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University of California
Berkeley, California

Global Mining and Materials Research Oral History Project

George Luxbacher
Mine Planning, Consolidation, Remediation, and Adaptation to Regulatory Change
in the Coal and Chemical Industries

Interviews conducted by
Paul Burnett
in 2015

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George Luxbacher

George Luxbacher is Principal at MELM Consulting, LLC, providing liability management services to the mining, oil & gas, chemical industries related to environmental issues and discontinued operations. After graduating from Penn State, he began his career in the early 1970s as a mining engineer for Pittsburgh Coal Company (a then Consolidation Coal Company subsidiary), leaving to return to Penn State for his MS and PhD degrees. After graduation in 1980 he joined Occidental Research Corporation, remaining employed by various Occidental Petroleum Corporation subsidiaries, including Island Creek Coal Company and Glenn Springs Holdings, Inc. (Occidental's environmental remediation/reclamation subsidiary), until he retired in 2015 as Senior VP at GSH. After retirement he formed MELM to return to his mining roots. He served as President of the Society for Mining, Metallurgy, and Exploration (SME) in 2008 and the American Institute for Mining, Metallurgical, and Petroleum Engineers in 2012.

Table of Contents— George Luxbacher

Interview date: February 15, 2015

Family origins in Pittsburgh and continuity of mining occupations for several generations—childhood memories of US Bureau of Mines Bruceton Research Center—majoring in mining engineering at Penn State, satisfaction of a variety of interests—importance of practical engagement in education—operations research and time-motion studies in the 1970s—UMWA militant but also very collaborative—first job as safety engineer at Pittsburgh Coal Co. (subsidiary of “Consol,” Consolidated Coal Co.)—Master’s degree and doctorate in mining ventilation—Bureau of Mines’ support for health and safety research—ground control research position with Island Creek Coal Co. of Occidental Petroleum Corp. in Madisonville, KY—conventional vs. continuous coal mining—moving to Island Creek operation in Lexington, KY—working with standardizing reserve data and supporting Dr. Armand Hammer’s new operations in China in the 1980s—global forays spur computerization and technological change at Island Creek—emergence of computer specialization at Island Creek in the late 1980s—practical experience vs. publication record in mining-related academia—importance of mentorship and professional societies such as AIME—named Director of Mining Engineering, 1985—price cycles and “super-cycles”—project evaluation, mergers and acquisitions, contracts, “forensic engineering”—mining becoming far less labor-intensive—sale and handoff of Island Creek to Consol—high cost of treating closed properties—impact of federal and state regulation of coal industry—Love Canal—managing liabilities, in many cases indefinitely, under CERCLA and RCRA—burden of past image of mining on business climate in the United States—maintenance of US standards in operations abroad—development of expertise in environmental remediation—running International Marine Terminal trans-loading facility in Belle Chasse, LA—designing and patenting a phosphorous recovery plant in Maury Co., TN—more on risk assessment and health and environmental protocols and standards—development of realistic standards of risk rather than containment and high-level remediation—move to Dallas as Senior Vice President of Operations for Glenn Springs Holdings—service to AIME, as member and president, and SME as member of Coal Division and president of entire society—family—passion for history of mining—recognition and awards

Global Mining and Materials Research Project

For over twenty years, the Regional Oral History Office (ROHO) produced in-depth oral histories of members of the mining community, under a project called "Western Mining in the Twentieth Century," which was overseen by Eleanor and Langan Swent, Douglas Fuerstenau and others. <http://bancroft.berkeley.edu/ROHO/projects/mining/index.html> The 104 interviews in the project covered the history of mining in the American Southwest, Mexico, South America, and Australia from the 1940s until the 1990s.

ROHO has recently changed its name to the Oral History Center of the Bancroft Library, and with that change we proudly announce a new project entitled "Global Mining and Materials Research," which will focus on key transitions in technology, policy, and geopolitics that have brought mining to its current state worldwide.

Much has changed in mining industries in the years since the Western Mining project was in full production, including the increased globalization of mining operations, the decreasing concentration of mineable minerals in ore, increasingly complicated regulatory environments, new systems of environmental remediation, new technology for exploration, extraction, and processing, and new stories of political conflict and resolution. In addition to collecting interviews about mining engineering, metallurgy, and administration, we also hope to explore the history of information technology and data analysis with respect to mining, as well as the legal, regulatory, and policy history of the industries.

This interview was funded with support from the American Institute of Mining Engineers, Metallurgists, and Petroleum Engineers (AIME), the Society for Mining, Metallurgy, and Exploration (SME), the Association for Iron & Steel Technology (AIST), the Minerals, Metals, & Materials Society (TMS), and the Society of Petroleum Engineers (SPE). We are also collaborating with the IEEE to host these oral histories on the Engineering and Technology History Website, located here: http://ethw.org/Oral-History:List_of_all_Oral_Histories. Thanks also to former Western Mining Project Lead Eleanor Swent, Dr. Douglas Fuerstenau, and Noel Kirschenbaum for their advice and support while the Global Mining Project was being established. Finally, we are most grateful to George Luxbacher for taking time out of a busy schedule to speak to us about the evolution of the mining industry over the past forty years.

Paul Burnett, Berkeley, CA, 2015

Interview #1 February 15, 2015

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01-00:00:09

Burnett:

This is Paul Burnett interviewing Dr. George Luxbacher for the Oral History Center's Global Mining and Materials Research Project of the business series. It's February 17, 2015, and we're here at the Convention Center in downtown Denver, Colorado. This is audio file one. Dr. Luxbacher, can you tell me a little bit about your background and where you were born and a little bit about your family?

01-00:00:37

Luxbacher:

Yes. I was born in Pittsburgh, Pennsylvania, in 1951. As a matter of fact, just as a little aside, the other day I was going through some files and I came across the bill my mother got from the hospital the day I was born. It's just interesting to see that I still had that. I was born in 1951 in Pittsburgh. My dad, at the time, was a meatpacker. He worked for a meatpacking plant. My mother was a housewife. We lived in Baldwin Borough, in the South Hills of Pittsburgh. When I was younger, the meatpacking plant my dad worked at closed, and he was off of work for a few years and did some other things, and then wound up in the steel mills. So, my blue-collar background. I'm one of five children. I was the first to go to college. Even between my dad's and my mother's brothers and sisters, I believe I was probably the first to go to college. So, real blue-collar background.

01-00:01:45

Burnett:

And in coal country, too.

01-00:01:46

Luxbacher:

In coal country, too. In Pittsburgh, while we were in coal country, we weren't really in coal country. You're in a rural area, and I really didn't know a whole lot about coal mining at the time, other than the fact that we were close to the US Bureau of Mines Bruceton Research Center. As kids, you always do these field trips, so we went on a field trip to Bruceton, and I still remember this. This was burned into my mind. They would do a methane ignition in the mine. They have a mine car in there, and they'd ignite the mine and blow a mine car out the portal. So you'd have all these kids there that came for a field trip, and they'd set this off, and the mine car would come blowing out the entry. It's just burned into my mind. I just remember that day vividly.

01-00:02:33

Burnett:

You thought that was pretty neat?

01-00:02:34

Luxbacher:

I thought that was pretty neat. But I really didn't give a whole lot of thought to being in the mining business. My dad's father—so my grandfather, who I never knew—he had died of black lung well before I was born. He had been a coal miner, and he and all his brothers had been in the mines. I think one of his brothers was killed in a mine explosion, another one in an accident within the mine, but it was a strong mining family. My grandfather was a mine foreman, possibly a mine superintendent. You never really get an answer out of my dad, because my dad didn't really remember too much of this. But my dad did remember going underground with my grandfather on weekends to start pumps and things like that, so he remembered my grandfather going underground with

his tie on and everything. The more formal management role, going underground on weekends to start pumps and things like that. But I really didn't give a whole lot of thought. My other grandfather worked in the mines, too. My mother's family immigrated from Croatia, and my grandfather on my mother's side, one of the first things he did when he came to the United States was work in the mines. He had a mining background, and then he left the mines and became a shoemaker. Both my grandfathers worked in the mines, one grandfather extensively, the other grandfather just for a short period of time. As a matter of fact, one of the houses my mother grew up in was very close to where the Bureau of Mines Bruceton research facility was, right down the road from that.

When I decided I wanted to go to college, it was a path predetermined. I really wanted to do that. I started out at Penn State in electrical engineering, simply because I was an amateur radio operator and I was interested in electronics and things like that. So I went to Penn State and I started out in electrical engineering, and quickly realized that it was a numbers game. It's like most of these fields, so many kids wanted to be electrical engineers that the whole system is geared to getting rid of people as quickly as possible, weeding out, so you can narrow it down to those that want to go forward. Being first generation going to college, I just didn't feel comfortable in that environment, so I thought, I need to find a different major. I moved over to geology. I went over from the College of Engineering at Penn State to the College of Earth and Mineral Sciences, and I went into the geology curriculum to work on a BS in geology. I did that for a year. I had an advisor over there, and I still remember I went in to him one day to talk about courses and everything, and he said, "You have a lot of potential, but there's no jobs for bachelor's in geology, so you might as well already plan on the fact that you're going to have to get a master's, and probably a doctorate." His speciality was plant paleontology, and he said, "I think you'd make a good plant paleontologist." I'm sitting there. I'm first generation. I'm happy I'm just in college. Here I have a guy telling me already that I have to get a master's and doctorate, which to me was well beyond anything I could ever dream I was going to do. So my answer to that was, "Well, I'm going to go find another major."

I debated what I wanted to do, and I was over at the College of Earth and Mineral Sciences. They had a mining engineering curriculum. I went over and I talked to Joe Hunt, who was at the department, and Tom Falkie, Dr. Falkie, who's actually here at this conference, and I made a decision that this mining engineering thing looks pretty interesting. I'll go back to my grandfather's roots and I'll become a mining engineer. That's really what got me in the path. It was a sort of convoluted path to get there. What's interesting, just as an aside, is I have a son who's a mining engineer and a daughter-in-law that's a mining engineer. My son, I never dreamed he was going to be a mining engineer, but he grew up listening to me talk to my friends, and when the time came for him to decide what he wanted to do in college, it was predetermined to him. He was going to be a mining engineer. This is the path he wanted. I got there a little bit of a different path.

01-00:07:05

Luxbacher: Yes, I'd taken some advanced classes in calculus and all that kind of stuff in high school. I really wanted to be an engineer. Growing up, my father, since I was a blue-collar background, basically, I didn't know a whole lot of people that had been to college. It wasn't the kind of people, all my uncles and everybody, and the people that my dad met. So I really didn't have any role models, per se, other than the fact that I met a lot of engineers through amateur radio. That's why I went that direction to start.

01-00:07:37

Burnett: That is ham radio?

01-00:07:39

Luxbacher: Ham radio, yes.

01-00:07:40

Burnett: This was big that time. My uncle is still a big ham radio enthusiast.

01-00:07:45

Luxbacher: It was big in that time. I'm not so much these days, simply because I have so many diverse interests that it's—but back then, that was a major part of my life. All my friends were ham radio operators, and it's what we did.

01-00:07:59

Burnett: It was kind of the internet of its day.

01-00:08:01

Luxbacher: It was the internet of its day, yes. I loved code, Morse code. That's mostly what I did, was Morse code. Yes, it was the internet of its day. Talked to people all over. I still have boxes and boxes of what are called QSL cards, where you confirm a contact, and so you mail these back and forth to each other. I have boxes and boxes of these things from that era.

01-00:08:25

Burnett: You also maintained your equipment? Is that also part of it? You had to know to recap the—

01-00:08:31

Luxbacher: You had to have more knowledge. Today, everything is solid state. You just go buy something. Back then, you had to have a little bit more engagement with your equipment. That's why I had an interest in electronics, and starting out in electrical engineering. The interesting thing about going into a mining curriculum is—and this is what I really like about a mining curriculum—is you get exposure to all elements. I took classes in electrical engineering, I took classes in geology, I took classes—so you had the basic engineering classes, but we had more surveying than the civil engineers had, because underground surveying is a very complicated deal. We had more surveying than the civils. We got exposure to electrical. All those different fields. It's a great curriculum.

01-00:09:18

Burnett: It's very hands-on, very practical. It's a little early in the interview to get philosophical, but one of the things that people have been talking about in education is there's this technological enthusiasm, but what passes for technological enthusiasm is dumping a laptop in a child's hands and expecting them to sort of figure stuff out. This is a different kind of engagement.

01-00:09:43

Luxbacher: This is a different kind of engineering, different kind of engagement. That's part of the problem today with mining. Kids today, they grow up with video games and everything. To them, they don't want to get their hands dirty. It's a different kind of view of engineering, whereas I was thrilled to go underground. I was thrilled to get the hands-on and the practical aspects of this, to actually go out and be a ventilation engineer, and take what I learned in school and actually apply that at the mine level and things like that. Today, kids come into this—I think we get kids that have a background in mining, family background, and they understand what they're getting into, but there are other kids that just want to do the software part and things like that, and they just don't quite grasp it.

01-00:10:28

Burnett: It's not so much their fault; it's that we've black-boxed computing. We've black-boxed technology. You just sort of use the apps, but you don't understand the intimacy of the electronics and the machines and how they work, and the math involved.

01-00:10:42

Luxbacher: Part of this, as I mentioned earlier, before we started the interview, I'm interested in history, so I've been going back and looking at AIME history. I look at the engineers of the early era. AIME was founded in 1871, so you're looking at 1871 to 1900 era, and you look at what these guys had to do in terms of hands-on and practicality, and all of that carried through, still carries through, to the curriculum today. Very hands-on curriculum. I'll go back to the mining engineering at Penn State. I went into mining engineering at Penn State. I started, and I immediately got a summer job with Consol. And it was interesting, I was paid more money on my first summer job than my dad was making working at the steel mill. Here I am, and I'm working UMWA. Worked at the Oakmont mine as a wireman. I laid rail and hung wire, because you had trolley, and this was an old mine where they were still running DC equipment and everything else. So it was an old mine. I hung wire. We drilled holes and hung wire, and I laid rail. I worked on Saturdays. Any time they'd give me, I'd take it. But I made more money working as a summer guy in the mines than my dad was making working at the steel mill.

