



AMERICAN INSTITUTE OF MINING,
METALLURGICAL, AND PETROLEUM ENGINEERS

ORAL HISTORY PROGRAM

Raymond Lowrie: A Miner, An Author, An Influencer

PREFACE

The following oral history is the result of a recorded interview with Raymond Lowrie conducted by Barbara Filas on February 24th, 2020. This interview is part of the AIME and Its Member Societies: AIST, SME, SPE, and TMS Oral History Project.

ABSTRACT

Leaving the Navy in 1955, Raymond Lowrie began his lifelong mining career studying at the University of Texas-El Paso and working as an underground miner with Climax Molybdenum Company. After working in low coal mining, Lowrie started his career with the US Bureau of Mines and his marriage of over 50 years in Denver, CO. During his time with the US Bureau of Mines, Lowrie served as supervisor of the wilderness program and worked to implement and regulate the Federal Surface Mining Control and Reclamation Act of 1977. Lowrie's proudest work is his published Mining Reference Handbook, which reflects his commitment to serving the needs of engineering students and closing educational gaps. Lowrie continued his commitment to education as SME Professional Registration Coordinator where he evaluated the professional engineer (PE) exam and shaped its current structure. A lifetime Distinguished Member of SME and recipient of a SME President's Citation, Lowrie has dedicated his life's work to the mining industry where his influence will remain.

Readers are asked to bear in mind that they are reading a transcript of the spoken word, rather than written prose. The following transcript has been reviewed, edited, and approved by the narrator.

TABLE OF CONTENTS

PART 1

- 00:52 A Family Transition – Moving from Southern Appalachia to El Paso Texas
- 03:12 Uranium Wealth and Fortune – Drawing Me into Mining and the University of Texas-El Paso
- 08:07 Low Coal Mining – A Young Man’s Job and A Group of Men Doing Anything for One Another
- 09:43 From a Honeymoon in Denver to A Career with the US Bureau of Mines
- 14:10 Supervisor of the Denver Office of the Bureau of Mines Wilderness Program
- 18:44 Second to Earn a Master’s Degree in Mineral Economics from the Colorado School of Mines
- 22:38 An Eventful Two Years in Ohio – Implementing Strip Mining Laws and the Reclamation Board of Review
- 27:01 Bureau of Mines Serves the Mining Industry
- 31:26 The Federal Surface Mining Control and Reclamation Act of 1977
- 36:04 Kansas City Regional Director – Regulating State’s Reclamation Programs
- 38:32 The Reagan Administration’s Impact and Becoming Assistant Director of OSM
- 41:41 Differences Working in the East and West Mining Regions

PART 2

- 00:19 Labors of Love and My Proudest Work
- 03:36 Keeping Up with a Lifetime of SME Membership
- 08:00 SME Professional Registration Coordinator – First Step in Creating a PE Exam
- 11:34 Burning the Midnight Oil and Sharpening Skills – Testing Questions for the PE Exam
- 14:31 Forming the SME Mining Reference Handbook – Closing the Study Gap for Students
- 16:09 The Elephant's Grip – A Historical Novel of the 1859 Colorado Gold Rush
- 24:04 A Husband of 57 Years and a Proud Father
- 26:59 Climax Molybdenum Company – Where My Mining Story Began
- 31:00 The Move from Coal – New Environmental Sources for Heat
- 34:19 SME President’s Citation – Making the Changeover from Subjective Evaluation on the PE Exam

PART 1

00:52 A Family Transition – Moving from Southern Appalachia to El Paso Texas

Filas:

Today is Monday, February 24th, 2020. This is an interview with Raymond L. Lowrie, who is a mining engineer and former Assistant Director and Regional Director of the Office of Surface Mining. He was also the Chief of the Intermountain Field Operations Center for the US Bureau of Mines. I'm Barbara Filas, and I've known Ray for many years; and I'm honored to get to tap into Ray's professional background as part of the American Institute for Mining, Metallurgical, and Petroleum Engineers Oral History Project. We're here in downtown Phoenix, Arizona, attending the SME Annual Meeting and Exhibit. Now we'll be discussing Ray's mining sector experiences and his impressive contributions to the industry. Let's take a big step back, Ray, and let's talk a little bit about where you're from and how you grew up and that sort of thing.

Lowrie:

I was actually born in Alcoa, Tennessee, back during the depression days. My dad worked at the Aluminum Company of America plant in Alcoa, Tennessee. He made \$8 a week. This was depression days. We moved around a little bit as a young person, but my dad ended up with a job in Texas, first in Dallas. So, we moved to Dallas, and my early grade school years mostly was in Dallas. Then, he got transferred to El Paso, Texas, West Texas, which was quite a move for my parents because both of them were from southern Appalachian states. My mother, Elizabeth Buckner Lowrie, from Western North Carolina, she was raised on a tobacco farm. And my dad, Carl Henry Lowrie, from East Tennessee, here they are in West Texas. We didn't know for how long, but it turns out we were there for quite a long time. I grew up in El Paso, Texas.

Filas:

Did you have siblings?

