudspeakers, and the latest popular music from the States was being piped in. Engineers restored power with portable generators. Proper sanitary facilities were provided, and Bilibid was dusted with the then-new DDT. The medical detachment turned its attention to the sick, and by noon, stretcher cases were at the airstrips outside of Manila for evacuation by air. All of this was being provided by a division in combat, its front only a few blocks away.

Manila was by no means secure, and it would not be for several weeks. The Thirty-seventh Division front was only a few blocks away, and their patrols were feeling out the Japanese positions in the walled city. On the 5th, Santo Tomas was shelled, and took some casualties. A mortar shell landed in the Bilibid prison yard, but caused no damage.

By the night of the 5th, the city was in flames from one end to the other. It was hard to believe that there was

anything left to burn. The battle for the walled city was beginning. By 9 p.m., the fire seemed to be moving toward Bilibid. An officer came to us and said in effect, "The fire is moving this way and the Japs may counterattack behind the fire. My battalion in going to evacuate you to division headquarters. Transport will be provided for those who cannot walk, but the able-bodied will have to walk until transportation is free."

My wife and I packed our few scant belongings in a burlap sack. We walked out the back gate of Bilibid. We passed long columns of infantry moving in single file on each side of the street. In the roadway, tanks, artillery, trucks, command cars, jeeps, and weapon carriers rumbled by. But there was always infantry in endless columns. Each GI had a greeting, a candy bar, a pack of cigarettes, or an overseas edition of Time. We walked a few blocks, and were picked up by a weapons carrier.

The fire made a blood-red sky again that night, and the men of the Thirty-seventh cast long shadows behind them as they moved into battle. Behind us was Manila, Pearl of the Orient, dying in fire, and with it the ambitions of an evil empire. Ahead was the cool dark night, and freedom. "Then the Lord rained upon Sodom and Gomorrah, brimstone and fire from the Lord out of heaven." Genesis 19:24. [recording stopped]

Well, that was the tape.

Swent: That is very, very moving.

Thompson: I had a couple of notes. The reason we stopped at Pampanga, where the women and kids went into the convent, and the trucks were unloaded, was because we had reached the boundary of the military district, and the trucks we were in, that commander wasn't about to turn his trucks loose because he'd never get them back. So the commander of the new district at Pampanga had to provide his trucks. That was really the reason for the stop.

In the end there, I mentioned stretcher cases. They were almost entirely from the military group that were in Bilibid; there were none of our people that ill at the time. We only had about a dozen deaths in the three years, all from natural causes. Now mind you, natural causes, some of them might have survived with better medical care, but primarily was natural causes. You mean a heart attack, or something like that had nothing to do with anything, except it was the guy's time, that's all there was to that.

Swent: But you didn't get cholera, or anything like that?

Thompson: No, I tell you, in those days, everybody regularly in the Philippines got shots for cholera and dysentery. Well, the conclusion nowadays is that they don't work. [laughter] At least psychologically, we thought that it did.

Swent: Do you have a written text for this tape?

Thompson: The article I wrote in Mines Magazine based on this is a little different. For one thing, the editors are always hollering to cut it down, cut it down, cut it down, though I didn't do much cutting down, but it's a little different. This is really the best. The theatrics aren't as good in the article.

Swent: Well, it is certainly not over-theatrical. It is powerful.

So then you were walking down the street, and you got into a weapons carrier...

Thompson: Well, the best way to get a ride was get out in the street where the vehicles were. Incidentally, I have some pictures of the very gate we came out of if I can find them. I took them--I've been back to the Philippines several times, and in Manila I always visited Bilibid.

[Looks through albums for photos] Ah, wait a minute. Well, I can locate it later, but I did have it. We had a reunion in 1977, and another one in 1989.

Swent: In the Philippines?

Thompson: No, no, here. Many of these people came from the West Coast, that were there. Many of them came to the Bay Area and from Los Angeles.

In retrospect, it's a good thing the Japanese moved us out of Baguio, because the Air Force absolutely flattened Baguio. It wasn't flattened like that again until the earthquake of a couple of years ago. Of course, the bombing wouldn't have been at Camp Holmes. I went back to the Philippines several times and went up to Baguio, and went out to Camp Holmes and those buildings were all standing.

Swent: Perhaps they thought that's where you were.

Thompson: Well. I don't think so. Now wait just a minute, I am not telling it right. The buildings weren't standing. It was bombed. It was Camp John Hay that wasn't bombed. Camp Holmes there was nothing but the concrete foundations. So they bombed that; figured it was Japanese troop quarters. But as I say,

that's another one of those things that was fate, or divine intervention, because if we had been there, it would have been a disaster.

Swent: Let's see, you were rescued then in February, 1945.

Thompson: Well, it took some little time after we were evacuated to division headquarters, which was the shoe factory at Angtibai, a little ways north of Manila. We only stayed there two, three days. We came back to Bilibid, because there was no place else to keep us. That was as comfortable place under the circumstances; Manila was totally destroyed. We stayed there, and in small groups, we left, as space was available by air to Leyte. And as space was available on returning transport ships, we returned home.

Return to the States

Thompson: My wife and I returned home on a ship called the Japara, which was a Dutch tanker converted to troop carrier with all the tanks converted into dormitory accommodations. It had a Dutch crew with a United States Navy anti-aircraft crew. The anti-aircraft guns on the ship were manned by U.S. Navy crews. We were in convoy as far as Ulithi, a naval base in the Pacific. We pulled into Ulithi at night, and the lights were on everywhere; they weren't worried about the Japs. After that we didn't go in convoy. We went straight to Pearl Harbor and on to San Francisco. During that time between Ulithi and Pearl Harbor, there was a great naval tragedy. The Japs got the heavy cruiser Indianapolis, if you are old enough to remember that history.

It was an interesting thing that happened while we were at Angtibai. I say interesting; you have to have kind of a morbid curiosity to think it's interesting. Division headquarters is largely maintained by typewriter commandos and various service troopers. It was headquartered at this old shoe factory at Angtibai, and across the street was the Cemetario del Norte, Cemetery of the North. And in the tropics, you don't dig graves, because the water table is only six inches deep. So all of the tombs were low mausoleums: just little concrete boxes virtually on the surface, and they all had air loopholes in them, little slots. Well, suddenly division headquarters started picking up sniper fire, and it was soon detected that it was coming from the cemetery, but they couldn't see anybody in the cemetery. Well, they had to call a battalion out of the walled city to stop the sniper fire. And the troops came into

the cemetery, and they lifted the lid of each little mausoleum and tossed in a hand grenade, and after it was over in many of these little mausoleums there was a Jap with rifle, water, and some cooked rice, and now quite dead.

That shows you the tenacity of the Japanese. They knew that rear areas would be greatly disorganized if they came under sniper fire because--they didn't know the division headquarters would be there, but they knew there would be some kind of rear-line activity. Well, as I say, if that's interesting, it's in a morbid sort of way.

Swent: Yes. So when you returned home then, what did you come home to?

Thompson: Well, the first people to return home got a big welcome from the Red Cross and a lot of hand-outs. By the time we got back, it was old stuff. That would be about like the reception of the last guy that comes home from Iraq. We didn't get much attention.

Swent: Where did you come?

Thompson: We landed in San Francisco on May 10th, 1945.

Swent: Did any of your family know you were coming?

Thompson: Oh yes, they knew I was coming. My uncle had gotten a cable-gram to me with a message that says, "If you will report to General so-and-so, the chief of engineers, he will give you a field commission on the spot." Well, while I wasn't sick, I wasn't all that healthy, and I had a wife, and it was obvious the war was pretty well over or going to be shortly, so I didn't bother to look up the general. I just came on back home.

Swent: You got this cable in the Philippines?

Thompson: In the Philippines. Now see, we were there six weeks after the liberation. It took time to get transportation for people. Returning aircraft from Manila going to Leyte could only take a few people, and ships returning from Leyte could only take a few people, so we kind of dribbled back. We came back, and we visited Marie's folks and then went to Denver to see my mother.

Swent: Where were her folks?

Thompson: In Redlands, California. I had a job then with the Dorr Company, so we went on to Connecticut. I went to work for the Dorr Company in Westport, Connecticut.

Swent: And this job, also as I recall, you knew somebody from the Philippines.

Thompson: Yes, one of the guys that was interned in the internment camp, Charlie Burgess, was a 1915 graduate of the Colorado School of Mines, and he was the Philippine representative for the Dorr Company, and he and I were very good friends. But of course, anyone could get a job at that time, I mean, the war effort was still on, and the momentum from Wold War Two lasted until two weeks ago practically. I mean, in the economy, it lasted a long time, so there was no question about getting a job.

Swent: Was there any mechanism from the United States government for dealing with you? Were you entitled to any sort of medical care?

Thompson: Well, I'll tell you about that. We obtained money after the war from two sources. Immediately after the war there was what was known as the Philippine War Damage Commission. And this was to compensate people and companies and businesses for losses of physical assets. Now my wife and I had only been married six months. We lived in a company house. It was furnished by the company, and all we owned was our clothes and a few little wedding gifts. So under the War Damage Commission I filed a claim for less than $500. Then we were later, about 1950, awarded--well, my wife and I together got about $3000. This was under some kind of provision of the old League of Nations which compensated POWs, though strictly speaking, we were not POWs. We were not military. We got about $3000. And you know, I still got that $3000. I'm a tight rascal. [laughter] I invested that $3000 promptly, and as I say we never did blow it.

Swent: Well, good. What about Baguio Gold Company? Do they still exist?

Thompson: Baguio Gold Company got compensated by the War Damage Commission. They built a mill after the war and started up, and I visited the mine in 1957. The man that was running it still lives up in Reno: Allen Bakeley. They never built a mill as big as the one we had before the war. Now here was the simple truth at Baguio Gold: before I was mill foreman I was shift boss in charge of underground exploration, and as of July 1941, we had found no new ore. Before that we found ore every day: extended headings that were in ore. But we had gone for almost six months without finding any new ore, and they never found any after the war. But we had a pretty good reserve. Even though we hadn't found any new ore, we had a pretty good reserve worth going back after.

So particularly--I mean I don't think you could have financed Baguio Gold after the war, but getting the war damage money, and building another mill was eminently practical. You couldn't have started out on the street and promoted Baguio Gold from scratch with the reserves that it had at the time. But you virtually got a free mill, and it lasted. The company still exists, but it's gone into other things. I have five hundred shares of stock in Baguio Gold. Some years ago I got a check for two centavos: dividends. [laughter]

Swent: Did they feel any responsibility for taking care of you at all?