01-00:12:00

Burnett: When you said UMWA, you were working union?

01-00:12:02

Luxbacher: Union, yes. It was a union operation. I started out and I worked at Oakmont one summer, went back to school, and then the next summer I worked company, salaried instead of union, and I did time studies at different mines. That gave me an opportunity to get a little bit more engaged in a different aspect of it.

01-00:12:21

Burnett: It's so interesting. I spoke with Dr. Falkie yesterday, and he talked about the time studies that were going on at that time. I asked him, and I said, "Is this kind of like Frederick Winslow Taylor time-motion studies?" He said, "Yeah, kind of." I guess the question in my mind is, this is in the late sixties?

01-00:12:46

Luxbacher: No, no. I graduated high school in 1969. I started at Penn State then. I would have worked UMWA probably in '71, and then time studies in '72. So that era

right there. Penn State had a big deal. Dr. Falkie and everybody had—mining is a very cyclic thing. It's not a production process where things just roll off the production line. So, especially underground mining, you come in, you mine, you've got to do roof support. You have to haul and everything. You have all these unit processes going on, and there was a big thrust at that time to model some of these things, and doing modeling and everything. There was a lot of interest in how you improve efficiency. For example, shuttle cars, which hauled the coal from the continuous miner to the load-out. I was working for Pittsburgh Coal Company, actually is where I started working for summers, and Pittsburgh Coal Company didn't have belts. We used rail haulage back then. It was still rail haulage. Just where the shuttle car tie point was would have an impact on the time it took the shuttle car to run from the continuous miner back to the load-out. [loud noise] That's a loading dock next door. So they do time studies. We were doing time studies on the efficiency and all that kind of stuff to see how we could improve productivity. Consol liked to put summer interns into that kind of work because it gave you a real opportunity to learn how the process really worked underground.

01-00:14:25

Burnett:

I guess what's fascinating is that time-motion studies in industry, that's 1910, 1915 or so, and this is now 1972, 1973. What accounts for that lag? Is it because the processes are difficult to—that because it's not a continuous- process industry?

01-00:14:50

Luxbacher:

Let me point out that people were doing time and motion studies during that period of time. It wasn't like the industry didn't do that, but I think there was more of a focus on it toward the seventies, and an attempt to try to improve productivity. I think there was really a focus on declining productivity at that point in time and trying to get the productivity back up on a tons-per-man basis. Penn State was doing a lot of work at that time on simulators, so they could simulate the process.

01-00:15:23

Burnett:

Operations research.

01-00:15:24

Luxbacher:

Operations research, yes. Under an operations research mode. That's what they were doing. A lot of the companies were going back and focusing on this, too. When I actually went to work, and we'll get to that a little bit later on, when I went to work for Island Creek, they actually had a very strong industrial engineering group that did nothing but time studies and things like that. It's a component part of the industry. The thing you have to remember is mining is different than everything else, because your geologic conditions change every day. It isn't like you come to a room and your ceiling is the same and the walls are the same. It's a continually changing environment, and you adapt to handle that changing environment, and you have to adapt your processes, too. This mine is different than that mine. They may use the same equipment and everything, but geologic conditions, floor conditions, may be different. You can always tweak the system.

01-00:16:19

Burnett:

This is the fascinating thing about the mining industry. I'm going to be talking with a number of other folks as well about different aspects of this, but the tremendous unpredictability of something that's being done by very large social and technical systems.

01-00:16:41

Luxbacher:

We would like to argue that, today, we have a little bit more knowledge because we've improved on our predictability, just simply because we continue to advance. We understand exploration and things like that a lot better. But back then, we used to call it exploration by continuous miner. So you basically mined, and your conditions changed. You had a little bit of an idea what a paleo-depositional environment was and how that impacted roof rock and things like that, and floor conditions, but you really didn't know a whole lot. You just went in there, you had core-hole data that was probably from the 1900s sometime, and you used that for your planning purposes. Quality wasn't necessarily all that critical, so you weren't too worried about sulfur content or anything like that unless you were mining met coals, metallurgical coal, as opposed to thermal coal used in heating. You really didn't do a whole lot of predicting ahead of time. Actually, when I first got started back in the seventies, that's when there was really starting to get a thrust toward that.

01-00:17:41

Burnett:

Is labor also a part of it? Because labor's agreements—and I do not know this at all, but I'm guessing here—starting in the sixties, labor's pay increases were keyed to productivity. Is that—

01-00:17:59

Luxbacher:

To some extent, but you're talking United Mine Workers. United Mine Workers is a little bit different than most other unions. Very militant union. For example, later in life, I'm dealing with other unions. I'm dealing with chemical unions a little bit, for example, and I've seen contracts that are written that you can only force a guy to walk a half a mile an hour or something like that. It's even specified in the contract. You don't have those kind of things in a UMWA contract. I truly think the UMWA is a little bit more of a partnership with industry, but they were still a militant union. That was about the time that different things happened within the unions, too. Very interesting period of time.

01-00:18:47

Burnett:

I guess going back to your education.

01-00:18:52

Luxbacher:

I finished my bachelor's and interviewed at a number of coal companies. I actually flew out to visit AEP, and it was the first time in my life I had been on an airplane. Again, the blue-collar background, and back when people didn't fly quite as much, so it was interesting. I interviewed, I don't know, four or five different jobs. Got job offers from everybody I interviewed, and then decided that I had worked for Pittsburgh Coal Company, which is a subsidiary of Consolidation Coal Company, as an undergrad, so I'd worked union for them and worked salaried, and I decided to go back to work for them. It was right there in Pittsburgh, an area I was familiar with, and just decided to stay there. So I joined Pittsburgh Coal Company and started out in the safety department. That's the direction I went there.

Very first job was as a safety engineer, and looking at accidents back in that time. I had actually done a column for *Geotimes* that talked about this a little bit a few years ago. Back then, the fatality rates—an industry that fatalities were extremely common. When I worked for Pittsburgh Coal Company, we had eight mines, eight or twelve mines, within the Pittsburgh Coal Company Group—I'd have to actually count them to remember how many—but, average, we had a fatality a month. So we would investigate fatalities and things like that, and accidents. Very different than the industry today. A lot of that had to do, at that time, we used rail haulage, even section rail haulage, so we had a lot of fatalities with people crushed between cars and things like that. Very different industry today. I was a health and safety engineer for a while. I still remember I was talking to a fellow from Consol last night about we had to clean out file cabinets. We were short of space, and I still remember emptying file cabinets and throwing things away, and we had accident reports from the early 1900s, 1920, 1930, talking about a mining section. It listed the number of languages being spoken on the section. It was hand-loading, so you had fifteen guys on a section, and there were twelve languages spoken, and the section foreman didn't speak any of those languages. It's just interesting. It's a shame, when I look back on it, that we threw that stuff out. We trashed tons of that stuff.

I was a safety engineer for a while, and then I moved over into division engineering. I took over a division engineering role for three mines. I handled the underground surveying, planning, mapping, things like that, for three different mines. I was doing that, and then I was debating what I wanted to do. Here was a guy who said he didn't want to be a geologist, because I couldn't comprehend the fact I'd go back for an advanced degree. I had made a decision that this is interesting, I'm enjoying this, but I need more education. I had started looking at an MBA and applied to Carnegie Mellon and Duquesne and a couple of other local universities, and I was about to do an MBA, while I would continue to work, probably, or try to work something out there where I could continue to work. Out of the blue, Bob Stefanko from Penn State called me and said, "I have a research project on ventilation. Would you be interested in doing this?" One of the things I had done for Consol was I was a ventilation engineer. That was when I was in the safety department. That was one of the things I did, was mine ventilation. I had done mine ventilation surveys at probably eight different mines within Pittsburgh Coal Company, and I'd probably done simulations on the mines and things like that.

I don't want to divert too much, but that was always interesting to do these ventilation surveys, going back into places in the coal mines where nobody had been in twenty or thirty years, but you were trying to figure out where the mine course is. Even though you had to walk certain air courses legally, there were places we had to get to try to figure out the mine that nobody had been in for quite a long time. It was an interesting project. Bob knew I had been doing some of those things, and so Dr. Stefanko called and asked me to meet with him and talk to him about coming back for graduate school. I had a young family at that point in time. I had a daughter, and I was a little bit worried about funding and all of that. Bob convinced me to come back, be a full-time student for nine months, and then he put me on as a teaching assistant. So that's what I did. We packed up and moved back to State College to become a grad student. And with no intent on getting a doctorate, just getting a master's. That was just it.

I wanted something more, because one of the interesting things, mining was so hands-on, there were so many rules of thumb, and here I was doing planning, and people were saying, “Okay, we want to put an air shaft in every three miles, so we’re going to put the plan in. We’re going to put an air shaft in here.” I’m a ventilation engineer, I’m doing simulation, but there were so many people that were focused on the rules of thumb, the old way to do things. I said, I’m going to go back to school, I’m going to get an advanced degree and find out what direction I really want to go here, and do a little bit more engineering. Bob gave me that opportunity, and it was a great opportunity to come back and work on my master’s.

Moved to Penn State. Lived in an apartment for nine months, bought a house. Moved into a house there and worked on my master’s. Got my master’s in mine ventilation. Penn State was doing some things with their vent simulation, so I got my master’s. I tied that into an actual underground ventilation survey that I did at an underground mine, Vesta 5, as I recall. Former J&L mine. I forget who had it at the time. I did an underground ventilation survey, tied that into the Penn State ventilation simulator, and helped complete a whole bunch of different government contract reports we had to do. Finished that, and then Bob says, “Well, I’ve got research for a doctorate if you want to do a doctorate.” Without even really intending to, I wound up staying at Penn State to get my doctorate.

01-00:25:13

Burnett:

I guess the other piece of this is that you mentioned government contracts, there’s a demand for safety research, because, in the 1970s, there’s OSHA, and I guess NIOSH becomes a—

01-00:25:28

Luxbacher:

As I mentioned, we had a lot of fatalities in the industry when I worked at Pittsburgh Coal. The fact that we knew we were going to probably have a fatality every month at that point in time in industry was—you know. It was not admirable for the industry, but you had the Bureau of Mines, and Bureau of Mines was—that’s one of the worst things that happened to this industry, when the Bureau of Mines went away. But you had the Bureau of Mines funding university research on a slew of different things. At that time, you had work being done on automated [roof] bolting. Some concepts that industry had tried, but here’s the government funding this research on trying to improve worker health and safety, trying to remove the worker from that hazardous environment, move him back. That’s basically where a lot of the funding. I was blessed that I was there at that time and I could receive Bureau of Mine funding for this. That was the ventilation work, and then they continued to fund the work—I did my doctorate on trailing-cable protection, and that was under a Bureau of Mines contract as well.

01-00:26:39

Burnett:

Did this research alter the rules of thumb in some cases? Did you find surprises?

01-00:26:50

Luxbacher:

You never alter the rules of thumb. You’ve got the old guys after you. There’s still rules of thumb. But I can say that I felt that both my master’s and my doctorate helped advance the practice of engineering. To that extent, I felt we actually brought something to the table. I don’t think I would have picked mine

electrical systems to do my doctorate on, even though I was a ham radio operator and everything. I had gotten away from that. I was more interested in other areas, but that's where the funding was. Bureau of Mines had a research project, so I wound up doing my doctorate on mine electrical systems. During that time, Penn State had a small contract on going back and reexamining the Sunshine Mine fire, which was interesting. They gave three universities a small contract to look at that. Michigan Tech—Rudy Greuer—Colorado School of Mines, and Penn State.

01-00:27:40

Burnett:

Briefly, can you talk about the Sunshine Mine fire?

01-00:27:45

Luxbacher:

I've got to think way back in my mind on all this, but Sunshine Mine fire was a major hard-rock mine fire that occurred. A number of people died. It was related to the smoke migration underground and things like that. This wasn't even coal-related; this was hard rock out in Idaho. There was a lot of litigation over that and things like that as to how the smoke propagated and how that cut off people's escape from the mine and things of that nature. Penn State was one of three universities to examine that. That was a very interesting project. These were the little things that came up while I was at Penn State that gave me an opportunity to do some other things. That was really an interesting project.

01-00:28:36

Burnett:

So you complete your Ph.D. in which year?

01-00:28:42

Luxbacher:

I graduated in 1973, and I graduated a term early, because I had been electrical engineering, I had been in geology. I had so many credits that I was well ahead of the curve, so I graduated early. I graduated in winter '73. Went back to school in '75. Finished my master's in '77, and then finished my Ph.D. up in 1980. In 1980, I graduated with a Ph.D. and tried to figure out what I wanted to do. I had some overtures from a couple of universities. The faculty situation back then was not as dire as it is today. Today, it's a big issue. Back then, it wasn't quite. But I had an opportunity. I could have gone and I could have taught. At that point in time, I had basically put financial gain on hold for a number of years. I had a growing family at that point in time. I had two children. I decided, okay, it's time to make some money here.

It was interesting. Consol called me back. They wanted me to go to work for their research group. Doug Dahl, who is a good friend, wanted me to come back to work for them. Hilmar Von Schonfeldt, who I'd worked with at Consol, wanted me to come to Oxy [Occidental Research Corporation, a subsidiary of Occidental Petroleum Corporation]. I had a couple of universities, I had a couple other options. I really felt at that point in time I wanted to get into some type of a research mode, rather than just go back to engineering. Here I am with a doctorate. It's sort of hard to go back and be an engineer for a coal company. I wanted to get into the research mode. Occidental—since I had worked for Consol, I knew Consol—it was just interesting. Here I got this opportunity from Occidental, who owned Island Creek [Corporation], to go a different direction, different mines, different coal fields. I just thought it would be intriguing, so I elected to go that route, and I went to work for Occidental.

Occidental was doing mining research. Occidental, at the time, they had bought a company called Garrett Research. Garrett Research morphed into Occidental Research Corporation. They were doing the work on oil shale out in Colorado. They were doing work on coal-water mixtures, coal-oil mixtures. They had a slew of different projects underway. They also did the mining research for Island Creek Coal Company that Occidental owned. So I went to work for Occidental Research in Island Creek's West Kentucky Division. That's what I did. I wound up in Madisonville, Kentucky.