Lowrie:

I do. I have a brother, Ernest Benson Lowrie; he's still living. He was a professor at Penn State. I had two sisters: older sister, Mildred Cornelison Meder, she's passed away, and a younger sister, Carlene Kennedy Lowrie, also passed away. So, that's my siblings. My older sister was also born in Alcoa, Tennessee, my brother in North Carolina, and my younger sister in El Paso.

03:12 Uranium Wealth and Fortune – Drawing Me into Mining and the University of Texas-El Paso

Filas:

So, I'm going to ask you what influenced you to become an engineer. But, before I ask you that, because I think you mentioned that you were in the Navy and that might've had something to do with your decisions on your career path.

Lowrie:

Correct. I graduated from high school in May of 1950. One month later, the Korean war broke out. I went down and tried to join the Marine Corps. I was only 17 years old, and you have to have parental consent.

My Dad wanted me to go to college. So, I started college, turned 18, and then joined the Navy instead of the Marine Corps. I did four years in the Navy. One of the significant things, I spent a year in Yokosuka, Japan. One of the officers that I was under, I was a second-class aerographer's mate. Aerology is the science for weathermen. This officer I was under was a graduate of New Mexico School of Mines. He knew I was about to get out of the Navy, so he put a rush on me to go to Socorro, New Mexico, to be at New Mexico School of Mines.

I gave it serious consideration, but El Paso at that time had the remnant of Texas College of Mines and Metallurgy, which has become the University of Texas-El Paso. They still had a mining program then, and this was during the fifties, during the uranium boom, and uranium fortunes were being made in uranium all the time. Charlie Steen, the great uranium owner at Moab, Utah, was actually from the school there in El Paso. And, he was an extremely wealthy, multimillionaire. At that time, and I'm not sure this is the best of reasons for going into a profession, but there was an awful lot of money being made, and it was being publicized. That drew me into the mining profession. But, I decided to stay there at El Paso because after having been gone for four years, I was kind of homesick, and it seemed prudent to go there to what was then called Texas Western College, now UTEP, University of Texas-El Paso.

That's how I got into the mining industry, not into the industry; I was just into the school. When you get ready to graduate in most of the mining schools, companies come and interview some of the students who are about to graduate. I was interviewed by Lone Star Steel, which is a steel company that made pipe in East Texas. They hired me for the coal division, which is in Eastern Oklahoma. Eastern Oklahoma has very good met coal, metallurgical grade coal. And, I went to work for the Lone Star Steel company. One of the mines was outside of McAlester, Oklahoma and their other mine was outside of Bokoshe, Oklahoma. So, I went to work for them as an engineer for two underground coal mines. It's low coal; so, If you ever know anything about working in low coal, it's quite an experience.

08:07 Low Coal Mining – A Young Man's Job and A Group of Men Doing Anything for One Another

Filas:

I've always thought about low coal as being very claustrophobic. Did you find it that way? A lot of people that work in low coal prefer it because they feel a safer feeling.

Lowrie:

It is claustrophobic, and you have to get used to it; Or, once you do, it's kind of like a group of men all loving each other. They would die for each other. They would do anything for each other. It's a cult almost, the low coal miners, and it's a good thing. It's a good, good relationship. It's hard to work under low coal because you're either stooping all the time, or working sitting down, or on your knees. And, of course, you wear knee pads; your knees just go to mush after a few years of working in low coal mines.

Filas:

It sounds like a young man's job.

Lowrie:

It is a young man's job. I had to quit because I was hurt in an accident, not a mine accident, it was a car accident. I had two broken vertebrae in the small of my back. And, I had a crushed heel bone. Your heel bone is a very small bone. Mine was crushed, had seven breaks in it. So, I was very uncomfortable with a

broken back and that broken heel bone. You are just kind of dragging it, working in low coal. So, I got out of there.

09:43 From a Honeymoon in Denver to A Career with the US Bureau of Mines

Lowrie:

I decided I would become a lawyer. I went back for my convalescent period, back to El Paso with my parents. I had made an application to the University of Texas Law School. They wrote me back and said that I needed to have speech and accounting. And so, I took those two classes in summer school at UTEP, getting ready to go to law school at the University of Texas. Backing up a little bit, I met this girl in McAlester, Oklahoma. She was a teacher in California, but we'd met when she had come home to McAlester to spend Christmas holidays. We dated every night. So, I called her up and asked her to come down to El Paso to see me. She did, she came over to El Paso, and we decided to get married. So, there went the law school idea. On a honeymoon, we went from McAlester, Oklahoma, to Denver, Colorado. I knew the USGS hired mining engineers in their conservation division because we had some federal coal in Oklahoma. USGS regulated what kind of percentage you would get in the federal coal that you mined. So, I knew some of the people in the conservation division of the USGS. I went to their office in Denver, which is in the Denver Federal Center on the West side of town. I walked in, told them I was looking for a job. They said, "We don't have any openings right now, but the Bureau of Mines is hiring somebody that's got your background." So, I went over there to the Bureau of Mines at the Denver Federal Center, and they seemed very happy.