Thompson: Not in the least. Not in the least. The old guy that was president was a Dutchman and not interned. And he smuggled some money to us occasionally. If we had money, we could buy a few little things, one way or another.

##

Thompson: He got some money to Ward Graham, and Ward Graham distributed it to employees. Three of our employees--three of our expatriate staff--were not in the concentration camp because they took off to the wilderness. One of them was a single man, Frank Camp, an ex-marine, and he wasn't about to go to jail to the Japs, so he beat it up into Mountain Province and was never heard from again. And two others, Harry Turner and Ed McDaniels--Ed McDaniels was a Colorado School of Mines man, 1932--they were reserve officers. Let me never detract from their devotion to duty, but it was a tragic waste of their lives. They beat it to the lowlands and joined the army, because they were reserve officers. I was not a reserve officer. At my last year in college I could not take ROTC because I was an irregular student, and ROTC conflicted with the classes I had to attend to get enough credits for graduation. So I didn't get to go through ROTC.

Harry Turner died on one of those ships that the Japanese tried to take to Japan. They were both in Cabanatawan. They were both in the Bataan Death March. Harry Turner was on one of those ships that was sunk by U.S. submarines; like I said on the tape, it was sure to happen. So Harry died in a ship that was sunk, and Ed McDaniel died of dysentery in Cabanatawan. As I say, nobody really knows what happened to Frank Camp, except we never heard from him again.

Swent: When you came back, were you entitled to medical care from the government? What sort of resources did you have?

Thompson: Not needing any medical care, I never really investigated whether we were entitled to any or not. The Red Cross gave us some clothing, I think. My mother had wired me $1000, which was available the minute I got to San Francisco. But as I say, we didn't need any medical care, so it wasn't a matter of great concern.

[Looks through albums for photos] These were pictures that I took on the way over and after I had been in Baguio a little while, and I sent them to my mother. That's why they survived. There's a picture of me at lifeboat drill.

Swent: This is going over.

Thompson: Yes, this was on the Nita Maru. This is the old boy that introduced Marie to me. He was way up in his sixties or seventies, just taking a cruise. These were shipboard people I met. That's Hong Kong. I'll show you the house we lived in.

Swent: Did Marie speak Chinese?

Thompson: She spoke kitchen Chinese. She could speak to servants.

Swent: She had lived in China.

Thompson: Seventeen, eighteen years. That was our house. There was another set of quarters--this was on a steep hillside. There's another set of quarters underneath here, and we had this set of quarters, and that was our kitchen.

Swent: And the corrugated iron roof. What was the side structure?

Thompson: Well, that's timber, lumber. There was a poker party at the bachelors' quarters before I was married. There's one of our mine locomotives. That's the mill. That was the power plant at one of the mines below us.

Swent: What kind of power did you have?

Thompson: Those were diesel--every mine had its own diesel power plant. Here's that fellow Frank Camp who disappeared and never came back. This boy, Carol Dickey, he died just a few years ago. There's the mine superintendent; he died a long time ago. That's Ward Graham; Ward Graham was about forty in 1940, and he died about ten years ago.

This was the May Day contest. All the mines submitted teams. There was a timbering team and a drilling team, and the

machinery company, Manila Machinery Company, put out free beer for everybody on that particular--kind of a local celebration.

There's my wife. There's our wedding picture. That's Harry Turner, who went down with the ship. He was the best man. That girl, Lucy Vincent, after the war, after surviving the concentration camp, died of polio. That was Marie looking glamorous. That was the church we were married in.

Swent: Where were you married?

Thompson: In Baguio.

Swent: But then here's a picture in Shanghai.

Thompson: This was on the way over, the year before--July 1940.

Swent: You stopped in, or went up to Shanghai.

Thompson: Marie's folks lived in Shanghai. She got off the boat, and I went on to the Philippines. Marie had a job teaching in Japan, and as things were deteriorating very fast, that was scrubbed.

Swent: How did her folks get out of Shanghai?

Thompson: Well, her mother and her youngest brother left for Australia well in advance of the disasters.

Now there was our wedding picture.

Swent: Very elegant.

Thompson: My trousers were too long.

Swent: Well, you look very elegant.

Thompson: And here's the sad remains fifty years later. [laughter]

Swent: You were going to say Marie's father--

Thompson: Well, her father remained behind, and he was interned. But he was later evacuated on a Swedish ship, the Gripsholm, which didn't take anybody--. Well, the Gripsholm put in at Manila and took some diplomatic people. One guy got out of our camp and was on the Gripsholm. And nobody to this good day knows how he got picked. He worked for General Electric, and for some reason or another he got on that ship. Now this would have been well into 1942. It would have been late spring of 1942. It was after we moved to Camp Holmes.

But that's the story of the Philippines. The country is not what is used to be.

VI ASSIGNMENTS IN BRAZIL AND MEXICO

Pignatari Industries and DOCEGEO, Brazil

Thompson: I mentioned last time, I had a couple of interesting assignments in Brazil. On one of them I went to Brazil at the expense of Kaiser Aluminum to check out Pignatari Industries. Pignatari's father was a wealthy Italian, and the son who I met was in his early sixties. And he was the head of Pignatari Industries.

Kaiser Aluminum was checking this firm out to buy it. It consisted of a mine, an underground copper mine, in the state of Rio Grande do Sul, Camaqua, and a smelter a few kilometers south of Sao Paolo. It was a mine and mill at Camaqua, and the smelter a little ways out from Sao Paulo, and in Sao Paulo were their rolling mills. And they made all kinds of copper and brass and aluminum semi-finished hardware: plumbing fixtures, and they also had an electrolytic copper refinery in Sao Paulo, and I checked this out for acquisition. I wrote about it in Skillings' for May 6, 1989, under the title, "The Ancestral Copper Mines of Brazil."

Pignatari also owned the Cariba deposit in the state of Bahia. Ultimately Pignatari went bankrupt. Kaiser Aluminum had never made a deal with it. He went bankrupt, and the government of Brazil took over everything he owned, and the government of Brazil has since sold that back to the private sector. But they developed the deposit at Cariba, and built a smelter at Salvador. Of course, that was developed by CVRD, who do everything; it's a government-owned company, also on the block for sale to private enterprise.

These countries that want to unload publicly-held corporations always limit the foreign participation to less than a majority. Well, nobody of the locals have got enough money to buy 51 percent of it, so they get hung up on that.

Another time I went to Brazil to do a feasibility study on a couple of bauxite deposits. That was for an outfit called

DOCEGEO, which was the exploration arm of CVRD. I wrote that little adventure up about the bauxite deposits in Brazil; I wrote that in Skillings' Mining Review, too: December 15, 1990. But those were interesting things.

Real de Buenavista Mine, Nayarit, Mexico

Thompson: One of my most interesting trips was to Mexico: Real de Buenavista. I went to Mexico to examine this mine. It was in the state of Nayarit, north of Guadalajara. It was totally inaccessible. It was a little village of La Yesca, which could be reached only by mule trail, and the mine was near that. And we went in to this mine, Real de Buenavista, by helicopter.

It had been last operated in 1911, when it is alleged to have been shut down by the Revolution of 1911. It was a fabulous silver mine with some gold values. And at the time, the dump rock--this was in the mid-1970s--would assay $100 a ton in gold and silver.

The trip in by helicopter was quite a thrill, the kind of thrills that I don't like to go into every day. We flew from Guadalajara to Magdalena on the coast, and between Guadalajara and Magdalena is the area where they grow the tequila cactus, and squeeze the cactus and make tequila. Some of the staff houses still existed. There were some Mexicans living there, but as I say, the place was totally isolated. We landed our helicopter on that cliff. [shows photo]

Swent: There was not much extra room, was there?

Thompson: Well, the helicopter blades were about three feet from the rock. We first landed on a ridge below. The alternative was to climb that mountain, and I said, "Well, let's go for it; let's crank up the helicopter."

So the pilot took us up there one at a time. It was early in the morning, so there was no wind, but he didn't want to be heavily loaded, in case he had to buzz off quickly. He wanted the helicopter to respond quickly. There were three of us, and the pilot, but at the ridge we unloaded, and he just took one of us at a time up to the mine. That ledge on the cliff was where the mine cars were pushed out. We then came back down one at a time to the millsite area. The tailings pond had a lot of good values in it.

James V. Thompson (right), Nayarit, Mexico, 1973.

While we were standing on the tailings pond, out of one of these old houses that was the residencia of the supervisors, a Mexican came out running, and waving a machete, and he was barefooted and ragged, and had whiskers, and he was the meanest-looking Mexican you ever saw in your life. I said, "Hey fellows, let's get in here and crank this bird up; let's get out of here." But the other two were too far apart and finally when he got within hailing distance, he said, "Hey guys, where you from? I'm from San Francisco!" [laughter] So much for Mexican bandits. Turned out that he had parientes in the area, and he was down on vacation. For a while I was a little nervous about this cat.

I wrote that story in Mines Magazine for February, 1988. I have some spectacular pictures of it, a lot more than the pictures that were used in the magazine. I prefaced that article with a quotation from [Rudyard] Kipling from some verse of Kipling that says, "Something hidden, go and find it. Go and look behind the ranges. Something lost behind the ranges, lost and waits for you. Go." It kind of felt appropriate because it was very mountainous country. I quoted Kipling, that same verse, in a brochure I made for Kaiser Engineers. I brought it in to Sam Ruvkun. And he read it and said, "That doesn't even rhyme." I said, "Sam, if your name is Kipling it doesn't have to rhyme." [laughter]

But those were, as I say, some interesting things. I remember we stopped on the flight down to Guadalajara, made an unscheduled stop at Mazatlan or someplace like that, and after we took off I found out why that stop was made. The pilots or one of the stewardesses thought they heard some noise in the cargo compartment, so they landed to see if they had a stowaway. Apparently it wasn't. It just--when we landed I noticed that police cars came out to meet us, but apparently it was nothing but some cargo shifting or something.

More About the School at Camp Holmes, Philippines

Swent: I would like to fill in a little bit more about your teaching during the Bilibid period. You did mention a youngster named Buck Parfet.

Thompson: The teaching actually was while we were at Camp Holmes. We closed the school the month before we left Camp Holmes. We closed the school because it was getting a little too tough.

And we knew the end wasn't too far off. But of course, our school ran the year round.