01-00:31:21

Burnett: This is purely extraction research?

01-00:31:24

Luxbacher: Well, mining systems. Yes, extraction, but mining systems. Ground control and things of that nature. I went out to West Kentucky and hit the ground there. I'm the only person there from Occidental Research. It's a coal company. They're trying to produce coal. I had to fit myself into their culture and things like that. I had a vast enough background in operations that I could easily step into that. I did ground control research. Actually, they were doing conventional mining there yet, so they were doing continuous mining and some conventional mining. When I had worked for Consol, I had seen both. I forgot to mention, when I was with Consol, I actually got my miner's papers, my machine-runner's papers, and my shot-firer's papers. I had an opportunity at Consol to run the underground equipment when I was working UMWA and salaried, and also had the opportunity to do some blasting and things like that. I had my certifications there.

01-00:32:30

Burnett: Just a brief question about conventional versus continuous operations and how they're different.

01-00:32:36

Luxbacher: "Continuous" is not continuous, but they define it as continuous. Conventional is a little bit different. You come in, you have the coal face. You undercut it with a coal cutter. You come in, you drill holes, you shoot it down. Then you come in with a loader and you load it out. So it's basically a drill blast for underground coal. Continuous simply means that you have a cutting head with cutter bits on it, so you cut through it. To some extent, you're continuous. Unfortunately, you have to get the coal from your miner back to a belt head or something like that. Over the years, different things have been tried, continuous haulage to run from the miner back to your haulage, be it belt or be it rail, going out of the mine. They've tried different things. So "continuous" is a misnomer. You actually operate for a fraction of the time that you potentially could operate that equipment. When I went out to west Kentucky, they were still running mines with conventional equipment, and they were still running mines with continuous miners, too, so they had both. They were actually planning for longwall mining, doing some planning for longwall mining. I had the opportunity to do a lot of ground control research out there and work on specifications for longwalls and things of that nature. Very interesting. Very different from the Pittsburgh seam, where I had worked for Consol and done a lot of work in the Pittsburgh seam. I'm out in west Kentucky in the number nine and number eleven seams, and just very different conditions and things like that, which is one of the reasons why I went with Occidental, is I wanted a chance to see what Island Creek had in the world versus what Consol had in the world.

01-00:34:11

Burnett: And ground control is managing the flow of the coal?

01-00:34:14

Luxbacher: No, ground control is managing roof conditions. We were very interested—

01-00:34:19

Burnett: Oh, *literally* ground control. [laughter]

01-00:34:20

Luxbacher: Ground control, yes. The ground control, so you don't have roof falls. We were doing a lot of planning out there for longwalls, and we were trying to size pillars and stuff like that. I actually put a lot of convergent stations in underground and would go underground to measure roof convergence and do plots and things like that, and morphing all this into some pillar design and things like that. It's interesting, because we mined in places—we had mined the eleven seam. We were mining the number nine seam underneath. You tend to get floor heave and things like that if you don't superimpose pillars and do different things, and I had an opportunity to do some ground control related to that, too, some convergence of major floor heaving events and things like that. It was interesting work, but here I was, I had come from—I lived in Pittsburgh, moved to State College, university town, and then I moved to Madisonville, Kentucky, a town of 8,000. Very small town, dry town. Can't get a drink in a restaurant. It was very different. My spouse at the time was not extremely pleased with that. I think it was a little bit of a cultural shock, a little bit different.

01-00:35:31

Burnett: That was a bit of a navigation.

01-00:35:32

Luxbacher: Yes. Occidental Research's solution to this was to send me for a while down to Keen Mountain, Virginia, where our Virginia operations for Island Creek were, to show me how their research group down there, what they had to contend with in southwest Virginia. It was a little bit different. There was an opportunity that opened up with Island Creek then in Lexington, Kentucky. They advertised for a position for a Director of Engineering, Data and Technical Services. It was an opportunity then to relocate to Lexington. I actually saw this ad in *Mining Engineering* for the position. Here I am, working for Occidental at Island Creek's mines, and I open up *Mining Engineering* and here's this ad for Island Creek. I said, wow. So I applied. That's how I moved from Madisonville, Kentucky to Island Creek in Lexington. I morphed over to the Lexington group.

01-00:36:31

Burnett: What were you doing at Island Creek when you got there?

01-00:36:35

Luxbacher: When I went to Island Creek, it was a newly-created position at the time. It handled managing of the reserve function, the company reserves and things of that nature. We were just starting to get involved in China then, and Island Creek had a big thrust, big project, in surface mining in China, and the vice president of engineering, who I was working for when I went there, he spent 80 percent of his time on the China project. This was a big thrust for Occidental, Dr. Hammer. It meant a lot. The VP of Engineering was trying to build an organization that could continue some of the other stuff that he should have been

doing, but he didn't have the opportunity, because he was so involved in China. I wound up in there, basically managing the technical data associated with the company, the reserve data, reserve reporting for the annual report, SEC filings and things of that nature, although coal reporting is a little bit different than metal and nonmetal. There's a lot of vagueness to coal mine classifications and stuff like that for reserves and resources and things of that nature. I managed that. I managed the technical data associated with the various mines that we had. I actually pulled together probably the first summaries of everything associated with each one of those mining operations. It was an interesting job.

01-00:38:05

Burnett:

How do reserve assessments work? Is it more incremental in the sense that, as mining continues, they discover, oh, probably we have more?

01-00:38:14

Luxbacher:

No. Especially in coal mining, you have a fairly good idea what you have. That's one of the interesting things I learned when I morphed over and did work in other Occidental subsidiaries, is, in the coal company, you live, breathe, and die by your reserves. You know what you own. You know what mineral you control, you know what surface you own. I was a little bit surprised when I started dealing with the chemical company and they had no idea what property they owned. Very different. You know what you have, and you have some type of drilling data. Sometimes it's old drilling data, because it's not related to a current mining operation or a mining operation you're planning, so you're not too worried about it, but you can assess whether you have reserves or not. You can base it on how soon you're going to mine it, as to whether it's reserve or resources that are associated with an active mine. Have you planned to put a mine into it? How closely spaced is your drill-hole data, and things of that nature. You have a lot less exploration data in coal than you typically would have in some of these other mines where you're going after metal deposits and things of that nature.

01-00:39:25

Burnett:

So you're data is typically older?

01-00:39:27

Luxbacher:

Older data.

01-00:39:28

Burnett:

Are there questions of translation? Are there different standards, and you have to then—

01-00:39:36

Luxbacher:

Any time you have data that's been acquired over different periods of time, [there are] different interpretations and things like that. At the time I moved to Island Creek, we just started to implement a more rigorous assessment. Whenever we did any drilling, core drilling or something like that, geologists would log it. Before then, we just used the driller's logs, and the driller would tell you what he went through, and that's what you used. Instead, we had more of a focus. We had a couple geologists on staff at Island Creek, and we did a little bit more rigorous assessment of what we did. We started to use John Ferm's [University of South Carolina] classification system for rocks. John Ferm had a booklet with pictures in it, so you could compare your pictures to your core, and then you could—the whole idea was to try to get consistency so

that you could ultimately put this into a computer database. If you put something in as a shaly sand or a sandy shale, and you could code it, it was consistent across the whole board. We were trying to get to that point in time, which is where the industry has driven toward. This is what I was telling you. It's a lot different today when you do assessments than what you did back then. It's been a tremendous change in the whole system. So I managed that function, which was an interesting function. From there—let's see. I'm trying to remember what my next job was.

01-00:41:06

Burnett:

In the interim, when was Island Creek getting into China? What years? When did that start?

01-00:41:14

Luxbacher:

I went to Island Creek in 1982, and Island Creek was already starting to do some work in China. Dr. Hammer was looking for oil and gas reserves, oil and gas assets, within China. He was renowned for being able—the only person who could fly his private plane into Russia and all that. He actually had the same system in China, where he could fly his plane into China. He was interested in oil and gas reserves, and interested in then helping to develop coal reserves as a trade-off then to get access to oil and gas reserves.

01-00:41:57

Burnett:

I know very little about the history of modern China, but I guess the big story is 1978, they start those special economic zones, and that's sort of light manufacturing. I know nothing about western companies' exploration and collaboration with the Chinese state.

01-00:42:18

Luxbacher:

This was one of the first endeavors to do this. I came into this, it had already been going on, so I can't tell you the early history of it, but I can tell you that Island Creek was competing against Consol and several other companies for the opportunity to build a large-scale surface mine in China. We were heavily involved at the point in time I came. I still remember the VP of engineering used to love to pull out his passport. He had extra pages, and there were just reams of stamps from all the trips when he went back and forth. It was a major endeavor. I had draftspeople and a group that reported to me, and several of those people were trying to find people to babysit drill rigs in China. I sent my draftsmen over to China to babysit drill rigs, because we needed people over there to do that. It was a major undertaking for the company at that point in time.

01-00:43:20

Burnett:

There were Chinese mining—I don't know if they're companies, but they're—

01-00:43:25

Luxbacher:

We were working with CNCDC, China National Coal Development Corporation. We had delegations from CNCDC that worked with us on the planning on this and everything. We had delegations of Chinese that were there in Lexington, and they had co-teams and a team that matched the Chinese team, and they would meet and plan and things like that. I basically kept out of that. I was dealing with the US stuff while my boss was dealing with the China stuff, other than the fact that I was also, at the time, putting together an early computer system to do some of the modeling, reserve calculations, and things like that.

Part of that was because we had told the Chinese we had all these capabilities. In truth, we didn't have those capabilities, and so we had to create those capabilities. It was an IBM Series/1 computer. I can still remember this. We were trying to use an IBM Series/1, and we went and we bought a CalComp plotter, a huge belt-bed plotter, and we were trying to do all these things to show the Chinese we could do all this stuff. It was an interesting time.

01-00:44:41

Burnett: That initial spur of globalization actually inspired development, inspired the technological development?

01-00:44:48

Luxbacher: At least for us, yes.

01-00:44:50

Burnett: We need to show that we have some value-added. [laughter]

01-00:44:52

Luxbacher: Yes. As a matter of fact, I was looking back through the list of papers I've done, and I did a couple of papers early on about this, about how we did our mine planning and things like that. Because, as we did that thrust for China then, later on, that morphed into computerized mine planning for our underground and surface operations. Although Island Creek was primarily an underground mining company. We had a couple large-scale surface mines, but primarily they were run by contractors. I always thought it was interesting that here we were selling the Chinese on our capability to run large-scale surface mines, and as a company, we had no large-scale surface mines. We had some people that had experience, but we really didn't have the capability.

01-00:45:35

Burnett: Market the capacity and then develop the capacity.

01-00:45:37

Luxbacher: Yes. That was what was being done there. It was interesting. At the time, we had all these Chinese there, too, and we were trying to do work related to the regular stuff at the same time we were trying to do work related to China.

01-00:45:52

Burnett: The Series/1, is that a mainframe or a mini—

01-00:45:54

Luxbacher: That was a minicomputer, the IBM Series/1 minicomputer. Occidental, their IT group had tied these into their mainframe, the IBM 370 mainframe and all of this. They used these Series/1s as little minicomputers that then interfaced with the main computer. I still remember we had our own spreadsheet that mimicked an Excel spreadsheet or a Lotus spreadsheet that was on the IBM Series/1 and all this, and they used huge floppy disks and all that kind of stuff. I date back to that era. We replaced that. We moved from that to—I've got to think of the computer system we went to. We went to a technical computing system. Again, a minicomputer-based system.

01-00:46:38

Burnett: Customized for—

01-00:46:39

Luxbacher: I'm trying to think of the name of the company at the time. This is horrible. I can't think of it.

01-00:46:43

Burnett: DEC?

01-00:46:45

Luxbacher: Was it a DEC? Yeah, it may have been a DEC. It was another system with the small ones, the small minicomputer that we—and we wound up buying the Eagle [surface and underground mine planning] software off of Morrison-Knudsen. I think it was a DEC. It ran on the DEC. So we got ourselves off of Occidental's mainframe system and migrated to our own little minicomputers.

01-00:47:08

Burnett: This is early-to-mid-eighties?

01-00:47:10

Luxbacher: This is mid-eighties, yes. Mid-eighties, we were doing this stuff. When I got to Island Creek, we had not advanced into the computer era, other than running stuff on the mainframe and whatnot. We thought the Series/1 was the cat's meow. Here we got this computer that we can actually put data in, and the Series/1 will then transmit it to the mainframe. I don't have to have my card decks, I don't have to have my tapes. [By contrast, for] my master's and my doctorate, I still have probably somewhere a couple boxes of computer cards, my computer stuff, and I have a couple tapes. I thought it was great that I could go from my cards to my tapes, so I still have a couple tapes. But I remember the very first computer we bought, we had a guy going to China to do volume calculations and things like that, and we bought an Osborne. This big box. It was this huge box.

01-00:48:09

Burnett: The first portable—

01-00:48:11

Luxbacher: First portable computer, and it had a little tiny screen about this big [indicating five inches]. He had to haul this thing back and forth to China. I remember, I then got one of the very first IBM laptops, and this thing, there was no memory on it. Everything ran off of floppies that you had to put into it. You could do so little, and we thought we were going great guns.

01-00:48:34

Burnett: Cutting-edge.

01-00:48:35

Luxbacher: Yeah, it was cutting-edge. We took the CAD simulator. I remember we got the CAD simulator. We took it from the mainframe. We got it down to the Osborne so we could run equipment. We just really thought we were going great guns. It's hard to think back to that era. But it's funny. Now when I boot up my computer and it takes forever for my computer to boot up, I still remember you'd be doing something on a Series/1 and you'd hit a button, and you'd go get a cup of coffee and come back, and maybe things were done. You get so spoiled on what we have today.

01-00:49:03

Burnett: Absolutely. Engineers in the seventies would have had to be writing their own code for—

01-00:49:18

Luxbacher: There were programs available out there, but you could write your own code, too. For example, at Penn State, like I say, we were doing a whole bunch of operations-research stuff, and that was all being run on the mainframe. Our vent simulator was run on the mainframe. When I worked for Consol and I did ventilation work in ventilation simulation, Consol had an early vent simulator on there, and I had an interface where I could develop a DEC, and it would be run on the mainframe. Everything was done on the mainframe. I took a course in Fortran programming. I thought I was a fairly good Fortran programmer. For both my master's and my doctorate, I wrote code and did some programs, and so I was perfectly capable of doing that. Could I do that today in BASIC or C++? No. My children can. I just don't have the need to write code in what I've been doing the last few years.