They'd been looking for somebody with my background, underground coal mining, for quite some time. They said, "If you can pass the physical, we'll hire you on the spot." And, I said, "Well, good." So, my wife and I went back down to El Paso, and I got our old family doctor to agree that I can pass a physical and did all the paperwork, and we went back to Denver. That's when I started with the government, with the Bureau of Mines, which does not exist anymore. But, I worked for the Bureau of Mines for quite some time. I stayed there for a while, and I did a lot of interesting Bureau of Mines work there. But, I was transferred to DC, worked in DC headquarters, and the division I went to was bituminous coal. Worked in DC, stayed there for a while, came back in a promotion to Denver, and stayed there for quite some time.

14:10 Supervisor of the Denver Office of the Bureau of Mines Wilderness Program

Lowrie:

I was a supervisor of the Bureau of Mines Wilderness Program. The 1964 Wilderness Act required that the USGS and the Bureau of Mines evaluate all of the primitive and wilderness areas in the United States. Out of Denver, we covered quite a few of the Rocky Mountain States: New Mexico, Arizona, Utah, Colorado, Wyoming. So, there was quite a few wilderness areas in there that I was involved in evaluating for the Bureau of Mines, the mineral potential of those areas, along with the USGS. All that work is completed now. It was published in USGS series of publications of the mineral potential of each of those wilderness areas. Of course, they've been expanded and additional ones have been added. What they're doing on the mineral potential there since then, I don't know. But, the 1964 Wilderness Act required the USGS and the Bureau of Mines to evaluate the wilderness areas at that time.

Filas:

A lot of the USGS and Bureau of Mines publications ended up on the OneMine[.org] website. Have you ever

Googled your name on that to see how many of those publications come up?

Lowrie:

I do have a couple of our other Bureau of Mines' publications, but I haven't Googled for the USGS because, as a supervisor, I ran the program, where we had people that were mining engineers, subordinate to me, actually doing the work. So, their names are the ones on the ones with USGS. Sometimes they would give credit to me, but when you're running a unit and professionals are working in the unit under you, they get the credit, and they should get the credit.

Filas:

Totally agree, totally agree. So what was the most interesting project that you worked on with the Bureau of Mines?

Lowrie:

Oh, I evaluated a coal mine in Utah that had made an application for some financing with SBA, Small Business Association. So, I evaluated the mine and the market and determined that he couldn't sell the coal. The coal was to go to a particular power plant. I talked to the power plant, and they were not interested in this particular mine's coal for technical reasons; the coal didn't quite meet their needs. So, I reported that, and it really caused an uproar from this coal operator because the government turned him down on his application for financing. With all the shouting going on there, that was interesting.

18:44 Second to Earn a Master's Degree in Mineral Economics from the Colorado School of Mines

Filas:

Yeah, sure. I see that you have a master's degree in mineral economics, tell me a little bit about that.

Lowrie:

Yes, the start of the Bureau of Mines was because of coal mine disasters, and the Bureau of Mines started in 1910. For a long time after that, the mission was to stop these disasters, truly disastrous accidents in coal mines. Coal mines evolved over the years, and the Bureau of Mines still researched coal dust and gas suppression techniques but got quite a bit into metallurgy and rock mechanics. [They] became the world's greatest experts in rock mechanics and economics of producing minerals from lots of different deposits. And so, economic and environmental aspects became a large focus of the Bureau of Mines. For economics, we had a new assistant director that pushed economics. His name was Bill Vogely. I was considered one of the up-and-coming engineers at the time, and they sent me back to school. Colorado School of Mines had started a program teaching mineral economics. I was the second person to go through that program, and, of course, this was while I was working for the Bureau of Mines. I went there and got an MS in mineral economics from Colorado School of Mines because it seemed so applicable to what we were doing at the Bureau of Mines. I was the second person to get a master's degree in that program.

Filas:

Yeah, it was a master's. I wanted to confirm that because I thought it was a master's, not a bachelor's, I think. So, during your academic years, did any professors at either Texas or at Mine's, any people stand out

in your education?

Lowrie:

In my undergraduate years, I had a mining professor whose name was Guy Ingersoll. He was out of Minnesota, the Iron Range, and he kind of took me under his wing. There was another professor in the geology department named Bill Strain. He was just an outstanding professor. You have a lot of different professors, and you learned a lot from them. But, every now and then, an outstanding one pops up and sort of gets through to you. And, this is such a man. He's retired now.

22:38 An Eventful Two Years in Ohio – Implementing Strip Mining Laws and the Reclamation Board of Review

Filas:

As you were working with the Bureau of Mines, I think you mentioned to me before we started this interview, that you were moved over into Ohio for a position.

Lowrie:

The state of Ohio, in 1972, passed a very strong strip-mining law that pertained to coal strip miners. This state didn't really have in-house technical expertise in that topic. So, the Department of Interior, the Bureau of Mines was part of the Department of Interior, had little expertise either because there was no federal law at that time, so it needed to have some expertise. The Bureau of Mines sent me through what's called the Intergovernmental Personnel Act, to Ohio to assist in the implementation of this strong strip-mining law. I was to be the assistant chief, assistant under the guy that ran the program, to help him from a technical aspect. After I got there, this person became ill. So they asked me if would I do the program. So, I did, I became the chief, and I was there two years.