In the two years that I taught chemistry I had oh, probably twelve or fourteen students, about half girls and half boys, and I was only about ten years older they were. They would have been eighteen, and I would have been twenty-eight. They would have been seventeen and eighteen and I was twenty-seven and twenty-eight during that period. And today, why they're going to be kids that are pushing sixty-five. They would be sixty-five, and I saw some of them at the reunion we had in Los Angeles in 1989.

As I say, they all were taken into college on the credits they got from the school. The principal of the school was Father Gowan, who had been the principal of Brent School. Really what we had there was an extension of Brent School. Every now and then I get mail from Brent School addressed to me as an alumnus. Well, I never went to Brent a day in my life, but I guess I was considered a faculty member.

I ran into one girl who came over and gave me big hug and kiss who was one of my students. And she says, "You know, your chemistry was so good that I never cracked a book the first year in college." But of course you want to remember that those kids in high school in concentration camp didn't have much distraction. There wasn't much to keep them from seriously going after what they could get out of it.

And then the boy, Buck Parfet, his real name is something like Buckminster Parfet. It's a name he never was wanting anyone to call him by. He graduated from the Colorado School of Mines in 1949 on the credits he had in chemistry. Actually there were no distractions, we had a little bit of laboratory gear, and we taught rather an intensive course, and if the kids didn't want to go to school, they had to go and chop wood. Or work on the garbage crew, so we didn't have very much trouble getting kids for school. We had grades all the way from kindergarten to twelfth grade.

Swent: And you did have books and supplies?

Thompson: We had very good books, very modern texts, and enough laboratory equipment for me to perform experiments, and there would be only about six or seven in the class. So it wasn't really necessary to have enough equipment for an individual because we were all around a table.

Swent: And things like paper and pencils?

Thompson: Oh yes, we were able to bring all the supplies we needed out of Brent School. One thing we didn't have was a map of the United States. So the teachers made a map of the United States. And at the last reunion, they brought that map. And that map was made totally from memory, and it was unusually good. A map of the United States, and it was unusually good. I mean you could see the defects in it here and there, but it otherwise was unusually good. But that's one of the souvenirs of one of the people who taught there.

A good friend of mine, Phil Markert, was a General Electric representative in the Philippines, and he taught physics. And we managed to have teachers for everything you would normally have in a high school.

Swent: Who has organized your reunions? How have they come about?

Thompson: One of the principal people that organized it is a woman by the name of Betty Foley. She was formerly Betty Halsema, and her father was mayor of Baguio back before the Philippine Commonwealth. He was mayor of Baguio when the mayor was appointed by the Philippine High Commissioner, and she married a mining engineer-metallurgist by the name of Rupe Foley--Rupert Foley. He worked for the Dorr company about the same time I did. He came back and worked for Dorr. He died about ten, fifteen years ago. He was very tall, very thin, and how that guy died of a heart attack, I don't know, because he wasn't the heart-attack type. Betty organizes these things. They're planning one for the Philippines, but Marie and I are not about to go back to the Philippines. First place, I've done enough travelling, and I don't particularly like those long overseas flights.

Swent: Has she ever been back to the Philippines?

Thompson: No, no. And I've been back only because business took me there. One trip I went back for Superior Oil Company to check out an investment they wanted to make in a copper mine on the island of Marinduque.

But anyhow, our school I think was one of the very successful things we were able to do. The principal, Father Gowan, is still living; he was at that last convention. His wife has passed away. Some of the teachers are still living, but of course teachers at Brent before the war, other than a few older people, would naturally be the younger, more adventuresome bunch, that would take an assignment like that. It was a church school; it still is.

Swent: They got a little more adventure than they bargained for.

Thompson: Yes, the adventure was a little more than they really bargained for. I went to the Philippines, partly for the adventure, but partly because of the wage differential. Golly, I got paid $175 a month in the Philippines, and started right off at a professional position, and in this county, you were lucky to get $125 a month and you might have to start on a muck stick. So there was a combination of adventure, of course, and not only $175 but a free house. In this county, you'd have to pay your rent; maybe it would be $20 a month. Big deal.

Swent: Did they pay any of your transportation out or back?

Thompson: The government brought us back. And no, I paid all the way out. The first class fare on the Nita Maru was $235. At that time, the Pan-American Clipper, the big four-engine flying boats, were only for the very adventurous.

I typed up some concluding remarks.

A Mining Engineer, Claim Stakes to Ingots, Never Bored

Thompson: In retrospect I can say that in my career I have, on occasions, been frustrated but never bored. I have always resisted intense overspecialization and made every effort to learn about, and become experienced in, every phase of the mineral industries. I want to know this industry from driving claim stakes in the ground to pouring ingots.

Before World War II any good mining engineer, especially those graduating from the Colorado School of Mines, were expected to be practical geologists and metallurgists. They were educated that way. Where I could not gain hands-on experience, I made every effort to fill the gaps with continued study, plant visits, and constant attention to what was going on in the industry. I have attended many conventions and seminars, given papers at technical meetings, and written many magazine articles. Since I retired at the end of 1979 I have given four papers, written sixteen magazine articles, and attended eight conventions and seminars. My most recent presentation of a technical paper was at the SME [Society of Mining Engineers] meeting in Salt Lake City in 1990, and my most recent convention was the SME in Denver in 1991.

I have found that many laymen and many of the people in Kaiser Engineers have trouble understanding a "mineral engineer." They tend to want to fit you in some little square like an old Coca-Cola crate. In Kaiser Engineers most professionals were civil, mechanical, electrical, and structural engineers. In these disciplines they could work on any plant design inasmuch as structural engineering is about the same in any plant from a steel mill to a petroleum refinery. In these disciplines people are horizontally educated. Some could not understand the vertically educated mineral engineer who understands a complete industry from raw ore to finished metal or product.

Among laymen, when I say that I am a mining engineer the response is often, "What kind of mining?" The personnel department of Kaier Engineers was forever trying to come up with a computerized "skills inventory." To this end they were forever inventing nonexistent specialties. I would protest that there were no "copper engineers" or lead or zinc engineers; the degree is metallurgy. Open-pit mining for iron ore, copper ore, or bat guano has much in common. Kaiser Engineers could not afford, nor was there enough office space in Oakland to accomodate, all the phony specialists they thought existed.

But I am getting along in years and times change and I acknowledge that specialization has increased, and will increase as time goes on. There is more to learn today than there was fifty years ago. But none the less I would encourage young mineral engineers, be they geologists, mining engineers, or metallurgists, to become as widely educated and experienced as they can; it's more fun that way.

If you were to ask me whether my approach to a professional career has paid off in personal satisfaction and in economic reutrn, I would say that as for personal satisfaction I go back to my statement that I have on occasion been frustrated but never bored. As for economic return, we have put three children through college, one of them to the doctorate level, we own our home, and we have a very comfortable retirement income. But there has been another payoff in my attempt to be a broadly based mineral engineer: since my retirement I have averaged 120 days per year in consulting work, which would have been difficult to get if I had a narrow experience. Now understand that I enjoy consulting work and I do not do it because of economic need. I would not take an assignment that I thought was going to be a bore.

Swent: You have certainly had a remarkable and varied career, with lots of adventures, and I thank you very much for sharing your recollections.

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TAPE GUIDE--James V. Thompson

APPENDICES--James V. Thompson

Table 1

James V.Thompson

Consulting Mining & Metallurgical Engineer

Assignments by Country and Commodity

Country:	
United States	60
Canada	11
Brazil	9
Mexico	6
North & West Africa	6
India & Pakastan	5
Chile	3
Indonesia	3
Australia	3
Argentina	2
West Germany	2
Japan	1
Philippines	1
Nicaragua	1
Total since 1957	113

Commodity:	
Iron Ore	23
Copper/Molybdenum	20
Gold/Silver	17
Titanium/Columbium/RE	9
Soda Ash & Brines	9
Phosphate	7
Lead,Zinc,Pyrite	7
Uranium	5
Limestone/Lime/Cement	5
Diatomaceous Earth	5
Bauxite	5
Coal	4
Gypsum	3
Manganese	2
Potash	2
Nickel	2
Salt (Nuclear Waste)	2
Tin and Tungsten	2
Total Since 1957	129

Updated 822/90

Recent Additions Singe 1989		
Gold and Silver	3	
Asbestos	2	*
Oil Spill Alaska	1	**

* Two recent assignments to investigate asbestos in quarry rock in the Sierra Foothils of California

** Was asked to prepare an estimate of the cost of removing and calcining material on oil spill beaches of Prince William Sound in Alaska

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Engineering and Mining Journal [E&MJ]

August 1950, The Humphreys Spiral--Some Present and Potential Applications (with Whitman E. Brown)
July 1960, Counterflow Sizer Benefits Spirals
April 1967, Bong Range Iron Project (with Wolfgang Jacobs)
August 1977 Appraising Large Diameter Core and Percussion Drilling for Bulk Samples (with David L. Watson)
July 1987, Titanium Resource in Colorado Equals All Other US Deposits
June 1989, Magnetic Separation Cleans Placer Black Sands
June 1991, Silver Recovery by Older Methods
September 1991, The Engineer-Constructors

The Explosives Engineer, 1974

Photo, second prize, fire-fracturing quarry-hard granite

Kaiser Builder

March 1962, Professional Profile--James V. Thompson
February 1966, Low Grade Ore
March 1971, Professional Profile--James V. Thompson

Metal Mining and Processing, September 1964

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April 1952, Titanium--Metals of Tomorrow
May 1963, Fantastic Changes in Iron Ore Industry
Second Generation of Large Iron Ore Concentrators
February 1969, History of the Humphreys Spiral Concentrator
January 1982, The Autobiography of a Mediocre Success
October 1985, The Way It Was
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February 1988, Real de Buenavista
August 1988, Letter to the Editor from Squareset Stopehammer
February 1989, The Treasure Map

The Mines Magazine Directory, No. 83 or 84

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Mining Engineering

January 1958, The Humphreys Spiral Concentrator--Its Place in Ore Dressing
August 1958, Problems in Mechanization in Primitive Countries

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Rock Products, May 1966, Crushing & Grinding--Their Interrelationships

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February 17, 1990, The Humphreys Companies Mining Operations
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May 5, 1990, A Trip To Remember
October 1991, The Sabbatical

The Vortex, American Chemical Society, California Section
November 1987, Titanium: Minerals, Metal, and Pigment
March 1987, Gold
February 1988, Monday Morning Commute, by Squareset Stopehammer
May 1988, Silver
February 1989, Phosphate, The Earthy Industry
March 1990, Iodine
December 1990 and January 1991, Mercury: Stone Age Metal
November and December 1991, Inorganic Mineral Plastics

California County Planning Commissioners' Association, Clear Lake, October, 1966, remarks made during a panel discussion on "California Resources--Will They Meet the Need in 1986?"