01-00:50:12

Burnett: When is that cut-off, or trade-off, I guess, when you are an expert in—you're able to get close to the machine, as it were, and then, at a certain point, you're handing it off to someone called an IT expert? When does that happen? For you, at least.

01-00:50:29

Luxbacher: For me, it happened toward the tail end of the eighties. I just stopped doing that kind of stuff. I was lucky. When I went to work for Occidental and we started doing this China stuff and everything, we actually had a technical computing group that operated out of Tulsa. Andy Bouillot ran the technical computing group. We had a group of people that we could work with on technical computing. At the time, Occidental had a company called Occidental Minerals, and they were doing a lot of exploration in the west on minerals. We had opened up the Candelaria gold and silver mine in Nevada. With Candelaria, the technical computing guys then had done a bunch of modeling and things like that, and Kriging and things. They were developing programs for that kind of stuff. We had the Florida phosphates, because Occidental Chemical ran phosphates, and that was mining, so they were supporting the phosphate mining in Florida, and they were supporting Island Creek Coal Company, too. Suddenly, as we got into China, they started to work with us on these different things. We had the capability then of a trained IT group that was dedicated toward mining for IT support. That helped a lot in developing software and things like that. Up until that, we were doing a lot of this stuff on our own.

01-00:51:46

Burnett: That's fascinating, that period of that hand-off, the late eighties. You continued to work on developing a conception of the operations at Island Creek.

01-00:52:03

Luxbacher: Their reserves and stuff. Let me take a quick glance at a resume and I'll tell you when I started. I'll look at what I did next. Somewhere in here I had one where I had listed up some of the things I had done.

01-00:52:15

Burnett: Because there's a gap here in the late eighties to the early nineties. Occidental Research.

01-00:52:23

Luxbacher: I'll fill that in here in about two seconds. When you start doing resumes, you don't so much worry about the stuff that happened twenty years ago. But I'm going back and I'm trying to create a CV more than a resume right now, because I'm debating where I'm going with my life right now. I'm in a transition period, so I'm recreating some of this in a CV so I can look at some academic positions. That helps.

01-00:52:52

Burnett: Back to, actually, when you were talking about as soon as you finished your Ph.D., thinking about going into academia. Because this is so hands-on, and especially Penn State's work was so hands-on and practical, what are the requirements for publication at that time for Ph.D.s in engineering? Is it a different kind of—you have to publish in journals and there's a set—journals of record that—

01-00:53:24

Luxbacher: No, that's if you want to get tenure, if you want to go to an academic position, then you worry about all that stuff. But for your Ph.D., you're just doing your dissertation. Same thing as it is today. You develop and fed all your time into your dissertation. It's interesting, I have two daughter-in-laws with Ph.D.s, so I've watched them go through this process on doing their research and writing their Ph.D. dissertation. You don't really get into the idea on publishing and all that until you go down to an academic environment. As I mentioned, at the time, I really didn't give a whole lot of consideration to an academic environment. I was interested in making money, and more interested in making money than anything else, and I always figured, well, I'll eventually go back to an academic environment. The opportunity really never arose to do that over all these years.

01-00:54:13

Burnett: Speaking with Dr. Falkie, it seems like, at least in the 1970s, for doctorates in engineering in the academy, they really valued practical experience. So if you were a Ph.D. and you went in, you didn't necessarily publish anything but private reports for companies. There wasn't a kind of open record in the journals of record of engineering journals, but they would want you precisely because you had that intimate connection with industry, you understand what's happening, what's going to be happening in industry. You were of tremendous value to students. So I can imagine that there's less of an emphasis on—in the sciences, for example, you have to do—

01-00:54:56

Luxbacher: Back then, yes. If you wanted to move to an academic position—and that's what Tom was talking about, basically, is there was more of a focus on interaction with students. Today, universities have become huge bureaucracies, much more than they were back then. I think the bureaucracy and the fact that mining is treated just like another program, we don't have the students. For example, it's not like electrical engineering, where you have thousands and thousands of students. Instead, we have fourteen programs in the US right now. Quite a few of those programs are struggling today. The university administration looks at that. So you have to get those publications in. You have to be treated just like

every other department within the university in terms of academic advancement. Back then, the thrust was more to get people who were practical, because you're trying to educate students in a practical discipline. Tom had a lot of great experience. Tom's been a great mentor to me over the years. Tom and Raj Ramani. If you haven't talked to Raj yet, he needs to be on the list. Bob Stefanko, who's unfortunately passed away, and Chuck Manula, who was another guy at Penn State who's passed away. These guys, they were practical people. And Lee Saperstein. Lee also ought to go on your list. These were just great guys, and they really set the stage for where my career has gotten to today.

01-00:56:23

Burnett:

That's so important. We hear time and again, even today, how important mentorship is.

01-00:56:28

Luxbacher:

Yes, most definitely.

01-00:56:30

Burnett:

That face-to-face contact, and both the inspiration and the advice, the ongoing advice. That's really important in any field, I think.

01-00:56:47

Luxbacher:

Whenever I get into this kind of conversation, this is where I always talk about professional societies, because as a past president of SME, past president of AIME, to me, I was a coal guy, and I came to SME and I have friends here who are in fields. I have great friends in the copper business, gold business. To me, professional societies give you that ability to find mentorship, to develop friendships, networking, to learn. I love to come here and go to the Dreyer lecture, the Jackling lecture. I don't care what it's really on. It's an opportunity to hear a presentation, a top-quality presentation. I learn something out of it. It's the whole aspect of continuous learning. To me, people who don't get involved in their professional society miss that opportunity for continuous mentorship.

01-00:57:39

Burnett:

SME is over 10,000?

01-00:57:42

Luxbacher:

Yes. I think we're 14,000 members or something right now.

01-00:57:46

Burnett:

At the conferences, you've got—I don't know. It's a fraction of that, I suppose, but—

01-00:57:50

Luxbacher:

But this conference here will have 8,000 people, which is a lot of people. A lot of these guys are vendors and whatnot, but you cannot miss the interaction that you have over there as you walk around and talk to vendors. Tremendous opportunity. So I'm a big believer in professional societies.

01-00:58:06

Burnett:

I imagine some interdisciplinarity, too, comes in. You might learn something, even if it's gold, but you're in coal, you might learn something about management. There are new techniques being used in different areas, and it gives the opportunity for people to—

01-00:58:21

Luxbacher: There's cross-fertilization in all this stuff. You can always pick up something.

01-00:58:28

Burnett: We can close that parenthesis for now and then talk about—

01-00:58:31

Luxbacher: Come back to it if you want to.

01-00:58:32

Burnett: Sure.

01-00:58:34

Luxbacher: We'll go back to what I was doing at Island Creek. I was manager of technical data and engineering support. Then I moved on to Manager of Mine Planning. I took over more of a mine planning effort, trying to get all of our operating divisions to use some computer software and everything. We had the DEC minis and we were trying to—because Digital [Equipment Corporation, or DEC] had really—came out with that mini platform that was a little box about three feet tall that did what the Series/1 did, and the Series/1 was like eight feet tall. DEC came out with this little mini, and so we migrated all of our planning over to MK Eagle software and started doing that. I started doing more of a planning thing, and then in '85, I moved over to Director of Mining Engineering, so I took over the coordination of mining engineering among all of our operating divisions. All the division mining engineers reported to me. That was an interesting transition, too, because I was dealing more with the day-to-day stuff that was happening out in the field. At the same time, all this China stuff is going on in the background. We're actually building the mine in China and whatnot. Again, my boss is out dealing with China, and I'm dealing more with the day-to-day stuff. I think I was blessed. I've often looked at this like this, that whereas some people have a hands-on manager above them, I had a manager who was never there. So I had an opportunity to do a lot and step into his shoes on a lot of different things that otherwise I may not have had the opportunity to do. I think that really helped me grow, because I took on so many different roles over time. So it worked out very well for me.

01-01:00:15

Burnett: Wow. That's late eighties until?

01-01:00:20

Luxbacher: About '86 I think I did that. Then—let's see.

01-01:00:26

Burnett: During this sort of early period in your career, were there economic downswings or upswings in the coal industry that affected how the work was done?

01-01:00:42

Luxbacher: I guess I should have mentioned that. I saw it all. Whenever the first OPEC energy crisis hit in '73, I had come to work for Consol. Our prices were here, and all the sudden our prices were here [indicating a major increase], just overnight, the coal prices. We started getting more money for our coal during the OPEC oil crisis. Suddenly, we were making too much money. I remember I was told, okay, pre-buy your operating supplies for your engineering group and everything, because this isn't going to last. Because what happens, and I've seen this time and time again, the price goes up. Now, suddenly, you start mining in

areas where you wouldn't have mined when the price was down here. Suddenly, your costs creep up to match that very quickly. It's a short period of time when that happens. So you have your ups and your downs, and—

01-01:01:41

Burnett: That was a knock-on effect of the increase in the price of petroleum, or price of crude oil?

01-01:01:46

Luxbacher: Yes.

01-01:01:47

Burnett: People then switched from oil to coal.

01-01:01:49

Luxbacher: Coal. The people that have the ability to switch. To some extent, oil prices and coal prices—it's energy, so you're buying energy. But you can't readily switch. You can't put coal in your gas tank, but there is an element here where these track each other. The OPEC oil crisis suddenly raised the viability of coal for a lot of other things. It was just interesting. I still remember that. Overnight, all of a sudden the price on coal went up significantly.

01-01:02:22

Burnett: And probably an interest in conversion research as well.

01-01:02:27

Luxbacher: Yes, there was a lot of work being done on that at the time. I saw the same thing—Occidental had used the proceeds from some of the coal mines of Island Creek to fund the North Sea oil drilling. We had pledged against that, so one of the things I had to do early on in my career was we had to continue to show reserves, operating reserves, pledged against a cash flow that funded the North Sea. So we had to report to DeGolyer and MacNaughton. Every year, I had to prepare reserve reports for DeGolyer and MacNaughton. They'd come in and they'd review these. It's interesting. Here I am, many years later, and the Dallas Arboretum has a DeGolyer House down there. I haven't looked into how the tie is, but DeGolyer was the same DeGolyer that lived in Dallas.

I had to do those type of things. Even there, you could look at how prices changed over time. The coal business, you don't make a whole lot of money. What happens is your costs—like our Virginia division reserves for Island Creek had always seemed like irrespective of what price we got for met coal out of Virginia, our cost of production always seemed to rise up to meet that. It's just always interesting. We never made the money we should have made there. Later on, I got involved with our—this is after we sold Island Creek to Consol—I got involved with our International Marine Terminals asset down south of New Orleans, where we had bought it to transship coal, trans-load coal. We never made money there. Our operating costs always equalled our revenue. It was interesting. After we sold it to Kinder Morgan, Kinder Morgan cut costs dramatically and made money out of the whole thing. We should have been making money out of that, too, the whole time. That's just the nature of the business.

01-01:04:38

Burnett: It's the market. It sends those signals. That can lead to good things and prevent shortages, I suppose.

01-01:04:47

Luxbacher: This is a super-cycle business. I'm sure you've talked to enough people, you've heard the term "super-cycle." It was about three years ago we had a meeting here, and one of our keynotes was talking about how this is not a super-cycle, that it's going to continue, that the basics of the industry have changed. It turned out we were back in the super-cycle, and now we're down on the other side of it again. It's just how life goes.

01-01:05:14

Burnett: There was an article in the magazine that was distributed at SME this time around that talked about, although mineral prices are low, down from—2004 was this big boom, and it's down from that, but it's still higher than the long swing. It's in the backs of people's minds all the time about these cycles. I suppose there's a lot of debate about the nature of those cycles, too. That continues. That cycle research has been going on since the twenties.

01-01:05:50

Luxbacher: Yes, it has. One of the keynotes, somebody made the mention in the keynote about you talk about how bad times were, but prices are actually significantly up over what they were ten years ago, so that while the super-cycle goes up and down, you still have prices continue to climb, so there is some benefit to that. But in the mining business, that means then we chase stuff that's less economic. [laughter]

01-01:06:26

Burnett: How did you then transition to the next position?

01-01:06:32

Luxbacher: In '86, I took over responsibility for mine planning, the environmental compliance side, and the geologic function, too, so then I had geologists reporting to me, too. We changed the structure a little bit on how we handled the mining engineering, and instead I took over the planning function, and I took over the geology group. Up until then, we had had a vice president of geology, and then I took that over, so it morphed into me. That gave me an opportunity to do a couple different things, see a little bit different aspect of the company. That was '86 to '88, and in '88, it morphed into projects and evaluations. So I started evaluating things, but I was really doing that all along. Some of the things I did, we bought contract coal. Island Creek sold coal. They would buy it from a small operator and then resell it. We were responsible for compliance, and I did a lot of work associated with confirming that, if we were going to buy coal from somebody, he could actually deliver, because we were going to sign the contract on the other side, and we had to be able to deliver the coal. I looked at a lot of contract operations, some union, some non-union. Quite a few non-union. Interesting time, because I got an opportunity to go to places where the union had been shooting them up, and there were bullet holes. It was interesting times.

I looked at a lot of different operations. Did some work outside the US. Did some work in Peru. Dr. Hammer wanted to do some things to expand his operations in Peru, so we went down and we spent some time looking at Peruvian anthracite. I looked at some anthracite operations down in Peru and

how we would step in to do something there. It really never morphed into anything. I spent a little bit of time looking down in Venezuela, trying to figure out if we could do some work in Venezuela. Different things like that. I worked with the coal sales group. I spent some time with the coal sales guys on some mines we had that were jointly owned with other companies and things like that. I look at the different titles, but really I did a lot of the same things during that period of time. It was interesting, because it got me into a lot of different aspects of the company.