That was the most amazing two years I think I ever had because, in state government, in a politically controversial position, I had to do it all. Not being experienced in politics, not being experienced in that topic at all, but all of a sudden, I was in, and I mean I was really in. I got sued where I had to make an appearance in front of what was called the reclamation board of review. That's for lawsuits. During the two years I was there, I was in front of that board 14 times. I was in front of the state legislature committees House and Senate. I lost count of how many times. But, it was almost always on short notice that a call would come up, come in, Ray, we need you down here in front of a House committee. So, it was a couple of miles drive down there. Without preparation, you make a statement. The chairman of the committee asks, what do you have to say about some issue and so you say what you have to say. It was two years, a very good experience, but it was a heavy experience. Then after the two years were up, I went back to the Bureau of Mines. And, shortly after that, they promoted me to be the head; I was the Chief of the Intermountain Field Operations Center, which is quite a significant position in the Bureau of Mines.

27:01 Bureau of Mines Serves the Mining Industry

Lowrie:

At a later date, the Federal Surface Mining Control and Reclamation Act of 1977 passed. I became one of the regional directors at Kansas City, Missouri. Basically, because of my experience in doing regulation of coal strip mines in Ohio. [Filas: From the Ohio position] Yes, of course, you knew I had a lot of mining

industry experience.

Filas:

But, there wasn't a lot of regulatory experience in—

Lowrie:

Oh no, it was regulatory in Ohio, but not in the Bureau of Mines. The Bureau of Mines is the only agency in the federal government that had the mining industry as its mission to make sure it was successful. It started out with mining disasters and not much regulatory responsibility. After a while, it was in the 1970s, there was a reorganization in the Department of Interior that put the minimal regulatory function the Bureau of Mines had over in a new agency - MESA, Mining Enforcement Safety Administration. It was in MESA for quite some time. Then, at some point after that, Congress decided to take MESA and put it over into the Department of Labor and changed its name to MSHA, Mine Safety and Health Administration. The regulatory function went from, which was weak when it was in the Bureau of Mines, to MESA. It was much stronger. And then, over into MSHA, which was even much more stronger. The Bureau of Mines was left with the purpose of defending and helping and promoting the mining industry. Much to my chagrin, much later in the nineties, about 1994 or 5, Newt Gingrich wanted to eliminate a federal agency. At first, they said the purpose was to get some federal agency, and they had in mind the Fish and Wildlife service. But, it turns out there are too many fishermen, and there are too many hunters. So, the Fish and Wildlife service has a powerful constituency. It was too powerful to eliminate. The Bureau of Mines constituency was the mining industry, and the mining industry didn't make a big enough stink to save the Bureau of Mines. It was not funded; they just didn't fund it. So, with no money, you're out.

Filas:

And, I think many of us in the mining industry have regretted that day for a long time.

Lowrie:

Because it's a sad day, 1994, 95, one of those. That was a really, really bad day for the mining industry.

31:26 The Federal Surface Mining Control and Reclamation Act of 1977

Filas:

Let's go back to the seventies. You were in the Interior Department in various positions, whether it was the reclamation in Ohio or whether it was the Bureau of Mines, and you ultimately ended up at the OSM. So, what was your role during the development of the surface mining control and reclamation act and the promulgation of those laws and regulations?

Lowrie:

Well, I started out as a regional director in Kansas City. And, the early days of the implementation were kind of a rough time because the coal industry had to do a lot of things that they hadn't had to do before. Many of the underground coal industry didn't realize that they were even under the surface mining control and reclamation act. Suddenly, inspectors showed up at these underground mines; Where's your permit? Where is your reclamation plan? What are you talking about? They didn't realize. That's one of the reasons,

I think, that the surface mining control and reclamation act passed was the underground coal industry didn't oppose it that much. They thought it would be advantageous for them in competition with surface mining. That's not all of the underground mines, some are much more in tune, but a lot of the operators, especially the small ones, didn't realize. So, politically, there was something else to be, an agency where you're enforcing laws and regulations that they don't like.

There's a lot of screaming; but, as it turns out, the most, it's like 99.9% of the coal operators today, realize, and they even compete with each other on doing reclamation. We do a better job than you do. I can show you any number of places that you can't even tell a mine ever existed there because it's so well reclaimed. Natural vegetation is on it—lots of animals, deer. You can't tell it was mined, so what's to complain about that? Nothing. A lot of my job was working with the states because, at the beginning, it was called the interim program. Each state that wanted to put together a permanent program submitted a very detailed, very comprehensive proposal to us, and we went through it with a fine-toothed comb and required some changes. For the most part, things were acceptable, and we then recommended approval, and they were approved by the Secretary of Interior. So much of my work was involved in dealing with the various states that submitted programs.

36:04 Kansas City Regional Director – Overseeing State's Reclamation Programs

Filas:

So, you dealt with approving the programs. Were there some states that had coal mines that were under your jurisdiction that you had to regulate directly?

Lowrie:

We regulated directly until the permanent programs were approved. The first one in the United States that was approved was Texas. I got some kudos; essentially it was in my region. The second state to be approved was Montana. Montana had existing; when the federal act passed, they had existing, a pretty decent program. Before the federal act passed, so it wasn't a big deal for them to change over. Montana was under the jurisdiction of the Denver office. As you know, when you're head of the whatever program, whatever office, you have a lot of people under you that are doing the work, and you're overseeing it, and you're worried, and you get blamed, but you have other people that are doing the actual work.