Colorado Mining Association, February, 1964, paper on "Kaiser in the Mineral Industries"

ILAFA meeting, Belo Horizonte, Brazil, November, 1979, paper on "The Third Generation of Large Iron Ore Concentrators"

Society for Mining, Metallurgy, and Exploration, Inc., Salt Lake City, Utah, 1990, paper on "Titanium Pigments from Colorado Perovskite"

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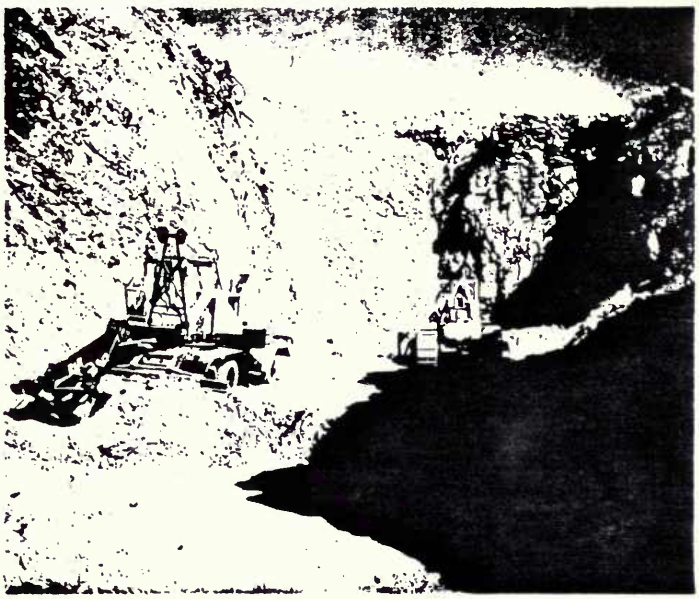

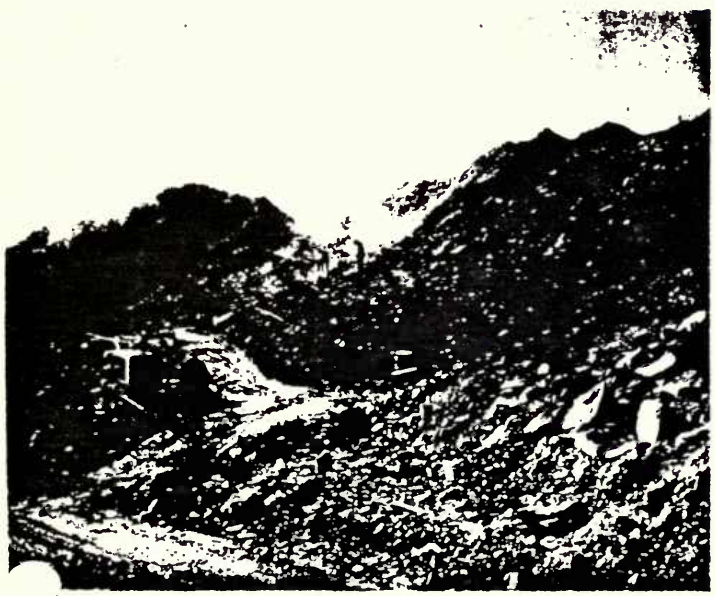

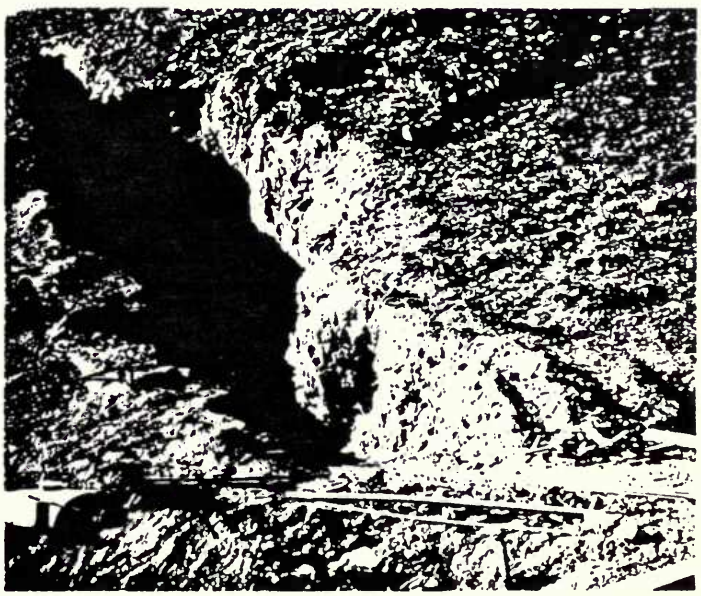

The California Manganese Rush: 1951 to 1959

by JAMES V. THOMPSON
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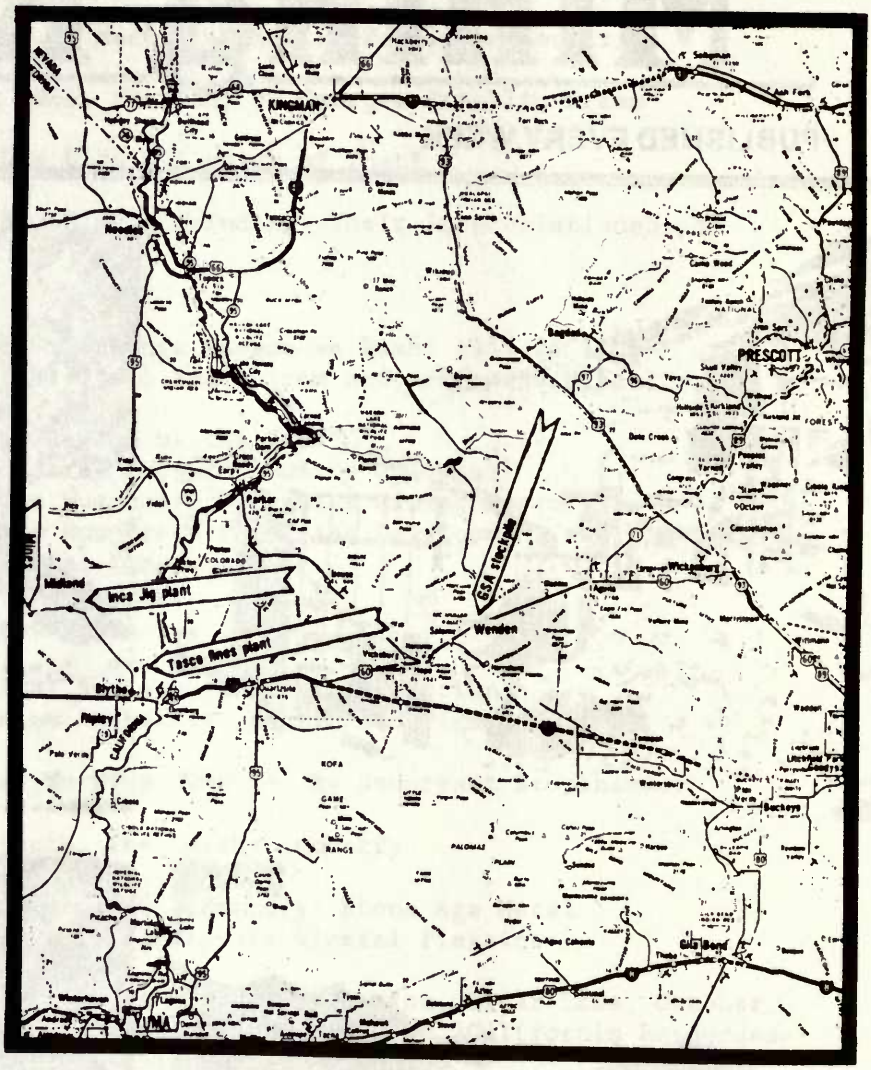
THE CALIFORNIA MANGANESE rush occurred during the period between 1951 and 1959 and was the result of the federal government manganese purchase program administered by the General Services Administration (GSA). The history of manganese production in California from 1867 to 1943 is contained in Bulletin 125 of the California Division of Mines & Geology (DMG) by Olaf P. Jenkins. Bulletin 176 of the DMG, in the section on manganese by Fenelon F. Davis gives the history to 1954. In addition, Mr. Davis mentions the mining and milling operation in Riverside county as being typical of a desert manganese operation during the rush.

Figure 1 taken from Bulletin 176 gives details of manganese production in California up to 1954. Figure 2 taken from USGS Professional Paper 820, "U.S. Mineral Resources," chapter on manganese, gives the history of U.S. manganese production from 1943 to 1963.

Briefly, the major uses of manganese are in the steel industry as a deoxidizer and desulfurizer and as an alloying metal. It is also used in the manufacture of dry cell batteries as a depolarizer. There are other minor chemical uses.

Since 1942 most manganese production in the U.S. has either been government subsidized or sustained by high wartime prices and shortages. The simple truth is that the U.S. has no world class manganese deposits.



GSA Stockpile Programs 1951 to 1959

The GSA manganese purchase program was part of the larger strategic stockpiling programs that started in World War II and continued through the 1950s. In retrospect the programs were to some extent based on hysteria. None of the manganese purchased was ever used. The Wenden, Ariz., stockpile exists untouched to this day. The Deming, N.M., stockpile was sold for non-metallurgical uses. Recently the GSA did call for bids to convert the high grade +40% Mn ores and concentrates to ferromanganese.

The major GSA program began in mid-1951 and was terminated in Aug. 1959. Production peaked in 1955 and again in 1957 (Figure 2). There were two major programs, the car lot program with minimum +40% Mn and the low grade stockpiles with minimum 15% Mn. There were three low grade stockpiles, but only the one at Wenden, Ariz., was of importance to California producers. Others were at Deming, N.M., and Philipsburg, Mont., (battery grade).

The Low Grade Stockpiles

The GSA would accept ores assaying over 15% Mn delivered by truck or rail at the low grade buying and stockpile depots. The shipper must have had ore that would upgrade by processes developed by the U.S. Bureau of Mines to a product containing at least 40% Mn, with not more that 11% combined silica plus alumina, not more that 1% combined Cu, Pb and Zn, of which not more than 0.25% could be Cu. There was also a low phosphorus limit. The price paid was $2.30 per long ton unit (1tu). A unit is 1% Mn or 22.4 lb. of Mn per long ton (2240 lb.). Freight was to the account of the shipper.