01-01:09:05

Burnett:

It seems like the difference, when you're talking about evaluations, you were always evaluating and assessing, but it sounds like a lot of the assessment was internal. You were assessing the internal operations previously.

01-01:09:15

Luxbacher:

Then I started looking at external stuff, doing a lot more external stuff. It was just the nature of the company at that point in time. We didn't make a whole lot of money. Occidental wasn't really happy with the coal company. The coal company was looking for how you expand and what you were going to do. It was interesting times. We looked at all sorts of bizarre things. We looked at coal mining in Michigan, because we were delivering stoker coal to Michigan, and so we were looking at Michigan coal deposits to see if we could mine in Michigan. That didn't take long to write that one off. It was not a viable entity.

01-01:09:51

Burnett:

From the economic perspective?

01-01:09:53

Luxbacher:

Yeah, from the economic perspective. I did a lot of reassessments, because Island Creek had sold some reserves off, sold some operating mines, to a company, for example, called Lexington Minerals. They took three of the Island Creek mines. I handled the interaction with consultants on reassessing the value of the assets for tax purposes and things like that. I was constantly working with consultants on those type of things, working with consultants on documents for other reserves. We had a mine in Ohio, the Vail Mine, and we were constantly looking at reopening the Vail Mine. I was working with different consultants on that. Things like that over time. It was a fascinating period of time. I was constantly busy, and enjoyed it.

01-01:10:40

Burnett:

It sounds like you're also getting more into contracts. It sounds like you're becoming more like a lawyer at this point.

01-01:10:48

Luxbacher:

I often say that a lot of what I've done over time, for one thing, I've done a lot of work on evaluating properties. When I pick up a document, a coal lease, for example, I have enough familiarity with all that that I do feel like I have some legal background. The lawyers used to joke around about the fact that I could look at this stuff, because I've looked at a lot of contracts. I've done work on all that. So I do have a good legal background. I look at this and say, "Wow, it would have been neat, at some point in time, to get a JD degree to go along with what I've done." It's just I've been too busy to do something like that. But I've often thought that that would have been an interesting path. I just never had a role model to show me that. I've done a lot of forensic work, too, where we've

gotten sued and we had to go back and figure out, okay, this company is suing us; what did we do? What contribution did we have to the conditions that led for them to sue us? I did a lot of what I call forensic engineering over that period of time, too.

Island Creek used a tremendous number of contract miners, so there were issues that would crop up associated with contract miners. I learned a lot of those things. I have a fairly good background on contracts, property sales, property acquisition. Actually, that's where I morphed over, then, in the mid—I'm trying to think. Probably '90, somewhere around in there, I morphed over to director of mergers and acquisitions, and I really focused then on purely mergers and acquisitions, because I had done so much of that work, and at that point, Island Creek was trying to figure out how we improve cash flow. We were looking at merging with some of the major companies. We were looking at, do we acquire Peabody, for example, and create a huge company out of Island Creek, or how do we do this? I moved over to an M&A role and left that engineering side behind, and my focus was purely on all these different companies.

Along the way in here, Island Creek did a historic agreement with the UMWA. It was funny. Over time, I saw this. We had taken the company at one point in time, and I had done a bunch of reserve work—which again comes back to the contracts and the legal aspects—I had done a bunch of work to take our unmined reserves and slide them off from Island Creek, which was a union company, and move all these reserves into a non-union company. We had done work on that, set that up, and then ultimately we brought it all back together again, and instead Island Creek went and had a unique agreement that they did with the UMWA to work more cooperatively. Then I did a lot of work on different mergers at the request of Richard Trumka, who was running the UMWA, and Bud Ogden, who was the president of Island Creek. So we looked at some things cooperatively where the union said, "We'd like to be able to operate this mine. Can you look at how you guys would buy it, and we could work together on the site?" Did some things on that, too. It was interesting. I've done a tremendous number of studies of acquisitions of different coal properties.

01-01:14:10

Burnett:

And tricky stuff. You're trying to anticipate or predict whether or not the merger or the acquisition is going to be beneficial, and you have to figure out which data to trust. It's a bit of a tricky operation.

01-01:14:27

Luxbacher:

It's a tricky operation. We looked at all sorts of things. We looked at acquiring the Old Ben reserves. BP was selling off the Old Ben Coal Company stuff. We spent a lot of time on that. Ultimately didn't acquire it, but spent a lot of time. There were a lot of these evaluations that I did. That would include going to the environmental regulator's office for the state that the operators were located in as a public citizen and pulling reports so I could look at some of this stuff ahead of time and things like that.

01-01:14:57

Burnett:

To talk a little bit about the labor and the collaborative agreement that you were able to put together with the United Mine Workers? During that period, and I suppose a bit earlier, there were these kind of epic, bitter, longstanding disputes

and struggles in particular towns. What's that county? [Harlan County, West Virginia]

01-01:15:22

Luxbacher: Down in West Virginia. That was a Massey operation.

01-01:15:28

Burnett: Do you have any reflections on how those became so bitter and how your company managed to avoid some of those?

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Luxbacher: I was working for Island Creek. Island Creek had always historically been a union company. They had a very non-union subsidiary called Welco that had been created and had a couple mines under it, but a very small part of the whole thing. When I worked for Consol, Consol's mines were union. When I worked for Consol, I crossed picket lines, which is a traumatic experience in and of itself, and people are beating on your car and everything. It's interesting. From a people perspective, coal miners are great people. Whether they're union or non-union, they're great people. They're hardworking people. This whole non-union issue in West Virginia, we weren't part of that. We were union operations. We did assessments for going non-union, simply because it gave you a lot more operational flexibility, but we never really got into that kind of stuff. We looked at acquisitions so that we could take some of those sites and move them more into a cooperative UMWA umbrella. I did acquisition evaluations on some properties like that. Like I mentioned, I went to one place that was full of bullet holes all over the building because they had been shot at. That was down in that area of West Virginia, and it was a company we were looking at acquiring so that we could take it under our umbrella. But I really can't offer much more insight other than that. There are people that can much better address those things than I. Stan Suboleski. If you get a chance, talk to Stan.

01-01:17:16

Burnett: Harlan County, I think, was the place that I was thinking of.

01-01:17:18

Luxbacher: "Hell in Harlan." That goes back to the twenties, where Harlan really had issues.

01-01:17:29

Burnett: Stuff has become less militant over time in certain places, but the other piece of it is that there's been, I imagine, some technological substitutions. There are fewer people.

01-01:17:44

Luxbacher: You have fewer people. Your labor workforce goes down, down, down, and the size of mines. When I started out, if you had a mine that ran a million tons per year out of the mine, you were probably approaching bottlenecks. Consol started putting in mines that did three or six million tons a year. The technology really has changed, and you can do that because you have support systems and things that are better equipped. And longwall mining, so now you're doing things with longwall mining that would have taken—you can replace five continuous miner sections with one longwall section. You'd have to have the continuous miner for development for the longwall, but once that longwall is rolling, it's rolling, and you're moving a lot of coal out of the mine. This technology really has reduced

the number of workforce, it's improved the tons-per-man productivity, and things of that nature.

01-01:18:34

Burnett: That feeds into safety issues. There's fewer people underground; there's fewer accidents.

01-01:18:38

Luxbacher: Yes. This column I wrote for *Geotimes*, I did a comparison, and it's just phenomenal when you look at the record. Now, people tend to focus on the disasters, and disasters occasionally happen. They happen in any industry. But they get a lot of attention, because they're good sound bites and whatnot. But when you really look at the industry, overall, even if you include those, this is a very safe industry, extremely safe industry, but people tend to focus on the negative. It really is a shame.

01-01:19:20

Burnett: So there are many transitions. There's computerization, there's health and safety emphases.

01-01:19:28

Luxbacher: There's technology changes. Yes, all of this.

01-01:19:31

Burnett: That's happening at this time. That's how you ended when you were at Island Creek?

01-01:19:43

Luxbacher: I was mergers and acquisitions. We had the realization at that point in time that we weren't producing a whole lot of revenue. We just weren't making a profit. The liabilities associated with the coal company were huge. Here you had a coal company that had been founded in 1902. It goes back to 1902, when Albert Holden went down to West Virginia. We had this legacy, and had been a union company. Tremendous liabilities associated with black lung and everything else. Tremendous liabilities. Billion dollars worth of liability. We're trying to offset that with some cash flow, and you just don't generate enough money. Toward the tail end there, we had looked at buying Peabody, going to that next incremental scale, and that hadn't matured. So Occidental made a decision they were going to sell the coal company. They basically put it out, and Consol wound up buying the coal company, for a very nominal sum, actually, a very small sum. But Consol took that huge liability along with it. Basically, Occidental took that off the books all together. It went out the door. Irrespective of the actual cash sales price, which I think was like \$25 million or something like that—it's almost insignificant, \$25 or \$40 million—the fact that they were able to move all the liabilities out was a tremendous benefit to Occidental.

01-01:21:21

Burnett: Why would Consol do that?

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Luxbacher: Consol did it because Consol wanted our Virginia division reserves primarily. We had reserves down in Virginia, and they were longwall mining down there. A lot of what we had down there was adjacent to them. Beyond that, I can just tell you that what they wanted was our Virginia division, and they took

everything else to get Virginia. They operated some of our other mines, too, and still today some of the other mines are operating. But that was the key to what they wanted, was the Virginia division, and then they could reorganize the Virginia—our reserves with their mine, and our mines, and hopefully it's been a transition that's paid off for them. I can't answer that. In 1993, we sold the coal company. We did it through a stock sale, and we sold the stock of Island Creek Corporation. Glenn Springs Holdings was the company that was used as that vehicle for that sale. Some excluded assets to properties that primarily weren't in production were retained under Glenn Springs, even though, as part of the stock sale to Consol, we retained the liability for those particular properties, environmental liability mainly. That would have been in 1993.

Suddenly, I was asked if I would stay around. Consol had a deal in there where they could exercise an option and take the remaining properties. Everybody thought Consol would exercise that option, so they asked a small group of us, rather than move on and find other jobs, to hang around for six months until Consol exercised the option, and then we could move on. That was the year of a UMWA strike. Everything was shut down. I can't remember how long the strike lasted. Three or four months. I'd have to go back and look. It was a fairly lengthy UMWA strike. Consol held off on whether they had to exercise their option or not, so this stretched from what was supposed to be six months, stretched into a year job. Then Consol decided they didn't want to exercise their option, so then we had these reserves that had liabilities associated with them, mines that had been shut down, so we had prep plants and things like that, or we had acid mine generation, things like that, and something had to be done with those. It turned what was supposed to be very short-term—I had moved over there, because my wife and I had just moved into a brand-new house and I wanted to stay in Lexington for a few more months. What was supposed to be that actually turned into a long-term job then, because we had to deal with these coal properties.

01-01:24:13

Burnett:

Is perhaps a piece of it that the management of closed, shut-down properties had become a fairly expensive proposition?

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Luxbacher:

It's always an expensive endeavor. Island Creek, like a number of other companies, tried to isolate those costs. For a while, they had created a separate group within Island Creek that handled those closed properties, because we were always trying to deal with those costs. They were a drain on the active mines. They had tried some accounting things where they set a separate reserve up for those properties, and then had a special group within Island Creek, that I assisted, that tried to manage those closed properties, although my focus was on M&A and my focus was on the active mines. So we had that.

01-01:25:04

Burnett:

This is perhaps a good point, then, to talk about a key evolution in the industry, which is the rise of federal and state regulation of the industry in terms of environmental cleanup and remediation. I know there's a long history of it, but it begins in earnest in the 1970s, and then you have the Superfund Act, the CERCLA, in 1980. Under that act, the polluter pays, and so even if you've signed off and gotten rid of a property, you're still liable because you engaged in that activity, and that company is liable forever.

01-01:25:48

Luxbacher: Hypothetically, yes.

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Burnett: Hypothetically. I understand—and this is very, very superficial knowledge—that in the 1980s, not too, too much was done. There was \$700 million of cleanup that was supposed to be done, and about \$40 million of it had been undertaken.

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Luxbacher: Most of it went to legal fees.

01-01:26:11

Burnett: So \$40 million worth of legal fees, and not much was done.

01-01:26:16

Luxbacher: Not much else. At that point in time, there was still a lot of debate. My coal work, I didn't focus on that at all. This is knowledge that I got later. You had CERCLA, and the way CERCLA was defined, there was motivation to argue about liability, rather than go in and actually do the cleanup. So what it turned into was a great revenue for attorneys, and everybody spent a lot of time suing each other and very little got done trying to clean things up.

01-01:26:49

Burnett: One of the motivations for the Superfund Act was a number of disasters that arose from toxic sites that had been sold off and subsequently repurposed to housing developments. I'm thinking of Love Canal—

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Luxbacher: Love Canal was one of the major—at that was an Occidental issue that we dealt with at Island Creek to some extent, because we were familiar with it. It impacted the public perception of us. Our environmental people at Island Creek followed that as to what had happened. It was one of the early drivers on this. Occidental had acquired Hooker Chemical. Love Canal came along with Hooker Chemical. I can sit here and I can give you the litany of why Hooker wasn't really liable or responsible for what transpired there. When you go back, properties were closed. This comes back even to mining, because when I worked for Consol, one of my responsibilities was the Westland Mine, and I still remember going over an area that had been surface mined for Westland. It was the typical cast surface mining operation, and it was just like this, hummocks, hills, and it was just because it had been mined. Nothing had been backfilled. They just dumped. But that was practice at the time. At the time, you wouldn't spend more money on reclamation than the land was worth. If you bought it for \$2,000, you weren't going to spend \$2,000 to turn it back. It was just accepted practice at the time. A lot of these things, you look at them. The context changes today. You put today's filter on and you look back at those things and you say, "How could people do these things? How could this happen?" But you have to filter it. You have to go back and look at what the context was at the time.

01-01:28:57

Burnett: In the case of Hooker Chemical, I suppose, it wasn't just Hooker Chemical, it was the US Army. There were other people that started using this site, and it was lined, and it was capped.