Filas:

I can see that you must've had a lot of people who liked working with you because you were giving credit to your subordinates rather than taking credit.

Lowrie:

OSM and the Bureau of Mines, too, have a lot of idealistic people that come in and work. And, many of them, you have to slap down a little bit; they're overboard. But, yes, I had a lot of good people, and I had good relations. I never had to terminate many people. I have had to terminate a few.

Filas:

It's always hard. Isn't it?

Lowrie:

Yes.

38:32 The Reagan Administration's Impact and Becoming Assistant Director of OSM

Filas:

So, as assistant director of OSM, I see that you spent some time in Pittsburgh and in Kansas City.

Lowrie:

Yes, at the end of my tour in Kansas City, it was because of the change – this was a huge change for the United States, not just for our lives. Jimmy Carter was President of the United States, and then it went to Ronald Reagan. Ronald Reagan brought in James Watt as Interior Secretary. James Watt had his own ideas on how things— Reagan ended up having to fire James Watt. Watt blew the agency apart, and the whole idea was to transfer everybody, allow them to quit because they might not transfer, and this happened. I was transferred to Pittsburgh. It was either transfer or out the door. I wasn't old enough to retire, So, I went to Pittsburgh. I headed up what was called a technical center, Eastern Technical Center. And, we provided the technical support for all the inspections east of the Mississippi River, all of Appalachia, which was a good experience for me because I hadn't really worked that much in Appalachia.

When you're in the coal business, that's good to get more knowledge on the coal industry in Appalachia. That went on for several years, and a new director came in. He needed somebody back in Colorado, and I leaped at the chance. I went back to Denver, and they changed the names of the titles of the positions from regional directors to assistant directors. Why? I don't know. It's basically the same job even though you have a little bit different title. So, I became assistant director of OSM for the area west of the Mississippi, including Alaska. I went up to the Usibelli mine in Alaska, several times. In fact, I was all over Alaska during that time.

41:41 Differences Working in the East and West Mining Regions

Filas:

As you know, I started my career in coal, and I worked both in the West and the East, or at least as far as Illinois goes. But, there was a very strong cultural difference between coal miners in Illinois, and I did some work in West Virginia, and those in Colorado and Utah. Did you see that from the regulatory side?

Lowrie:

From a regulatory side, I think it's really hard to say. I know Ohio is really a part of Appalachia. The coal part of Ohio borders Pennsylvania, West Virginia, Kentucky, so it's Appalachia. Some of those coal miners would do the best work you could possibly imagine. There are always a few select, 1/10th or 1% East or West, that will fight you on everything. So, even though culturally, in other ways, I can see many differences, but not really so much in coal mining.

Filas:

Did you ever see any influence from the regulatory side when a mine was a union mine versus a non-union mine? Difference in performance, a union mine versus a non-union mine?

Lowrie:

That was not a factor unless you just happened to know that this a union mine. The mines that I worked at when I was in Oklahoma, actually in mines, they were both union mines. That was a shock to me because I never knew that there was such a difference between union and management until you get there. Then you get there, and you realize there's a real, real difference. That was not an issue any of the time when I was with the Bureau of Mines or OSM. The union, non-union thing was not a factor.

PART 2

00:19 Labors of Love and My Proudest Work

Filas:

What are you most proud of, of your professional career, the regular day job, if you will?

Lowrie:

Oh, man. Why didn't you tell me you were going to ask that?

Filas:

We can skip, and I can ask it again later.

Lowrie:

Well, I think the proudest thing that I have received or gotten or done is my reference handbook; I think it is probably the nicest thing. It's also important, lots of people have it and use it. In the first edition, there are some little mistakes, here and there, that I hated that they're in there, but they're in there. Individuals out in the industry would call me or call SME or something, and it would get over to me to figure out what we do. And so, we [made] at least 5 or 10 changes, small changes, but changes were made later, in later printings of the first edition. Hopefully, all of them are out of the second edition. After that experience of— That's a big deal to work with a whole bunch of other people, 30 other engineers, on one project that ends up in a book. I looked at the latest edition of the mining engineering handbook, not my book, the big handbook, by Peter Darling and its predecessors, which I had all the way back to Peele's. There are all kinds of mistakes, and all of them are big efforts with lots of people, and then I didn't feel so bad. But, at first, I did. At first, I hated that there was a mistake in there.

Filas:

I think we all look at the work that we do and could rewrite things every time. They really are labors of love, though, aren't they?

Lowrie:

They are. I mean, they are labors of love in the true sense.

Filas:

Well, I think your book was probably one of the better, if not one of the best-selling, books that SME has had over the years.

Lowrie:

Thank you.

03:36 Keeping Up with a Lifetime of SME Membership

Filas:

We really didn't talk about how you got into being a part of the SME organization or even AIME, back in the day.

Lowrie:

AIME, I think the year was 1956; I started college after the Navy in 1956 and right into the mining engineering program. The faculty, and one of these faculty members that I mentioned, made us join AIME. You couldn't not join; you joined. What's that? Are you going to be a mining engineer? You joined! And, I joined the AIME, and we had a few local section meetings. I don't recall all that happened, but, at some point, I was in SME. I think it just transferred my membership from AIME over into SME. I've been a member, dues-paying member, ever since, including this year. So, I intend to keep it up as long as I keep up, which I hope is a good while.