A sample of the shipper's ore had to be tested by the U.S. Bureau of Mines to determine its recoverability when subjected to the Bureau's flotation process. This factor was important in the pur-

Wenden is situated on old U.S. highway 66, 62 miles from the California state line at Blythe and on a branch of the Santa Fe railroad. At Wenden there was public power and a potential for enough well water to operate a future upgrading mill.

In addition to the discount resulting from the recoverability factor, there was a $10 charge off the top for some future milling operation.

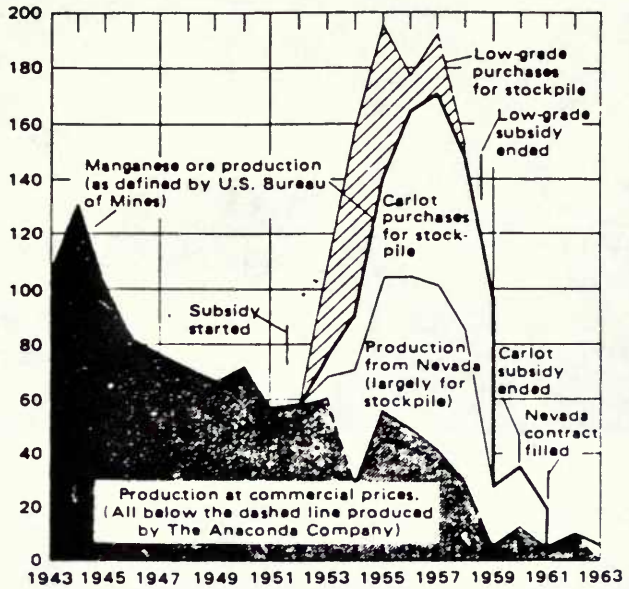
The following is an example of the economics of a shipper who mined open pit near Ripley, 20 miles south of Blythe. He shipped a consistent 20% Mn ore. His recovery factor was 90% and his settlement was: 20 x 0.90 x $2.30 = $41.40 less $10 = $31.40 per long ton. Trucking contracts could be obtained for about $0.06 per ton mile and he was 82 miles from Wenden so his freight was $4.92 per long ton. His contract mining cost was $10 per long ton, so his operating profit would have been $16.48 per long ton. While small lots of +40% Mn ore went into the Wenden stockpile, the average grade at the end of 1953 was only 19.4% Mn, indicating that indeed most shipments were low grade. The low grade stockpiles were limited by law to 6,000,000 long ton units (ltu) and were to be closed on July 1, 1958. By April 1955 it appeared that the Wenden stockpile was about full and would soon close. The producers raised a political question whether the law meant gross units or recoverable units. The producers won, and the limit was based on 6,000,000 recoverable units, and closed as planned on July 1, 1958.

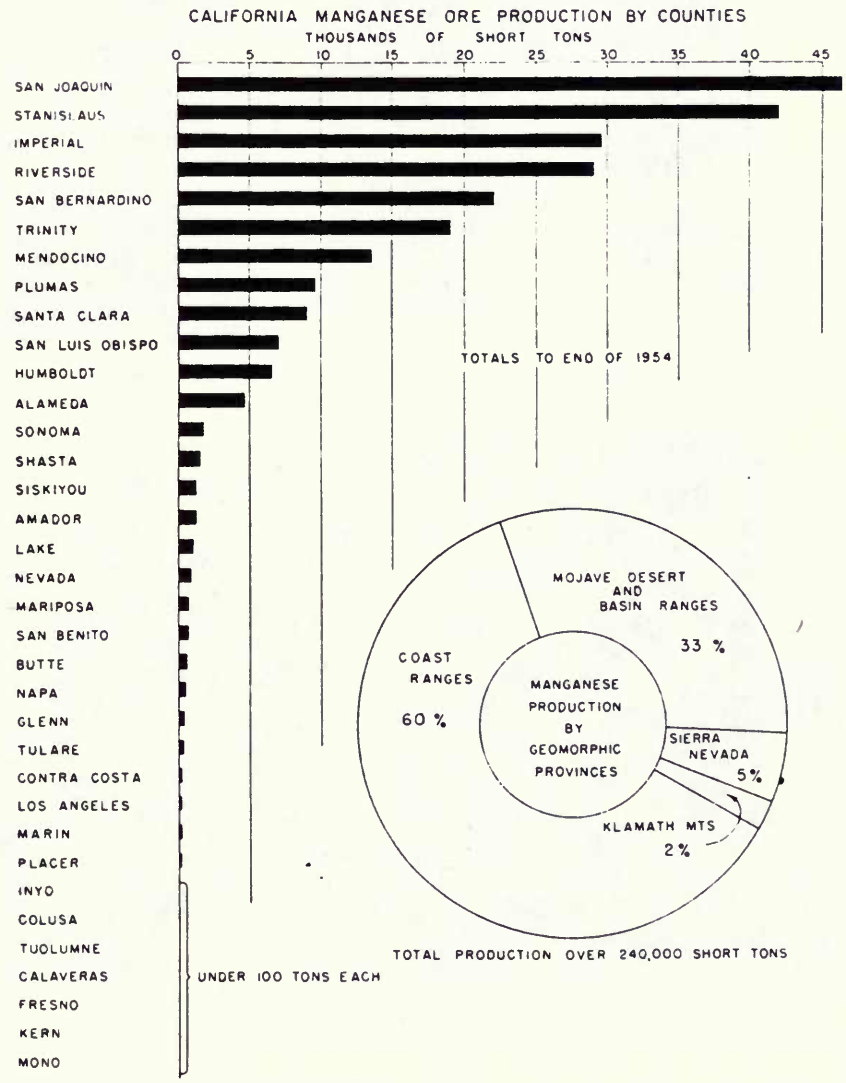
The Car Lot Program

The GSA would buy 50-long ton railroad car lots, freight pre-paid by the government at the shipper's selected railhead. The ore must assay not less that 40% Mn, contain not more than 11% combined silica and alumina, not more that 1.0% combined Cu, Pb and Zn (with not more than 0.25% being Cu) and contain not more than 15% —20 mesh. The price paid was $2.30 per long ton unit, with no deduction for future milling. The cars were sent wherever the GSA directed. Three types of products were bought under the car lot program: mechanical concentrates, lump high-grade ore and sintered fines.

Mechanical Concentrates

These were produced in mills employing heavy media, jigs, tables or spiral concentrators. Inasmuch as the concentrates could contain not more than 15% —20 mesh, only coarse liberating ores could provide such a product.





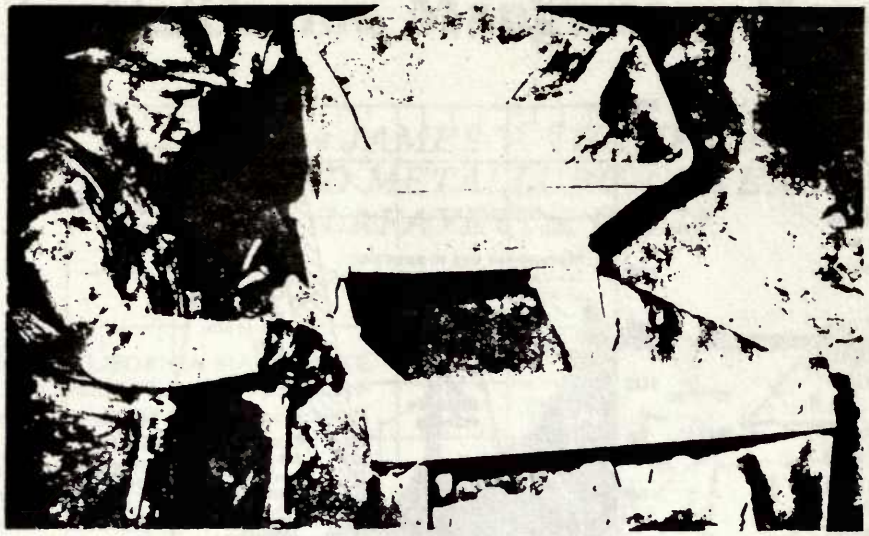


Photo 1—Mucking machine operating on the lower level of the Blackjack underground mine.

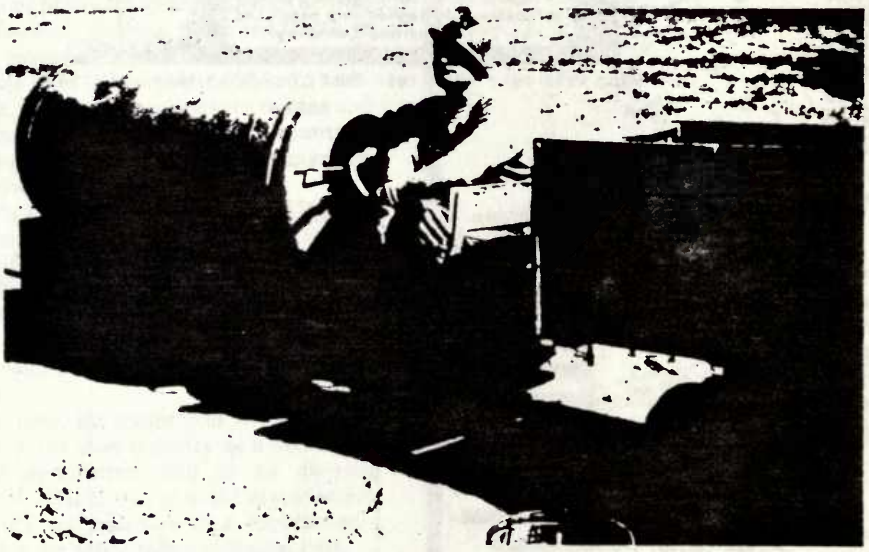


Photo 2—Compressed-air locomotive pulling four 1½-ton mine cars on the lower Blackjack level.