01-01:29:09

Luxbacher: It wasn't really lined, but the nature of the material, it was lined because of the nature of the material, because that was originally a canal that was dug by [William T.] Love for—his whole idea was for electrical generation. This was the old AC/DC electrical generation. He was on the DC side, and AC won out, and the canal never got built, and so it was sitting there and it was used for disposal. But it was capped, and you can make a strong argument that but for the fact that the property was condemned and a road was put through it that then breached the bathtub, and now the bathtub could fill with water from rain, that it wouldn't have been an issue. That's why I say you can go back and forth on liability. The US Army put material—you can go back through all that stuff and you can argue one way or the other. At the end of the day, the key is it was responsibly handled, long-term.

01-01:30:08

Burnett: I guess the way that CERCLA dealt with it was irrespective of any agreement, because I think Hooker Chemical, when it sold the land, it said, "there's toxic waste here, and we absolve ourselves of any liability for anything. We're not responsible. We're handing that off to you." And under the CERCLA act, there's no such thing as a hand-off.

01-01:30:31

Luxbacher: You ultimately maintain that responsibility, and you go back in. Occidental's stepped back into copper mining in Tennessee, what's called the Copper Hill area, because Cities Service had once upon a time owned Tennessee Copper Company. I worked extensively on litigation associated with the Miami Copper Company, because that was also a subsidiary of Cities before Occidental bought Cities, and it all comes back through exactly the chain you're talking about there. At the end of the day, they're going to go after somebody with money. I've worked on these projects, because we were ultimately in the chain of title and we had money.

01-01:31:25

Burnett: I think the eventual payout from Occidental was something like \$130 million.

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Luxbacher: Somewhere around that.

01-01:31:38

Burnett: One thing that we don't really know much about is how these companies managed those liabilities. Is it because you're sufficiently large that you can sort of amortize the liability? That's the wrong term. How do you manage these liabilities if they're significant?

01-01:32:01

Luxbacher: We never got to how I got from the topic of selling Island Creek to Love Canal, and I know you're interested in Love Canal. It's probably a topic I'm less interested in getting into, because I just don't want to deal with the company issues associated with it, but I will say this. Most of your companies that have those type of liabilities—and all the big companies have those type of liabilities. They have sites that have been landfills or have been production sites, that the only way you can deal with them is a pump and treat. Basically, you're going to handle those sites forever. The mining industry has the same problem, acid mine drainage. For example, I managed the Bird Mine site for Occidental for a

number of years, and the Bird Mine site, AMD generation in Johnstown, Pennsylvania, and it will be producing acid 100 years from now, 200 years from now. You're not going to stop the acid generation. Those are long-term liabilities. What large companies do is large companies reserve for that. You're typically bonded so that if you did go bankrupt, there's money out there to be grabbed, and hypothetically, the amount of that bond is enough to set up a perpetual sinking fund for pump and treat, amortize it, and pay for it, hypothetically. But large companies basically fund that out of cash flow. You're right. It's a perpetual liability that just continues.

01-01:33:34

Burnett:

Is there also a tax that the Superfund requires, or do they have a reserve requirement that comes out of the Superfund Act?

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Luxbacher:

The Superfund Act—and that went away for a while. I'm not sure whether they reestablished that tax or not, because it did expire at one point in time. It's for the fund for orphan sites. It has nothing to do with active sites that are being managed today. If you're a company, you're not drawing upon Superfund. You're paying for that. I'm trying to think of the number of mining sites that are listed on CERCLA. There's a significant number of mine sites—

01-01:34:10

Burnett:

Fourteen thousand Superfund sites total.

01-01:34:12

Luxbacher:

But then you've got to look at what the mining segment of that is. The mining segment, when you include smelters and things of that nature, is a significant component on that. The mining sites have actually had some of the higher NRD, natural resource damage claims, have been associated with mining sites. NRD is one of those ongoing things, but of the settlements that had been made, some of the larger settlements are related to mining sites. That's another aspect that really doesn't fall under CERCLA, per se. Most of the companies, though, handle this through cash flow. You have a reserve, you set aside a reserve. Typically, your reserve is set aside not based on perpetuity. Of course, after you go out about ten years anyhow, net present value of those costs goes down. But everybody has a period of time in which they establish costs for and they reserve costs for. So you have a reserve hypothetically set on the books for that.

01-01:35:10

Burnett:

I don't know if you can answer this, but one of the things I've been asking everyone is about the relative decline of the large American mining companies compared with the Canadian, Australian, and Chinese. Is there any relationship between the kind of remediation requirements? I don't know what Canada's remediation—

01-01:35:40

Luxbacher:

See, I wouldn't attribute that to remedial. America is not that great a place to do business today. Look at the issues that have went through to try to put in the new copper project, deep-mine copper project, in Arizona. It's just very difficult to get permits and things like that today. Nobody wants mines here. That's why licensed mines involving detailed mine planning, permitting, planned reclamation, sustainability, etcetera are all really critical factors that I think the industry is addressing, and I think the industry is doing a great job today trying

to address some of these things. But unfortunately, you have the legacy of the past that people tend to focus on as the legacy. We still have some large US mining companies, but these others have grown tremendously, and I think part of it is their ability to expand in other countries because of less stringent environmental regulations. Although, today, you're starting to get globalization of those requirements. It's a very different environment today than it was even ten or fifteen years ago.

01-01:36:46

Burnett: I think one of the other interviewees was talking about—I think it's Kennecott that maintains its US standards when it operates overseas.

01-01:37:01

Luxbacher: Yes, most US companies do that. For example, when we did the design on our China operation, our China operation was designed to US standards, and basically complies with US law. That was the basis for our design. Most US companies are not going to be accused of going to another country and dumbing down their standards. Rather, they're going to apply their same corporate standards.

01-01:37:27

Burnett: That was the fear, I remember, with the World Trade Organization. That was much more to do with manufacturing. There would be this thing called downward harmonization, where you'd have standards that would—so you feel that that's not the case in—

01-01:37:42

Luxbacher: I don't believe that's the case in mining. These are very large companies, and you can't afford to do that. You can't afford to operate under different standards in different countries. I've dealt a little bit with some of Occidental Chemical's operations in other countries, and they tend to operate to US standards.

01-01:38:03

Burnett: We're already gotten into the larger question of mining today, but let's go back to the narrative of your career.

01-01:38:14

Luxbacher: We sold Island Creek. We stayed and kept a small group. We tried to market the liabilities, because every one of these liabilities still had coal reserves associated with them. It may have been an idle mine or an idle prep plant, but there were coal reserves associated with it. The very first property we sold was actually a transaction I handled, was our Crescent operation in West Kentucky, and we sold that to one of Bob Murray's companies. That was actually the very first one, and after that, we were able to sell—I think we had twelve properties that were excluded from the Consol transaction, and we were able to sell all of them. We found buyers for the properties based on the fact that there were still operable reserves and they could develop a plan to operate the facility. We essentially worked ourselves out of that business. As we worked ourselves out of that business, Occidental was able to reverse a reserve that they had set aside for the coal company, and ultimately, then, that morphed into taking responsibility for historic RCRA [Resource Conservation and Recovery Act – 1976] and CERCLA liabilities within Occidental. That's how I morphed from the coal business, suddenly, to the chemicals and oil and gas business, with still a mining component, because we still had legacy mining issues associated with copper

mining under Cities. We still had some oil-shale operations in the West. We had AMD [acid mine damage] from our mining days. We had the Bird Mine that had no reserve associated with it, but has acid production, and so we had to deal with that.

01-01:39:53

Burnett:

And RCRA is?

01-01:39:56

Luxbacher:

Resource Conservation and Recovery Act. RCRA is your cradle to grave. So you're responsible for something cradle to grave, basically. But RCRA also imposes its own requirements. If you spill something, you have to clean it up. There were historic liabilities related to that. As we picked up the CERCLA stuff, we also picked up the historic RCRA liabilities for Occidental. I morphed from mining engineering basically into environmental engineering, and I retained a mining component. It was really a career change, but the beauty of a mining engineering degree is that I had a background in geology. I had a background in hydrology. I had a background in civil engineering. I have all these components that, if you go and get a degree in environmental engineering, you probably don't have a strong background in any of this, but I had backgrounds in every piece of this. The mining engineering degree was a fantastic degree to move over into this other thing. That's what took me there.

01-01:41:03

Burnett:

It's also exciting because you got to learn about new techniques for remediation, which are—

01-01:41:10

Luxbacher:

It was interesting, because I'm fascinated with different aspects, just continuous learning. Here, suddenly, I moved into something I hadn't really been affiliated with or associated with, and I started to learn. I learned about different treatment technologies. It really expanded horizons. Here's a guy with a Ph.D. in mining, interested in learning, and now I have a whole new area that I'm dealing with. It was a real growth opportunity. It was very enjoyable. I did that up until November of this past year, where I took advantage of a package to semi-retire as I decide on my next phase of my life. So 1993, we sold the coal company. By about 2000, we probably had dealt with most of the coal property. Maybe even sooner than that, maybe about 1998. From that period of time on, I was dealing with a lot of other environmental issues. It's just fascinating stuff, and an opportunity to do something different.

01-01:42:17

Burnett:

Just from what you've supplied me here, you were the Director of Operations from '96 to 2002, which was environmental remediation for the Occidental sites, including Love Canal, and the negotiations with the state and the federal government, because the states have their own environment protection.

01-01:42:39

Luxbacher:

The states have their own program. In some cases, the states have primacy, so you're dealing with the states rather than the federal. In others, they share responsibility, so you're dealing with both. I started to deal with regulators and things like that. At that same time, I also took over responsibility—as we were selling Island Creek, I think about 1992—I went on the Board of International Marine Terminals, which was a trans-loading facility that we owned down in

Belle Chasse, south of New Orleans. MP Mile Post 57.6, I think it is. We had a facility, which is interesting, because Island Creek actually had owned that facility as part of West Kentucky Coal Company, and they had acquired West Kentucky Coal Company, sold the facility, and then actually bought a third of an interest back in it later. The whole idea was you were having problems shipping coal out of the East Coast, because you had Lambert's Point, you had Baltimore. You had these ports, and at one point in time, you just had difficulty shipping because—

01-01:43:52

Burnett: Of waterways?

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Luxbacher: No, no, this was simply port congestion. They were looking for other venues to sell coal, to move coal. So they bought a third interest in IMT, after it had been rebuilt, after they had sold it. We owned a third interest in a facility with the idea that we would ship coal down the Ohio and then load Capesize—the facility was designed because they dredged the Mississippi River to a depth such that you can bring up both Capesize and Panamax vessels. So we could essentially load a Capesize vessel with coal and send it out.

01-01:44:27

Burnett: Capesize means it can go around Cape Horn?

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Luxbacher: Cape Horn. It can't fit through the Panama Canal. You have Panamax, which will fit through the Panama Canal, and Capesize so you can load much larger vessels. We owned this and really hadn't done a whole lot with it. It had not been a moneymaker. But I went on the board of that back in 1992. I continued on the board of that. I'm learning about Love Canal, I'm learning about all this environmental stuff. I'm also learning a tremendous amount about the actual operation of the terminal facility. I'm taking an active role, more than a passive role, in the terminal, simply because none of our partners seemed to be taking an active role. I learned a lot about trans-loading, about shipment.

01-01:45:12

Burnett: There's also an environmental side of transshipment as well, because I know that right now there's a big controversy surrounding the proposed transshipment of—or using the Columbia River to move coal.

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Luxbacher: A lot of that is the environmentalists that are more interested in no burning of coal anywhere in the world, so if they can stop a terminalling facility from being constructed, they can stop the burning of coal. These are the same guys that don't want the Keystone Pipeline, because they have this misconception that if they stop Keystone, then people aren't going to mine the oil sands up in Canada. It's the same type thing. Of course, I have some bias on this, I will admit. But it's the same type thing. There were a lot of environmental issues associated with the terminalling, but they were regular, just normal, day-to-day, operational-type environmental issues dealing with it.

It was an opportunity to learn something else, and I actually wound up there then—I spent a year as the on-site terminalling manager, as the president of the terminal, and actually ran the terminal for a year. So I had an opportunity to

spend time there and really get engaged in that. But at the end of the year, my boss says, “Okay, you have a choice. You’re either going to decide you’re going down to New Orleans to run this terminal, or you’re staying here in Lexington.” My wife says, “I don’t want to move to New Orleans,” so that’s how I wound up backing away from that. I ultimately sold our ownership interest in the terminal to Kinder Morgan, and Pen Coal Company’s ownership interest. That was one of our other partners. I sold both interests two days before Pen declared bankruptcy, I believe it was, so I managed to pull that off. When you talk about legal aspects, there’s times I think I’ve done as much legal work as an attorney.

01-01:47:05

Burnett:

It sounds like it. That’s a good segue, because amongst all of this work, there’s a story about designing and patenting a phosphorus recovery plant?

01-01:47:18

Luxbacher:

Yes, and that’s another interesting story. [break in audio] The phosphorus recovery thing is another interesting aspect that I got into, which is it just amazes me how the whole mining, mineral processing end comes together when you start talking about some of these things. Occidental Chemical had had a phosphorus plant in Maury County, Tennessee, located right outside of Columbia. They produced elemental phosphorus from phosphate rock that was mined all over the area. They had mines all over the place. They had a concentrating facility, or preparation facility. They had two of those, where they took the ore and concentrated the phosphate rock, and then fed it into an electric arc furnace to produce elemental phosphorus. They had had all these contract operations all around the area, but it was all contract, so they didn’t deal with the mining aspects, other than they owned the reserves. I dealt with some property issues associated with that, that dated from owning the reserves where they actually owned some surface and things like that, too.

As part of the elemental phosphorus production facility, what you basically do is you vaporize elemental phosphorus, and then you condense it, and you get a phosphorus, and you get a slag. You get a slag, you tap off the bottom of the electric arc furnace, and the phosphorus is condensed. You have vapor issues. You have to run ESPs, electrostatic precipitators, and things like that, and you generate a sludge. Occidental’s process—it was an older plant that had been built by Shea Chemical, and it wasn’t really designed quite as efficiently as the other plants. There were a number of other plants. Monsanto had one down there, FMC had a plant in the immediate area, because that’s where the phosphate ore was. Very similar to the concentration you had of plants down in Florida as well. Occidental wound up with a huge slag inventory—or let’s call it a sludge inventory—that was phosphorus that had condensed and was mixed in with dirt and mud, and essentially frozen at room temperatures. It basically condenses it. It was kept in ponds with water on top. If you took the water off, the pond would catch fire because you exposed the phosphorus, and the elemental phosphorus would catch fire.