Filas:

And, we hope so, too. So, you retired from OSM, then, with time, you ended up actually working for SME.

Lowrie:

That's right. I did some consulting for mining companies, and SME got in need of somebody. One of my friends, a former employee, now passed away, recommended me to SME.

Yeah, he [Gary Howell] called me up and asked me if I'd be coming in for an interview. I said, sure. I came in, and he hired me on the spot, and that started it. But, let me tell you, I had been in management a long time. I've been away from the details of engineering for quite a while. So, the first months, months, and months, I had to really bone up. I mean, I really boned up on my engineering to be able to do the job, even though I've been a PE forever.

I got a PE less than ten years out of college, something like ten years. So, I've thought back on it, it was one of the best things that ever happened to me because, after you get into management, you atrophy in some of your skills that you used to have. I had to get back up to speed after having been in management, and it was really good for me. It was one of the best things that ever happened to me, even though, if you're the professional registration coordinator of SME, it's not the most impressive thing in the world. It is a very good thing to do because it makes you get busy and relearn things you've forgotten and learn some things you never knew that come about. So, it was a very good experience for me.

08:00 SME Professional Registration Coordinator – First Step in Creating a PE Exam

Filas:

What exactly does the professional registration coordinator do at SME?

Lowrie:

As coordinator, there's a committee at SME, a professional registration committee. And, it probably has 20 to 25 members, some number like that. I understand this has just recently changed, but, when I was there and for quite some time after that, the members would write a question and the answer that was in a particular subject that they were expert in. Then there were categories that you had to have so many questions in this category, that category, another category, and so, these members were experts in all these individual categories. Maybe not expert in all of them, but expert in some of them. They would write a question and an answer, send it in to me. I would format it and put together all of what would be a proposed exam and send that package to the National Council of Examiners for Engineering and Surveying, which is in Clemson, South Carolina. They would maybe do some analysis on the work. I don't think they changed anything. And, they would provide that to all of the states that performed a mining engineering PE exam for the National Academy of Examiners for Engineering and Surveying. They did this for other branches of engineering, too, electrical, civil, etc.

That was their function. And, the reason they were providing it to the states, the state government doesn't really have the expertise in all of these engineering fields to write a PE exam. So, we were the first step in the PE exam. My part was to coordinate SME's professional registration committees' output, put it together, making sure everything was hunky-dory, and ship it off to the National Council of Examiners for Engineering and Surveying.

11:34 Burning the Midnight Oil and Sharpening Skills – Testing Questions for the PE Exam

Filas:

You mentioned you're a PE, and you got that many years earlier. I know that if people had to submit certain things to OSM, as a regulator, some of those things had to be certified by a professional engineer. So, this was a critical part of the kind of work you had been doing for a long time, wasn't it?

Lowrie:

Oh, sure, sure. I was familiar with all this work. When I say familiar, it doesn't mean that you're an expert in certain parts of metallurgy, for example. Incidentally, what we used to call ore dressing was metallurgy or metallurgical engineering. So, I was knowledgeable of these topics, but not an expert in each of the topics; and really nobody else was expert in all of them, but we had experts in each of the individual topics. They would provide what they thought was a reasonable problem and solution. One of my unofficial policies was— I had a lot of choices. I might have ten questions on the same narrow topic. So, I had to pick one or maybe two on that narrow topic. My unofficial policy was, I would never send off a question to end up on the PE exam that I couldn't work. I mean, I always made sure I could work through that question.

Filas:

So, you really had a chance to sharpen your skills?

Lowrie:

That's right. It meant that you had to burn the midnight oil, getting back after a significant part of my lifetime in management where you're not actually doing that work. Barb, I know you know, you atrophy

some because you're not doing that work, you're doing other important work, but it's not that work.

14:31 Forming the SME Mining Reference Handbook – Closing the Study Gap for Students

Filas:

And, we all forget things, but at the end of the day, you recognized that there was a gap in the books that students could use to help them with the PE test. And, that's how the engineering handbook came about. Is that correct?

Lowrie:

That's correct. I knew that students, or people that were sitting for the exam, would bring in volumes of books, stacks, big stacks because they wanted to make sure they had access to information so they could pass the PE exam. And, I thought to myself, wouldn't it be nice if you could have it all kind of reduced down to something manageable that you could fit in the glove compartment of the car and distill it down. And, you have to admit; there's an awful lot of stuff in these larger books that you never use, so you leave that out. I mean, that's what you're trying to do, is leave out the chaff and pick the good stuff, and put it in a smaller book. And, that's what we did, less than 400 pages.

16:09 *The Elephant's Grip* – A Historical Novel of the 1859 Colorado Gold Rush

Filas:

And, a lot of engineers have used that book in taking the test, but that's not the only book you've been involved with. I have a copy of another book that you were involved with that you did, I believe, on your own. Maybe you'll tell us a little bit about this one?