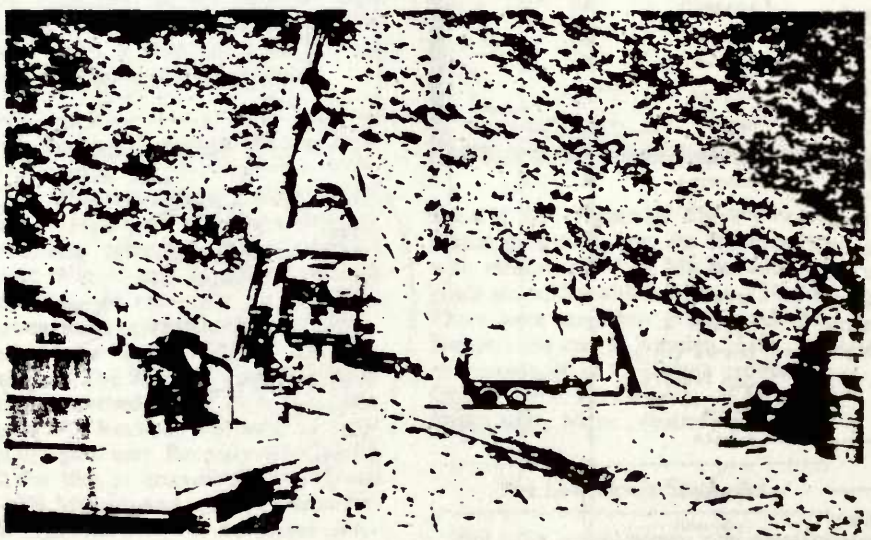


Photo 3—South Arlington mine at which a 2-ft. vein of very high grade ore entered through the small shaft. The hoist is an air-tugger compressor on left.

Lump High Grade Ore

Few deposits contained as much as 50 tons of +40% Mn ore that could be mined without hand sorting. If there were no mill and the mine was shipping to the low grade stockpiles, such ore was saved as a sweetener when shipments needed upgrading.

Sinter

If the ore required fine grinding and froth flotation, the concentrates would contain much more than 15% —20 mesh. Such concentrates required sintering or nodulizing to eliminate the excessive fines. There was a custom sintering plant at Wickenburg that accepted fines on a custom basis.

The car lot program was originally authorized for 19,000,000 ltu; however, as the quota filled up, political pressure was brought to extend the program. The producers claimed that they had not had time enough to recover the investment in mills that were built. The program was extended to 29,000,000 ltu and ended on Aug. 5, 1959.

The miners, often people with little experience, had to make decisions whether to ship to the low grade stockpile or build a mill and ship on the car lot program. If a miner was within 100 miles of Wenden, had open pit ore and could maintain at least 20% Mn, there was a strong incentive to ship to Wenden. The advantages of shipping to Wenden were: (1) Quick delivery by truck and therefore quick payment, (2) Wenden would accept small lots, and (3) no need to invest in a mill. The fast payment at Wenden was important to the small miner, who was often in a tight money situation. Even if they had 40% Mn ore some could not wait until they accumulated a 50-ton car. Some operators with mills preferred Wenden because of faster settlement. It is the author's belief that the operators who made the most money shipped as much as they could to Wenden, often at a grade just above the cut off of 15% Mn.

The problem of slow payment in the car lot program rested on the railroad and not the government. The problems were (1) The shipper had to have a siding or access to a public loading dock, which might be many miles away and that mileage could be used going to Wenden, (2) the railroad could seldom deliver a car on short notice, often requiring a week, during which time the small miner was starving, and (3) after the railroad picked up the car it could be lost in the system for weeks. The government obviously could not make payment until the car arrived and was unloaded and sampled.

However, if a deposit could not maintain at least 20% Mn in raw ore, and was

situated over 100 miles from Wenden (100 miles is arbitrary for this discussion) a mill might be indicated. A mill should be near water, power and a railroad loading point. These three items were seldom available near any one mine and most mill sites were compromises involving the intermediate trucking of ore from the mine to the mill site.

Public power had to come from the nearest substation, and while a high-tension line might pass over the mine site it could not be tapped for a small mill load. Many mills ran on war surplus diesel-electric sets that were worn out during their military service. Shippers must either build a railroad siding, for which the railroad had little enthusiasm, or truck to existing loading points. In much of San Bernardino, Riverside and Imperial counties, water was a rare mineral. On the other hand mills were more fun, and that seems to be the reason why some were built.

A Typical Mining and Milling Operation

By early fall of 1952, Blythe Manganese Co. had completed its mill at Inca siding on the Santa Fe railroad, 20 miles northwest of Blythe in Riverside county. Midland, the site of the U.S. Gypsum board mill, was 2 miles north. The gypsum board plant operated on tank car water brought on the railroad from Blythe and so did the manganese mill. The siding already existed and was built in the early post war years by Utah Construction Co. when it was mining agricultural gypsum 7 miles west of Inca. Inca and the mines are shown on the USGS Midland quadrangle topographic map.

The mines were situated in the McCoy Mountains, 9 miles west of Inca and reached by paved road paid for by one of the early aid-to-mining government programs. The mines were the Blackjack and the Arlington underground mines mentioned in the literature, (Photo 3). The Blackjack ore would run about 17% Mn and the small amount of Arlington ore could be maintained at +30% Mn. There were two open pit, wide orebodies, the Red Hill at 10% to 13% Mn and the White Face at 7% to 8% Mn. The elevation was 1100 to 1200 ft. and the environment was typical Colorado River desert. (See photos on front cover).

The ore was crushed to about 3 in. at the mine with a jaw crusher run by a diesel engine. It was trucked 9 miles over the paved road to Inca. A smaller jaw crusher at Inca reduced it to minus 5/8 in. A bucket elevator lifted the ore to the jig feed bins.

There were three banks of three 42 by 42—in. Joplin bull jigs, of great antiquity, in the mill (Photo 4). At the 5/8—in.

Photo 4—Joplin bull jigs in the Inca mill, in which the jig capacity was 8 to 10 tons per hour.

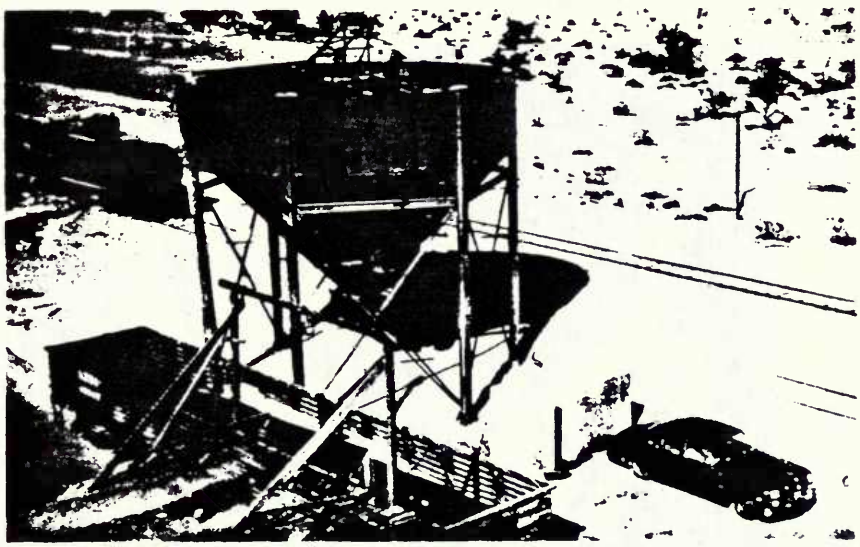


Photo 5—Loading platform from which jig concentrates trucked 200 ft. were loaded into rail cars, showing car loaded with 70 tons. To provide uniform mix of jig and spiral concentrates, loads were raked out level in the car. Railroad water tank car is in the upper left, while the large steel bin was not in use.

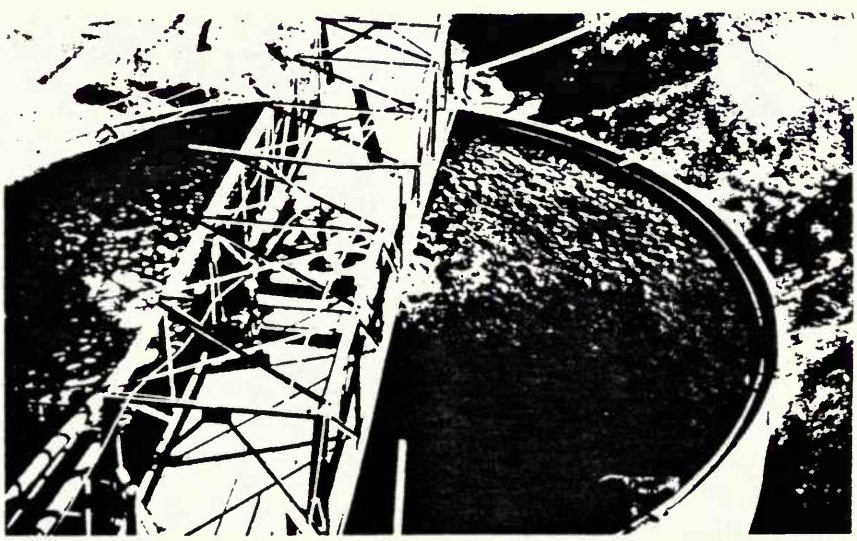


Photo 6—Thickener for recovery of water, with mud trench for thickener underflow in upper center of picture.

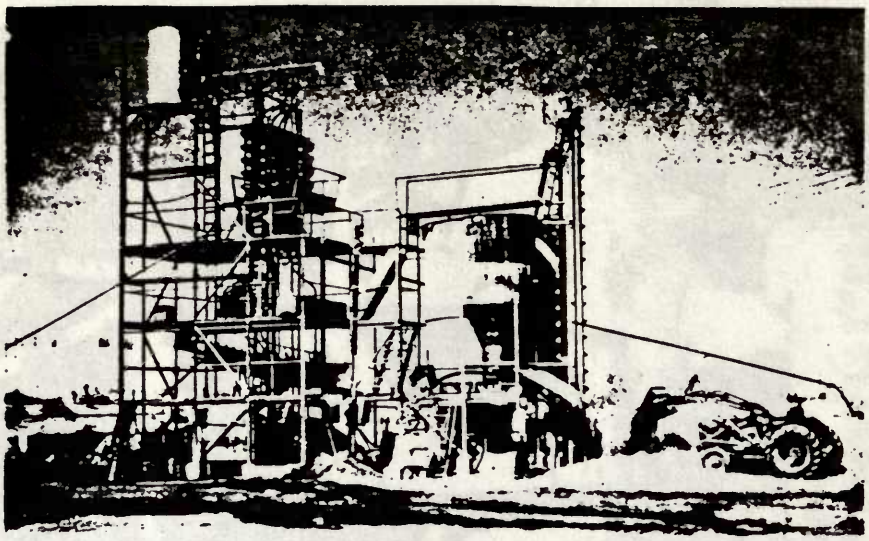


Photo 7—Fines plant completed in the summer of 1954, with steady head tank at top. Eight Humphreys spirals were on the top deck, sizer on the second deck, dewatering classifier on the first deck and pump on the ground floor. Front-end loader and tailings line, right.