It was an issue that had to be dealt with, and because it was a legacy environmental issue, ultimately came to Glenn Springs. I got involved in it. They had been doing some recovery just so they could show that they were making some effort using a steam system to try to recover a little bit of elemental phosphorus out of it, and it wasn’t very successful. Monsanto had

done another system where they used—I'm trying to think of the name of the process. They had developed a process where basically they took sludge and put sludge into a sealed container, heated the container up in a molten lead bath, and then vaporized the phosphorus off of that. They were using that, and Occidental started to go down that path, and I got involved in it. We did a lot of work associated with this and wound up with a couple patents out of this whole thing. I think we did four patents in total, of which I think my name is on two or three of the patents.

We did a lot of work associated with it on how we would recover sludge, basically re-mine the ponds. We developed the mining technology, and then a beneficiation technology, where we would concentrate the segment of the sludge that actually had phosphorus in it and take out the rock and other particles, and then feed that into a process. We spent \$15 million constructing a facility that included a re-mining aspect of mining. We tried different concepts. We tried some concepts where we dug phosphorus out of the ponds, fed it through a crusher. We tried some continuous processes, where we actually cut it out, just like a cutting head, different things like that, and then feed it into our beneficiation train, and then feed it into the plant. So we built the plant to do this, and recovered elemental phosphorus for a few years. This was a mining problem. It was purely a mining problem, and here we were in the chemical industry, and dealing with it from a mining standpoint. The only chemical side of it really came down to when we did the chromic acid work as part of the processing methodology, but that's mineral processing at the end of the day, too. It was really a mining problem.

It was actually a very interesting project. We built the plant. We ran it for a few years. We were the only merchant producer of elemental phosphorus in the United States, because Monsanto was still producing, but they use all their phosphorus internally for Roundup. They were up in Idaho, and they were mining phosphate rock up there and producing elemental phosphorus, and then using it internally. So we were the only merchant producer of elemental phosphorus in the United States. Unfortunately, we were competing with the Chinese. Any time you're competing with the Chinese, cost has no bearing on the real value of this when you're dealing with the Chinese, just has no bearing. The Chinese undercut us to the point where, even though we were doing remediation at the same time, it was just non-economical. We basically shut down and then capped it in the same method that FMC had used on their facility up in Pocatello, Idaho. We basically mirrored some of the capping technology that FMC had used, because they had a very similar problem up there with a facility they shut down, and we used that same concept down in Tennessee. We were able to do that because we had demonstrated to the regulators that we had done a very diligent effort in terms of phosphorus recovery from this, to the point where the economics weren't there anymore, and they let us cap it. So we tore down the \$15 million facility that we built.

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Burnett:

But hopefully that knowledge is recorded somewhere, because, downstream—

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Luxbacher:

It's in patents, so it's available for anybody in the patents. We've actually let the patents expire. Initially, we kept those patents in a number of countries and then

let them expire as they came up, because we decided there wasn't a whole lot of interest in the technology. It's a unique problem, but it was a unique solution. I look at this that, if I didn't have the mining background, I wouldn't have come up with a solution. It's just interesting when you see how you apply this.

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Burnett:

Again, it's this interdisciplinarity. They didn't seek you out, because you happened to be there and you happened to have that background, and you said, "We could do it this way."

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Luxbacher:

And we tried something different. We actually brought another mining guy back into the company that worked for us for Island Creek to work on that project, too, another mining engineer. We had a couple mining engineers working on that project. It was a neat project. I really enjoyed that.

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Burnett:

That is interesting.

01-01:54:48

Luxbacher:

It's like I say, the mining engineering degree has such a broad background. You get into something like this, and you've done enough hands-on, and you understand the electrical, you understand the civil. It was just fascinating.

01-01:55:03

Burnett:

I think what you said is very true about environmental engineering, because you have to understand—I think the only piece missing would be something like ecology. But in terms of understanding the chemicals, like how to render something insoluble, all of that kind of stuff, metallurgy and mining engineering are really—

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Luxbacher:

You've taken all those courses and you've done that kind of stuff. It's interesting.

01-01:55:24

Burnett:

When you talked about capping, is that a literal kind of mechanical and civil engineering capping, or is it also chemical?

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Luxbacher:

It's a cap. You put a cap on to basically preclude migration of ground water into the area. That's a cap. Actually, a RCRA-quality cap, which involves geotextiles and involves soil and everything else. It's an engineered cap, is, I guess, the best way to describe it.

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Burnett:

Have those standards and technologies involved evolved?

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Luxbacher:

They've evolved over time, and I think some of it has to do with the materials, too. You have much better geo-synthetics and capping materials today than you had twenty years ago. But Love Canal has a cap on it. Love Canal basically is a bunch of toxic material under an inert cap that, as long as it's left alone, there basically is minimal risk associated with it. That's actually a good way to deal with these types of things.

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Burnett:

I guess one of the definitions of engineering is building to a predetermined threshold. When you're talking about environmental safety, you're talking about protecting an ecosystem for 10,000 years. I don't know how those standards work in practice. You build a bridge to withstand a certain magnitude of earthquake and not beyond that, or a certain margin beyond that.

01-01:57:05

Luxbacher:

You have a safety factor built into all this kind of stuff. One hopes that when you address the ecological side of this that you also understand those thresholds and the safety factors and things of that nature. I'm an engineer. I like to solve problems. It's interesting, my one daughter-in-law has a Ph.D. in mining engineering; the other one has a Ph.D. in evolutionary and ecological biology. I have some interesting discussions with the ecological and evolutionary biology daughter-in-law.

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Burnett:

Some interesting disagreements?

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Luxbacher:

Yes, interesting disagreements. [laughter]

01-01:57:43

Burnett:

That is a real challenge in devising environmental solutions to engineering problems. The original Love Canal problem arose from a breach. We're thinking about 10,000 years from now, and guaranteeing the safety 10,000 years from now, and it took about twenty years for people to forget that there was something there.

01-01:58:13

Luxbacher:

Well, people knew there was something there, but I don't think they had the perception. I look back at that and I think there's been a quantum leap from the 1980s to today. We're dealing with these issues. A big issue—and I live in Dallas, so I see this with regard to a battery plant that was located nearby, about twenty miles from where I was at. You have the same issue with smelters. There's a lot of smelter sites now that people are dealing with. There was not the perception at the time those things were operated. But our knowledge on how to deal with those issues today—and what's happened is you've moved a lot to a risk matrix today, whereas before it was a cleanup to a standard. You had to clean up everything to drinking water standard. I think the recognition is there within EPA that that's just unrealistic. From a regulatory standpoint, or from a perception standpoint, EPA has slowly morphed toward risk analysis and more risk-based approach, because you simply can't close these sites.

If you want everything to drinking water standards, you can't close them. On a lot of these sites, given the solubility of the chemicals and everything, even if you remove 90 percent of the chemical mass, the 10 percent or 5 percent or 3 percent that remains is going to continue to contaminate. You have to start looking at this at a risk threshold. You look at it from a petroleum standpoint. When we take a petroleum reserve, we're lucky we get 40 percent, 30 percent, and then you go to the secondary recovery, then you go to tertiary recovery. It's just unrealistic to take the contaminant mass out of the ground on these sites. You have to look at it from a risk-based perspective, and you have to look at engineering solutions. Those engineering solutions may not drive you to

drinking-water standards, but you can protect the environment and the public. You can reach those levels. You just have to look at it from a realistic standpoint.

You have to give credit where credit is due to the mining companies. They've stepped in. BP has dealt with everything up around Butte. They've done a lot of restoration, stream restoration, and things like that. The mining companies have stepped forward to clean up these issues of the past. ASARCO has settled with the government on a lot of these sites. Things are being addressed. It just takes time. But people have this perception that's what mining is like today, without the realization that these are issues that were created when nobody understood the issues associated with mining.

01-02:00:43

Burnett:

So BP took over Anaconda's Berkeley Pit, or is that a different—

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Luxbacher:

BP is ultimately responsible, as I understand it—and I could be wrong on this. I'm just going off of memory and my other interactions with BP. But they're responsible for the pit, they're responsible for some of the stream issues, because you had, from some of the smelters, tailings were just washed away, for years, because it was an accepted practice. Now you have to go back and you have to pull tailings back and things like that. That's why I say I've often thought that if I go back into academia, one of the issues I'd like to look at is focus on the CERCLA mining sites and the costs associated within the legacies, how they were handled. There are still a lot of these smelter sites and things like that. I think it would be interesting to look into that.

01-02:01:38

Burnett:

There's a lot of new technology available that's not just a question of containment.

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Luxbacher:

When you go to a risk-based approach, there's a lot of new technology that you can look at, yes. Because before, containment was about all you could do. You had to contain your mass. But now if you look at a risk-based approach and you realize that you don't have to necessarily get to drinking water standards, and you don't pose a risk to the environment, then you can look at it from a different perspective.

01-02:02:09

Burnett:

I've spoken with a number of other folks who have looked at bio-remediation. Were some of these sites—did that also involve bio—

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Luxbacher:

I've dealt with bio, yes. I've dealt with bio-remediation and things of that nature, yes. I've dealt with molasses injection and what's called an in situ reactive zone. You get the bugs, you feed the bugs molasses, and things like that. Things I would never think, as a mining engineer, I'd be dealing with, because I wasn't even in the mineral processing side. I was a pure mining engineer. I've dealt with these kind of things.

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Burnett:

You've had the excitement of learning about these new things as well. In 2008, you became Senior Vice President of Operations.

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Luxbacher: Glenn Springs had been located in Lexington, Kentucky, because that's where the coal company was. Initially, we stayed there. We handled the coal company assets from that location. We moved into handling CERCLA and RCRA issues for both oil and gas and chemicals. We stayed in Lexington. In 2008, they did some reorganization and we relocated to Dallas. The idea there was to relocate in Occidental Chemical's building down there. They owned a building. We rented space internally rather than externally, and significantly reduced our travel costs, because it's a lot easier to get someplace from Dallas than it was from Lexington. We had been in Lexington for historical reasons, because that's where the coal company had been located. When we relocated there, I became Senior Vice President.

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Burnett: And a lot of similar things, managing discontinued operations and properties.

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Luxbacher: I continued doing basically the same things I was doing, except then I started taking over discontinued operations. I started handling demolition. Actually, I had started that when we were in Lexington. But I started handling demolition of idle chemical plants, demolition of idle oil and gas facilities, and things of that nature, and then dealt with discontinued operations. Part of discontinued operations, I dealt with some legacy contract issues where there had been commitments made, for example, to continue to provide services, because you think your chemical plant is never going to shut down, so you do a deal with the guy next door. You're going to provide him steam; you're going to provide him this and that. Then you shut down, and now you have to deal with all this. I've dealt with those kinds of issues. That's a continuation of the lawyer side of me. I've dealt with all those kind of issues, too. Then it's all part of discontinued operations. So I handled the discontinued operation side and did a lot of work on those areas.

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Burnett: Is it perhaps because you've relocated to Dallas that you're getting more into oil and gas?

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Luxbacher: That was a lot of it, but I also started to do a lot more of the discontinued operation side on oil and gas, simply because there was a recognition on the oil and gas side that things had to be done. Some of the work I've done for oil and gas is also regulatory-driven. California passed a law, AB 1960, that basically said that if you had tanks, you had to inspect the tanks. If you took a tank out of service, you had to do certain things. That led to demolition of a number of tanks, which turned into a huge project in the state of California for Occidental. So I did a lot of demolition work in California. There's regulatory drivers on a lot of these things you do. You typically don't tear something down, because you may want to reactivate it. Things tend to stand until well past their prime, simply because you may reactivate. You don't know what the conditions are going to bring.

01-02:05:58

Burnett: Perhaps because of your expertise in remediation of oil and gas facilities, I understand that you served on a special Occidental Petroleum Corporation task force.

01-02:06:06

Luxbacher: Let's not go into that one.

01-02:06:08

Burnett: Oh, I see. This is ongoing?

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Luxbacher: No, but I'd prefer not to talk about that. But yes, I did some work on an Occidental task force that was just looking at liabilities company-wide, on a macro extent, based on the BP incident. They did some work on that. But I really don't want to go down that path. I just recently left Occidental's employment, so I don't want to go back and touch on too many of those things. They're confidential things, so I don't want to go down that path.

01-02:06:38

Burnett: And so you retired from there.

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Luxbacher: Semi-retired, let's call it. It's called semi-retirement. Occidental spun off their California assets into a separate company, California Resources Corporation, and did some downsizing, so I took advantage of the downsizing to semi-retire, let's put it that way, and now I'm trying to figure out what the next phase of my career is going to be. Am I going to do consulting? Am I going to go back and teach? I'm looking at some jobs with some other coal companies. Do I go back to a coal company? I just have not quite made that decision yet.

01-02:07:15

Burnett: That's exciting. That's an exciting frontier to be at. You mentioned being part of the associations and getting so much out of that, but you've also been giving a lot to those associations. Can you talk a little bit about your work with AIME and SME?

01-02:07:36

Luxbacher: It's interesting. I was a student member of SME, so in 1969, or 1970, I guess—'69 or '70 is when I went to Penn State—I guess it was '70 or '71. I became a student member of SME, which—local section—all it really meant to me was I got a discount on books, and speakers came to the section and talked to us each month. I really didn't know a whole lot about SME. I left, went to work in industry for Consol, came back to Penn State, and Raj Ramani got me involved in SME. He basically said, "You need to give some papers and things like that." I gave a paper here early in my career, right after I got back to Penn State, on mine ventilation, and I actually won the best presentation award for that particular meeting. It was an interesting paper. That was my very first association, but I really enjoyed coming to the meetings. You could learn so much from all these different papers. It was different than picking up a magazine. You just don't get the same sense on reading an article as you do sitting through a presentation. I was at Penn State, so I came to a lot of meetings at Penn State. I left Penn State and went to Island Creek, and I really got involved with SME on the local section level, because we were within the Central Appalachian section. I got involved there. I was actually an officer in the Central Appalachian section. I got to meet some giants of the industry, who are now deceased, who were still alive at the time, Frank Gaddy, a number of people. It was an excellent opportunity to meet these people and learn from them and just talk to them.