Lowrie:

Sure, sure. Well, I have a belief that everybody would like to, at some time in their life, write a novel, and I'm no different. So, I thought about one of the key things in a novel: you write about something you know about. I suppose it was 20 years I've thought about writing a novel. I thought about the Gold Rush in 1859 to Colorado. Colorado was not a state in 1859. One of the famous things about Colorado at that time was Pikes Peak. Pikes Peak had been found by army officer, Colonel Pike. At any rate, people referred to the Colorado area as Pikes Peak; I'm going to Pikes Peak, people that were moving across the country. So, in 1859, it was hard times in the United States. There were economic problems, and gold was found in what now is Central City and the Black Hawk area of Colorado.

And, this was a second gold rush. The first big gold rush, everybody knows about is 1849 to California. Ten years later, in 1859, gold is found in Pikes Peak. It created a mentality of, "I want to get rich, there's where I want to get rich." So, this young man grew up in the Midwest, and he wanted to come to Pikes Peak to get rich. So, he announced to his family, his father, I'm going to Pikes Peak, and I'm going to make my fortune. His father was opposed to it, but he went anyway, along with a step-uncle. They ultimately, after they went through all the trials and tribulations of getting across the Plains, Indian warfare and hostilities, competition from other people in the Pikes Peak gold rush, anyway, they made it out there. And, they made their fortune with the help of an old, wizened, old-time miner who had been to California and came back.

So, he learned all about mining, and they made their fortune. There's aspects, this was prior to the civil war in the United States, there was an attractive, black, woman slave that they saw escape from a slave auction

on the trip to Pikes Peak. She shows up later on in the movie; I wish they would make it into a movie. She shows up, and because she had been a slave – but here she was basically free, illegally, but free – she put a lot of intellectual and moral pressure on the guy that had made a lot of money gold mining. Because the way she saw it, he had treated the Indians along the way badly.

What we did to the American Indians in manifest destiny, now this is just only a part, small part of manifest destiny, got to him. The bad things we did made a real impression on this guy. So, she and he ended up getting together and forming a charitable institution to help Indians that were in need of help. The book is called *The Elephant's Grip*, and the reason I named it, *The Elephant's Grip* is in the sense of you seeing the elephant in the room as a big powerful being. The elephant in this story is gold and the greed that people were experiencing in getting gold; that's the elephant of *The Elephant's Grip*. This is where the title came from.

Filas:

I like that. You call it a novel, but it sounds like it has a lot of historical background.

Lowrie:

It does, and it's got a lot of mining in it. Some of my readers that don't know anything about mining told me I have more than I should. Many of the things that in the early part of the development in Central City and Black Hawk, this is before gambling now, was surface mining, panning for gold. So, I'd talk about how do you pan for gold. It's part of the development. It seemed to me quite useful for me to tell people how you pan for gold. There's a lot of underground mining and disasters. You know, there were disasters back then. I have some of those in there, underground disasters. There's a good bit of mining in this novel. But It's a historical novel.

24:04 A Husband of 57 Years and a Proud Father

Filas:

I asked you earlier about what you might've been most proud of, and one thing I can see is you and Mariann have been together for a long time.

Lowrie:

57 years.

Filas:

That's a pretty good accomplishment. Did you guys have children?

Lowrie:

Two children; one son (John Carl Lowrie) and a daughter (Suzanne Elizabeth Lowrie). Our daughter lives with us in Sun Lakes, Arizona. Our son, I'm quite proud of him. He's a lawyer, works in Denver. I'm proud of him because he went to Afghanistan, spent five years over there trying to get the rule of law established in Afghanistan. He went over under a contract with a company. After two years, the state department picked him up, so he spent the last three years working for the state department in Afghanistan. The state department has— it's a real issue to send their people into combat zones, and so they were glad to get him.

He had some horrific experiences. The worst one was in Herat, Afghanistan, which is almost on the border with Iran.

It's a consulate, a United States consulate in Herat, Afghanistan, that was bombed. It was like five o'clock in the morning. He was asleep. Everybody was asleep. It blew the door off of his room. In a firefight that occurred after the bombing, eight members of the security force protecting the consulate were killed. They killed nine attackers. That's a pretty hairy story, but my son didn't get injured.

Filas:

I'm glad to hear that.

26:59 Climax Molybdenum Company – Where My Mining Story Began

Filas:

So, we've talked about a lot of things. Is there anything that I didn't ask you that you were hoping to share?

Lowrie:

Oh, Barb. Let me think about that. We didn't talk about Climax [Molybdenum Company].

Filas:

That's right.

Lowrie:

That's where I got started in the mining industry. I recommend that to anybody, any mining engineer: go to work for some mining company, go underground, and be a miner. You learn more about mining than you ever learned in school. You really do. To start at Climax, they started everyone at the Philipson Level. That's where I started. Then they put me down on the Storke Level. This was before they sunk a shaft down to a lower level, but that was after me. I never worked down there. I drove as a miner on the Storke level, one of those slusherdashes, where you drive it in and then drive up these finger raises. They had a job called a hang-up man. That wasn't for me; I never did any of the hang-up work; it's very dangerous. He was the highest-paid miner there; I've forgotten what the pay was. They paid him a lot more, where you climb up into the crushed rock, put explosives up there, come back down, and blow it up, and hope nothing moves while you're up there. Are you familiar with Climax?

Filas:

I've never worked there, but I've been up to see the sites, and, since it's reopened, I'm sure you have seen it since it's reopened? And, it's a big change.