Photo 8—Interior of fines plant showing Humphreys spiral. Dark streak on inside of channel is manganese concentrate.

Photo 9—Author James V. Thompson on the upper level of the Blackjack mine. At this point, the ore was 5 ft. wide and assayed 17% Mn.

crush reasonable liberation was possible and a concentrate grade of 42% to 43% Mn was made. The tailings and concentrates were dewatered in drag—type classifiers with tailings trucked to nearby disposal. The concentrates could not be direct loaded into rail cars and had to be trucked about 200 ft. (Photo 5). The overflow of both the drags passed to a thickener (Photo 6) where the solids settled out and the water was recirculated to the mill. The mud underflow of the thickener ran into a dozer cut where it dried and was covered over from time to time to prevent dusting.

The mill operated on tank car water and this was not a major item of cost. A 6000—gal. tank car cost about $16 delivered at Inca siding. The net consumption was about 125 gal./ton ore or about $0.33/ton ore. Power was provided by war surplus diesel-electric sets, the bane of the desert manganese mills.

The mill had many mechanical problems related to excessive wear such as secondary crusher parts, bucket elevator chain links, drag blades and chains and jig screens. The bucket elevator would break about once a week and drop all the buckets into the boot. The tired old diesel-electric war veterans often broke down. If the concentrate bin was full and the railroad was late delivering cars, the whole plant had to shut down.

Georges F. Kremm, owner of a small chemical company in Chicago, had acquired an interest in Blythe Manganese Co., and in the fall of 1953 I was retained as a consultant to examine the operation and suggest improvements. The operation had done well while it ran on the easy-to-mine Red Hill open pit ore despite the mechanical problems. However, it had generated little more than operating money and it was now faced with mining underground, but much higher grade, ore from the Blackjack and Arlington mines. The White Face open pit ore at 8% Mn was marginal. After my visit I made some suggestions, which were carried out.

Georges Kremm took over the operation early in Jan. 1954. The first alteration Mr. Kremm made was to put in a portable two-stage crushing plant run by a 'Jimmy' diesel engine. This eliminated the undersized secondary jaw crusher, and the bucket elevator was replaced with a long conveyor belt. The portable two-stage plant was second hand, poorly built in the first place, and worn out when it arrived. The mechanics welded on it for 16 hours to keep it running for 8 hours. Despite the desert heat the engine would require a dozen cans of starting ether to get it cranked up. Once started, it was difficult to find because it was enveloped in a dense cloud of dust. So much for crusher improvements

One of my suggestions to Mr. Kremm in the fall of 1953 was to put in a fines plant (Photos 7 and 8). I proposed to

screen the —5/8 x 0 in. feed at 10 mesh, which was the screen size in the jigs. This would reduce the amount of jig hutch product, reduce screen wear and save water because I did not intend to wet the —10 mesh with tank car water at Inca. I proposed to build a fines plant at Tasco siding (while by the railroad there was actually no siding) where we would drill a well and get water from the Colorado River flood plain sands. Tasco was six miles north of Blythe on the road to Midland. The —10 mesh ore would be trucked from Inca 14 miles and treated where we had unlimited water and tailing disposal. The concentrates would be trucked back to Inca and mixed with the jig concentrates.

A belt feeder under the feed bin fed the —10 mesh ore to a sump where it was mixed with water and pumped to eight Humphreys spiral concentrators (Photos 7 and 8). The spirals made a disposable tailing in the first stage. The concentrate was then treated in a hydraulic sizer, which increased its grade to as high as 44% Mn. This simple device was developed at the Blythe manganese fines plant by the author and later manufactured by Humphreys Engineering Co. Thousands were subsequently sold in the iron ore industry to mines including Quebec Cartier and Bomi Hills.

The fines plant was built in the summer of 1954 and was a success from the first day it operated late in Aug. 1954. The concentrate contained too much —20 mesh to be sold alone but when mixed with Inca jig concentrates the shipments would meet all specifications. The fine concentrates were higher grade than the jig product but the combined assay was always +42% Mn.

In April 1955 Aspen Mining Co. took over the operation from Georges F. Kremm. Aspen Mining Co. was a wholly-owned subsidiary of Humphreys Gold Corp., Denver. The parent company mined titanium and zircon minerals in Florida. The author became resident general manager in Blythe

The first action by Aspen was to junk the portable two-stage crusher. The primary jaw crusher was brought down from the mine and a 3-ft. Symons short head cone crusher was installed in closed circuit with a double-deck vibrating screen (Photos 10, 11 and 12). The +½-in. oversize (we were going to crush finer for the jigs than the previous operation) was returned to the Symons crusher, the —½-in. +10-mesh went to the jig feed bins, and the —10 mesh went to truck bins and on to Tasco (Photos 13 and 14). One way or another, a small plant seems unable to avoid bucket elevators and the new crushing plant had one and as expected it gave trouble from time to time (Photos 12, 13 and 14).

At Inca and Tasco we got rid of diesel engines and brought in public power.

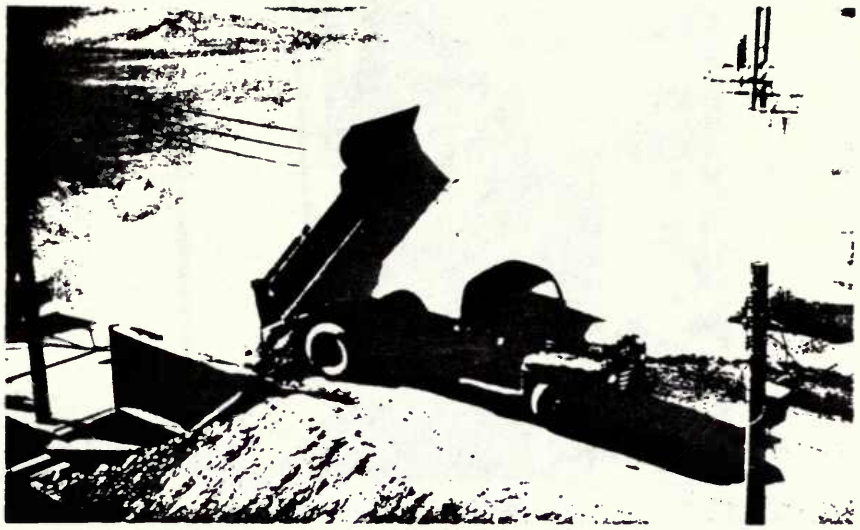


Photo 10—Ore truck from mine dumping at new crushing plant at Inca. Through dust at right is the new substation.

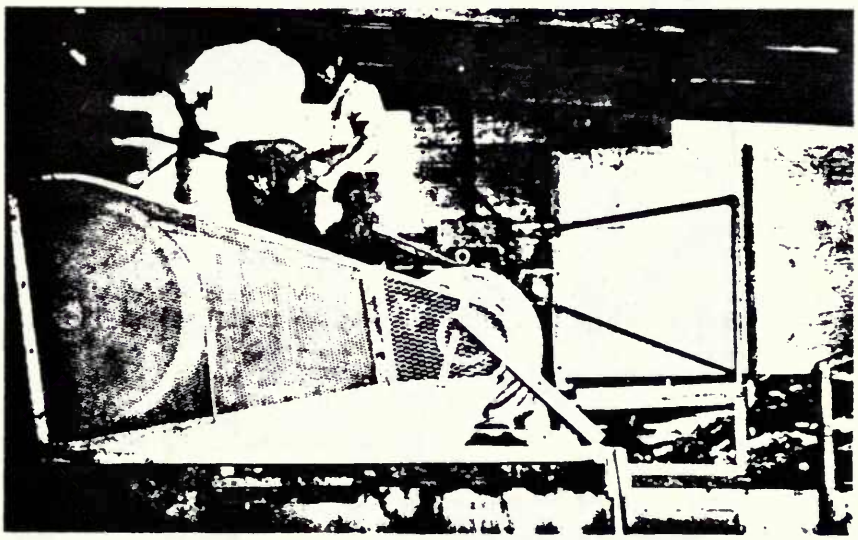


Photo 11—Operating floor of jaw crusher.

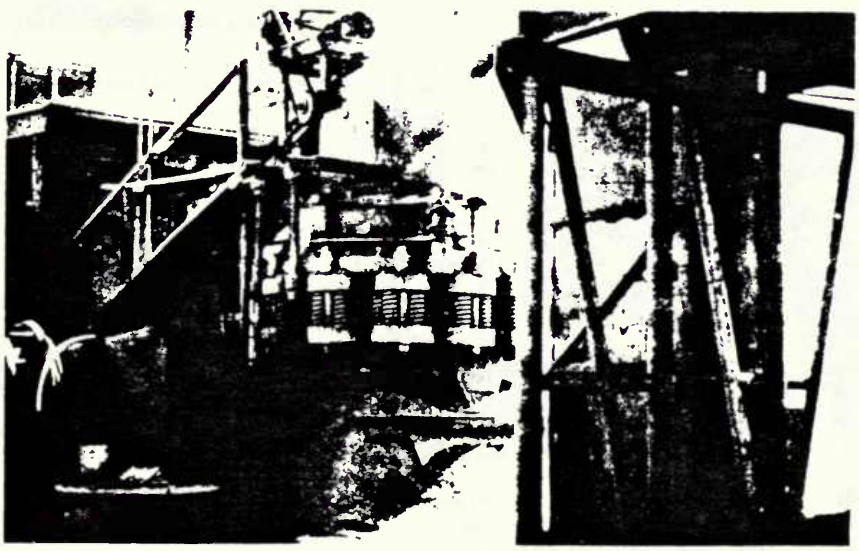


Photo 12—Symons short head cone crusher of 3-ft. diameter, with bucket elevator on right. Support steel for bins on right.

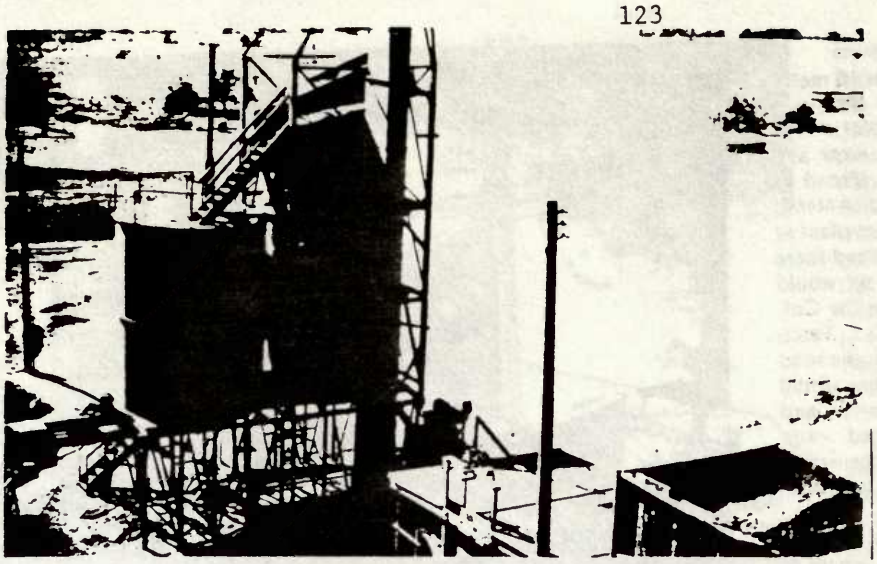


Photo 13—Bucket elevator, screen and ore bins, with coarse ore bin, left, and fines bin, right.

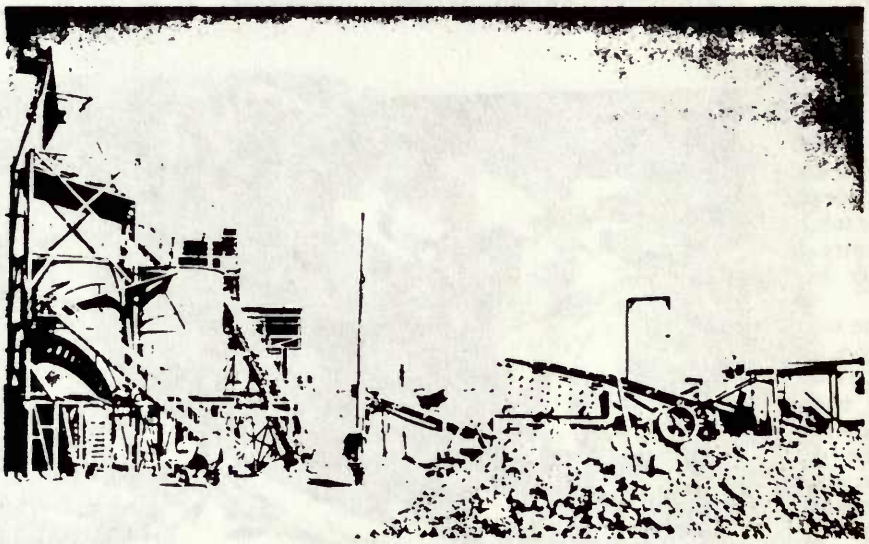


Photo 14—Screen and ore bins from other side of crusher. At right is the portable two-stage crusher not in use, while at lower right is stockpile of ore from Langdon mine.

Photo 15—Sad remains as they appeared in Jan. 1980. The jig plant building skeleton is still standing. The aluminum paint on the thickener tank is holding up, and the old Utah Construction gypsum bin is still standing.

We moved the primary jaw crusher from the mine to the mill at Inca so it could be run with an electric motor and thus got rid of the diesel engine.

We were never at risk on making grade and our overall recovery was 75 to 80%. There was a middling problem, but recovery was helped by the fact that our manganese was mostly hard black psilomelane with a minimum of pyrolusite, the soft black earthy oxide that slimes when crushed resulting in metallurgical losses.

We had a capacity of 8 to 10 short tons per hour. We started operations on a 16-hour day but had to cut back to 8. The two underground mines just could not provide the ore. They could barely provide 30 tons per day—some days. The White Face, while low grade, gave good recovery and high grade concentrates, and provided 50% to 60% of the ore.

Capital and Operating Cost

Capital Cost. This estimate contains a high degree of speculation and, of course, the figures are for 1952 to 1955. The expenditure by Aspen is the most accurate. The estimate is as follows:

Original Blythe Management Co.	$170,000
Georges F. Kremm	90,000
Aspen Mining Co.	118,000
TOTAL	378,000

All of the operators including Aspen used much rental equipment and many contractors. These were open air plants, and there was minimum development cost at the mines. Aspen paid for the public power line. Small operators keep loose accounts and often talk about "what we have in it," which includes not just true capital, but all their operating cost. On the "what we have in it" about $800,000 were spent at this operation. The total revenue was perhaps $500,000 produced by all three operators.

Operating Cost. These costs are in part from my records and in part restructured from memory. Table 1 gives averages for a typical month.

Operating Economics. The ore mix if 40% from the underground and 60% from the White Face open pit would average 11.6% Mn. On this mix we would get an 80% recovery or 9.28 units in the concentrates yielding $21 per ton of ore. With costs of $27 per ton we obviously did not have a viable operation. However beginning in Jan. 1956 we began getting custom ore from the Langdon mine, two miles away, and this ore plus some increase in grade from the small Arlington mine brought the operation to the breakeven point in April 1956. We milled Langdon ore for $7 per ton or 33.3% of the value of the contents of the car. All concentrates were shipped on Aspen bill of ladings so we

got the money first and deducted the custom milling charges.

. The operation became more efficient as we worked out the bugs and learned to live with the problems. By summer of 1956 I expected to be showing a small profit. But in Denver, breakeven was not good enough and the order came to shut down at the end of April and return the property to Mr. Kremm. At the time of shutdown we did not know that the car lot program was going to be extended but this may or may not have made any difference.

In Retrospect

The government may have obtained something useful out of the car lot program. This was manganese that could be converted to ferromanganese on short notice. But only the miners may have made a little profit from the low grade stockpiles. The low grade stockpiles are worthless and require milling before they are in a useful form. Even if the low grade were available free in place it could not be milled and converted into ferromanganese economically.

The manganese program might have been much better if it had been run like the uranium program. Under these conditions the manganese miner mines his ore and is given a $6 per long ton freight subsidy to bring his ore to the buying depot. Freight over $6 per long ton is to the account of the miner. A substantial mining company has a government contract to buy both high grade and "mill dirt" and operates a mill to the account of the government. Payment is made to the miner as soon as assays are available. When the program is over the government has a stockpile of useful high grade concentrates. A second contractor, or the mill operator, could convert the concentrates to ferromanganese thereby creating a truly useful product for stockpile.

In retrospect the experience had its compensations. We did not have to have permits for anything from anybody. There was no EPA, OSHA, MSHA or Mined Lands Reclamation Act. We were never visited by inspectors except for an occasional visit from the Border Patrol. We had PCBs in the transformers and asbestos in the truck brake linings. If we had radon in the mines we were happy without knowing it. Yet we polluted no air, contaminated no groundwater, endangered no species, gave no one silicosis and had no injuries that could not be treated with a band-aid. It is sobering to reflect that the entire manganese program did not last as long as it takes to get some mining permits today.

Table 1 Operating Cost Summary

Operation	Tons per Month	Cost per Long Ton	
Open Pit Mines (all ore sorted)	735	$ 10.52	
Underground mines (some sorted ore)	525	17.14	
Trucking to Mill	1260	0.54	
Sub total, weighted average	1260	$ 13.82	(*)
Crushing ,Screening	1260	2.20	
Jigging	840	3.37	
Trucking to Fines Plant 14 mi.	420	0.84	
Fines Plant Operation inc. Back haul	420	6.19	
Sub Total weighted average all milling		6.73	(*)
Central Maintenance Shop (undistributed)		3.98	(*)
Resident General Manager and Overhead (1)		2.78	(*)
TOTAL of Items Marked (*)		$ 27.31	

(1) Does not include any corporate overhead

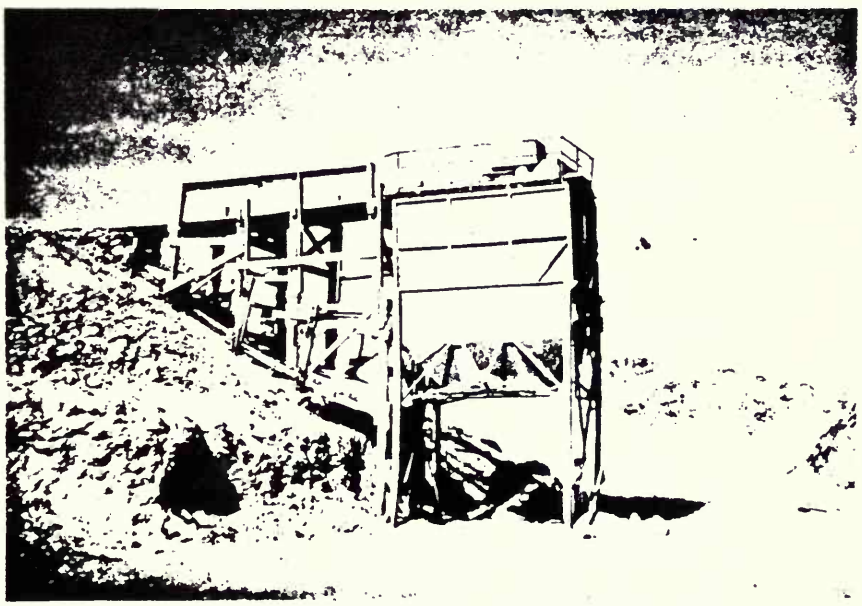


Photo 17 above is the new bin at Blackjack upper level. Note mine car on top of bin. Former bin was on slope of ground and would not flow by gravity. Steel portion of bin was from the old portable crusher that Kremm used before Aspen took over.

Photo 16 to right shows underground at Blackjack upper level.

INDEX--James V. Thompson

Eleanor Herz Swent

Born in Lead, South Dakota, where her father became chief metallurgist for the Homestake Mining Company. Her mother was a high school geology teacher before marriage.

Attended schools in Lead, South Dakota. Dana Hall School, and Wellesley College, Wellesley, Massachusetts. Phi Beta Kappa. M.A. in English, University of Denver. Assistant to the President, Elmira College, New York. Married to Langan Waterman Swent, mining engineer.

Since marriage has lived in Tayoltita, Durango, Mexico; Lead, South Dakota; Grants, New Mexico; Piedmont, California.

Teacher of English as a Second Language to adults in the Oakland, California public schools. Author of an independent oral history project, Newcomers to the East Bay, interviews with Asian refugees and immigrants. Oral historian for the Oakland Neighborhood History Project.

Interviewer, Regional Oral History Office since 1985, specializing in mining history.