Lowrie:

Yeah, it's a big open-pit mine now. But, it was strictly underground then. At the time I was there, which was 1959, it was the largest underground mine on the North American continent. It was huge. I've forgotten numbers on production, but it's a lot. Of course, it produced most of the molybdenum, hard to always say in the United States, most of it. So, but again, for all mining engineering students, you learn a lot in your

classroom, but you really learn a lot when you do the whole thing: drill the hole, load it, shoot it, muck it, scale it, put up roof bolts, and start over. We even had to run the cars out of the mine and dump them. So, it was kind of like you do everything. After we got through, a concrete crew would come in and concrete the area, and part of the finger raises.

31:00 The Move from Coal – New Environmental Sources for Heat

Filas:

So you worked hard rock, you worked coal. Was there a reason you stayed in coal, or was it...?

Lowrie:

No. It's just like you—your life is not what you plan and what you want to do, it's what happens around you; opportunities present themselves. You could go this way, or you go that way. Not to say either way is better, but you have to pick a way, and you go. At first, when I went into coal, I wasn't so sure I liked it. The people in coal are really good people. And, coal, even though here it is 2020, and coal is really down and doesn't have much of a future, it was quite a good thing back when I started. It had a good future. I think all the fossil fuels, coal, oil, and gas, were in a transition. And, for heat, it's got other things beating it out, gas, solar, wind. Beaten over time for heat. I'm not talking about for chemicals or for lubricants, plastics, substitute materials. Coal, oil, and gas will always be useful for that, but, for heat, there are other environmentally better and economically eventually better sources for heat. Not for chemicals, not for plastics, synthetics, lubricants. That'll always come from fossil fuels.

Filas:

Anything else?

Lowrie:

You've asked me a good bit about my life.

Filas:

I really have enjoyed learning a lot more about your life. I've known you for many years, but we've never really just sat down and had the conversation.

Lowrie:

Well, you don't go into this much detail normally. You know, what would have been interesting is having my wife sitting here, and she would have learned some things too.

Filas:

And I would have enjoyed that.

34:19 SME President's Citation – Making the Changeover from Subjective Evaluation on the PE Exam

Filas:

In your SME time, I see that you were the recipient of a president's citation.

Lowrie:

That's correct. And, that was because of my service as the professional registration coordinator. There was a particular issue that came up while I was there that I got the president's citation for. Prior to me being the coordinator, there was half of the questions that were put together for an applicant to answer. Questions that were not four or five answers to it.

You laid out your work, and how did you get to that answer. You laid it out on a piece of paper, the applicant did, for half of the exam. And so, in the grading of those exams, they would send it back to us, and we would convene a meeting at an SME place and evaluate the work on these questions. It might be the wrong answer, but if you did good work all the way through and made a mistake and got the wrong answer, you still get partial credit. The problem with that, from the NCEES standpoint and their statisticians, is they couldn't control what you might do and what I might do. You might say, well, he did good work and made a mistake right at the end; let's give him full credit or almost full credit.

I might say, as a hard-ass type, he got to the answer wrong. The bridge would fail, no credit. So, it was too hard for NCEES and their statisticians to continue with that for half of our exam. So, we changed over, and that changeover was where I got the president's citation. We have discussions, some difficult discussions, with NCEES that I had to present. We ended up having to do what they said, and I understand even now, there are more changes to be made. But, the president's citation was because of the work I did as a professional registration coordinator.

Filas:

But, that changeover actually went from the society members were grading the papers, and then you moved over to a single answer?

Lowrie:

You go over to just a multiple choice. So, you have a form where there are four or five answers, pick one. We went from show their work, or you make some expert, one of our experts makes a subjective evaluation. What's that answer worth? And, like I said earlier, you might say, well, he got, his process was correct. He knows the topic. He made a mistake in the arithmetic at the end; let's give him full credit. And, somebody else says, with the wrong answer, the bridge might collapse, nothing. This guy gets nothing on that. And so, that difference in people is what bothered the statisticians, and rightly so.

Filas:

SME resisted that for a long time.

Lowrie:

Yeah.

Filas:

But, the change ends up being more clear to the test taker.

Lowrie:

When you think about it, it's probably, from our statistician's point of view and probably from the larger point of view; it's probably a good thing to get rid of that subjectivity in there because there's so much difference. You're familiar with the mining industry. I am, too. And, you know there are some real individuals in there that, by God, I know it, and if you don't do it the way I say you should do it, then you're wrong. I read a little joke the other day, it said, "I'm no longer going to argue with people. I'm just going to let you be wrong."

Filas:

You're also an SME distinguished member. That is a very tremendous honor because it's only bestowed on a very small percentage of the membership. I'm sure that was a function of your long-time history with SME but also the work that you did with professional registration.

Lowrie:

That's right. There is a committee in SME that considered me, along with others. I think maybe they only do one a year, I think, and, somehow, I came out on top, so yes. I see you are, too, and you certainly deserve to be too.

Filas:

Well, you've had a very impressive career and contributed a lot to the industry. And, it's been my honor to visit with you today.

Lowrie:

Wow, Barb, I really appreciate that, and it's my honor to be with you. And, I also think you've got a very fine husband.

Filas:

Well, I think he's okay too.