I was heavily involved in the local section level, and still continued to occasionally come to national meetings, but my focus was on the local section. They had a regional sectional meeting at the SME annual meeting, and because I was from the local section and nobody was here, I got sent to it. I went to this, and the next thing I know, I was Eastern Region Vice President for SME. Suddenly, I went from just a rudimentary idea of what happened on a national level, but a lot of understanding of the section level, to now I'm a regional vice president, so I'm serving on the board. I really learned a lot about SME. I kept on coming to meetings. I went to the Coal Division, all their meetings, executive committee meetings. One thing I've learned here is that if it's not a closed session, you go. You sit there. It doesn't matter whether you serve on the committee or what. You get a lot of exposure. I started going to the coal division executive committee meetings. I wound up serving on a bunch of academic committees. I think if you print out my SME service, all the different committees I served on, I couldn't even begin to tell you, but it's probably three or four pages long. As an industry guy, I was one of the few industry guys that served on academic committees, and I got involved in accreditation and things like that, just simply because I was interested in all that. I got heavily involved in all that. I became an ABET program evaluator, so I did ABET programs for engineering accreditation. I did that for a number of years.

01-02:11:00

Burnett:

What is ABET?

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Luxbacher:

Accreditation Board for Engineering and Technology is what it used to stand for. Like a lot of places, they've expanded and they do accreditation for more than just engineering and technology now. They also moved into the sciences. It's ABET, but it doesn't stand for anything anymore, because they've removed what it used to stand for. I was an ABET program evaluator for a number of years. Here I am, I'm constantly getting more and more involved in different aspects of SME. I wind up serving on the Coal Division. Somebody says, "You've been coming to these meetings for twenty years and you've never served. You sit here in these meetings." So the next thing I know, I'm the chair of the Coal Division. That put me back on the SME board again, so I did two tenures on the SME board. Then, suddenly, I find out I'm nominated for SME president. Then I become SME President. My love for the society is heartfelt, even during this time that I've been doing all this environmental stuff. I worked for ten years on the Miami Copper Company stuff in Arizona that we had, which was all litigation. So I still have my feet in the mining side of it, but I'm really doing a lot of environmental work. I really felt like the Society was my home; it was my tie back to mining. There's not enough that I can do for the Society. I've never turned them down if they called for anything, because there's not enough I can do for the Society, because I feel like the Society has done [so much] for me. My son is an active SME member, and also an active local section member. I think he's coming in as chair of the Central App section that I used to belong to.

01-02:12:52

Burnett:

What's your son's name?

01-02:12:54

Luxbacher:

Mark. My daughter-in-law, Kray, she's here. She must be in the program for giving papers, six or seven papers this time, so she's very active, too. It's really

nice to have a son and a daughter-in-law that are also mining engineers. As part of SME president, they do an interview for you in the magazine. I was telling somebody this story last night. On my interview, they asked a question about my children. I said, "I have three children and two step-children, so I have five kids total." I said, "I have a son and a daughter-in-law that are mining engineers. The rest of them have mundane occupations." That did not go over well with the rest of my children when they read the interview. But I guess I look at it, if you're not a mining engineer, then, pfft. [laughter] I have a little bit of a biased view of this whole thing.

01-02:13:44

Burnett:

Let's call it an enthusiasm. [laughter]

01-02:13:49

Luxbacher:

Yes. I've served as SME president, and I served as president of OneMine [www.onemine.org], which is our online technical journal-type repository. Dave Kanagy had this idea to steal a concept from the Society of Petroleum Engineers. They had something called OnePetro, and he had this idea to steal this and we'll call it OneMine. I was there as we initiated this thing. I feel very good about my role in that and the guidance I gave on that. Whereas the petroleum engineers charge their own members for access to papers, we made a decision early on that this is a free member benefit. All the archives of the society are available on OneMine, and any member has free access to it. That has since morphed into a global agreement among a number of mining societies, to put their archives out there. I believe, to this day, this is probably the best benefit that SME has given to its members since the establishment of *Mining Engineering* magazine, because you can get on there and you can find anything you need. I'm on there all the time. Whenever I have a question about something technically, it's easy to get on OneMine and see what's out there.

I served as president of OneMine. I've been on the SME Foundation for a number of years. Real big believer in giving to the society through the [SME] Foundation and getting others to contribute as well. Then I served as the AIME president in 2012. The four member societies each go through a roll where somebody rotates onto that. We had an opportunity for the president, and I was nominated to be the AIME president, so I rotated into that role. I served for a year as AIME president, which is very prestigious. That's the parent society of the four other societies, and you follow behind a legacy since 1871, some true industry giants, on that. I have this interest in history. I probably have more information on Island Creek Coal Company than anybody else out there. I probably have more photographs from the legacy era of Island Creek Coal Company than anybody else, just simply because I collected this stuff, because I worked for the company and things were being pitched, or nobody cared about them. I acquired them.

I have this interest in history, and I've always said I want to do a history of Island Creek Coal Company. One of these days I'll do it. I've taken that interest now and I've applied it toward AIME. We're getting ready to celebrate our 150th anniversary in 2021, so I've gone back and I've started to reexamine the legacy and the history and the development of AIME since 1871. Fascinating, fascinating things. I've told my wife, and I don't know whether it's practical or not, but I've told her, I said, "When we actually enter into retirement, when we

make that decision we're going to retire, I'd like to be someplace where I can look at going back to school to get a degree in history." Just simply because I have an interest in this area, and it'd be nice to do something like that for a few years. That's one of those things that I have in the back of my mind, and we've talked about, whenever we make that final decision, that we're going to do it. I just find it absolutely fascinating when I look at how Island Creek Coal Company was created, the decisions that were made through the years. Then I look at AIME and I look at the people that were members, and how they've created—what is SME today basically is an outgrowth of decisions made in 1871. It's just fascinating. I can't get enough of it. I can't read enough about it. I spend a lot of time doing that stuff, too.

01-02:17:35

Burnett:

That's wonderful. You've received awards as well. You got the SME Ivan Rahn Education Award in 2010.

01-02:17:43

Luxbacher:

I have a number of awards. I got the Ivan Rahn Award, which, to me, was particularly—two awards that are really heartfelt. Ivan Rahn. That award was named after Ivan Rahn. Ivan worked for Consol, and he and I were the only two industry people that were always in the academic committee rooms here. The society has compressed. Once upon a time, it had ten academic committees. Ivan and I used to sit together in the back of the room, and then I'd rotate in and I'd serve on the committees. Ivan never served on them, but he and I were always the two industry guys that were always there, that gave the industry perspective on these things. When Ivan eventually retired from Consol, they created the Ivan Rahn Award, and I was very pleased that I was nominated for that, simply because I knew him so well. The other award that I'm really pleased with is the Stefanko Distinguished Alumni Award from Penn State. Bob Stefanko is the one who brought me back to grad school. He taught some of the courses I had when I was an undergrad. He was a tremendous mentor, a great friend. When he passed away, the industry really lost a tremendous asset. He was former SME president. Just a couple of years ago, I got the Stefanko Distinguished Alumni Award from Penn State.

I have a number of other ones. I'm a Centennial Fellow. There were a hundred people named for the College of Earth and Mineral Sciences when it hit its hundredth year, and I was one of those people named as a Centennial Fellow. I'm an honorary member of AIME. I'm an honorary member of SME. I'm an honorary member of the Central Appalachian section. I have a number of these things. These are awards that I have gotten over the years.

01-02:19:41

Burnett:

They all signal a passion for the work that you've done, but more specifically for the communities. You've been part of these different communities, and you have this enthusiasm for learning, and you have this enthusiasm for people, it seems.

01-02:19:57

Luxbacher:

Yes, people, the profession, learning. I'm just a big believer in all these things. I really look back at this and I say I've been blessed through my career. To some extent, I made this decision in November to be semi-retired, because the path I was on, I really wanted to go back a little bit more into the mining industry. I

wanted to finish these last few years of my career, more involved in what I started out in, and less involved in the oil and gas and chemical side. This was an opportunity that I saw to get back into that. I don't know what that means. I don't know what I'm going to be doing a year from now. But I knew that I wanted to change paths just for those last couple years. It's my opportunity to get more involved.

01-02:20:47

Burnett:

That sounds exciting. Well, the best of luck to you in that, and Dr. Luxbacher, I want to thank you for taking the time to sit with us. I hope you enjoy the rest of the conference.

01-02:20:56

Luxbacher:

Thank you very much. My pleasure.

[End of Interview]

RESUME OF GEORGE W. LUXBACHER

SUMMARY OF BACKGROUND

- Mining Engineering graduate (BS, MS, PhD) with multi-industry experience (mining, chemicals, oil & gas) at both the technical and executive levels; strengths in strategic planning, health and safety, environmental and regulatory compliance, property acquisition, divestiture and management, major litigation, technical management, environmental remediation.
- Background in project implementation, from conceptual design through permitting and construction, for small and large scale operations.
- Experienced in dealing with and relating to all stakeholders, both internal (employees through senior management) and external (contractors, consultants, local community, regulators).

CORE COMPETENCIES

- Demonstrated leadership, organizational and management skills, within both industry and professional societies (Past President of 11,000-member mining professional society).
- Highly effective communicator; ability to relate and present to people of all levels.
- Skilled negotiator, striving for a win-win solution.
- Ability to quickly grasp technical issues, identifying and implementing effective solutions.

EDUCATION

Pennsylvania State University, Mining Engineering: BS, MS, and PhD

EMPLOYMENT

1993- 2014 **GLENN SPRINGS HOLDINGS, INC.**, the environmental remediation and discontinued operations subsidiary of Occidental Petroleum Corporation, Dallas, TX

(April 2008 – Nov. 2014) – Senior Vice President, Operations

Part of senior management team responsible for planning, budgeting and oversight of GSHI activities (\$100 million annual expenditures); directly managed team (Services Group) responsible for discontinued operations, including demolition and property management, at OxyChem former plant sites and Oil & Gas facilities (\$15-25 million annual expenditure). Served on special Occidental Petroleum Corporation task force in 2011 conducting a global safety and security assessment at world-wide operations in response to the BP spill incident. Manage environmental liabilities at former coal and oil shale mining sites as well as chemical plants in PA, WV and Belgium.

(April 2002 – April 2008) – Vice President, Operations.

Responsible for environmental remediation operations at former and active OxyChem sites; managed technical aspects of Arizona state superfund litigation related to former copper mining operations (claimed impact of \$750 million); managed Services Group providing demolition and asset recovery services for closed OxyChem plants; served as business manager for phosphorus and Ferrophos® businesses.

(July 1996 – April, 2002) – Director, Operations.

Responsible for environmental remediation obligations and operations at former OxyChem sites in WV, TN, and NY (including Love Canal), with extensive negotiations with State and Federal regulators; designed and constructed unique elemental phosphorus recovery plant in Columbia, TN; served on the Board of Directors of International Marine Terminals, ultimately negotiating sale of OPC and other partner (Pen Coal) ownership interests (to Kinder Morgan); managed litigation related to former copper mining operations.

(June 1995 - June 1996) - Managing Partner, International Marine Terminals Partnership (IMT), Myrtle Grove, LA.

Served as on-site executive manager of 9.5 million-ton bulk materials terminal on the Lower Mississippi River.

(July 1993 - June 1996) - Director - Asset Sales.

Member of small group involved in the disposal of coal properties, including idled mines, remaining from the sale of Island Creek, actively negotiating the sale of liabilities and property; served on the Management Committee of International Marine Terminals, of which Occidental was a joint venture partner.

ISLAND CREEK CORPORATION, a subsidiary of Occidental Petroleum Corporation, Lexington, KY involved in coal mining, processing and sales

Applicable Highlights:

- Involved in design and construction of Ping Shuo surface coal mine in China, including a review of operational economics.
- Progressive responsibilities, including reserve management, mine planning, design, permitting and construction.

Director - Mergers and Acquisitions
 Director - Technical Services
 Project and Mine Evaluation Director
 Director - Engineering Technical Support
 Director of Mining Engineering
 Manager Mine Planning
 Manager-Technical Data and Engineering Support

OCCIDENTAL RESEARCH CORPORATION, a subsidiary of Occidental Petroleum Corporation, Madisonville, KY involved in coal mining research related to ground control and mine planning

PENNSYLVANIA STATE UNIVERSITY, Mineral Engineering Department, University Park, Pennsylvania

PITTSBURGH COAL COMPANY, a division of Consolidation Coal Company, Library, Pennsylvania

AFFILIATIONS

- ◆ Society for Mining, Metallurgy and Exploration, Inc. (SME)
President – 2008
- ◆ OneMine (onemine.org)
President – 2008 and 2009
- ◆ American Institute of Mining, Petroleum and Metallurgical Engineers (AIME)
President – 2012

- ◆ Member NIOSH National Occupational Research Agenda (NORA) Mining Sector Council
– 2007-2012

REGISTRATIONS

Professional Engineer - Pennsylvania

HONORS AND AWARDS

SME-AIME Best Presentation Award
 Centennial Fellow – Penn State College of Earth and Mineral Science
 Distinguished Member – SME-AIME
 Distinguished Member – AIME
 Robert Stefanko Distinguished Achievement Award - Penn State College of Earth and Mineral Science
 SME Ivan B. Rahn Education Award 2010

CONTINUING EDUCATION

- ◆ Managing for Results; Sterling Institute
- ◆ Strategic Productivity Systems; R.L. Lorber and Assoc., Inc.
- ◆ One-to-One Communications Skills; Communispond, Inc.
- ◆ Total Quality Fundamentals Course; Monsanto
- ◆ Managing Negotiations; Baker Communications, Inc.

- ◆ Exceptional Management Practices; The Forum Corporation
- ◆ Problem Solving & Decision Making; Action Management Associates, Inc.
- ◆ Economic Evaluation and Investment Decision Making Methods; F.J. Stermole
- ◆ Leadership and Teamwork; The Center for Creative Leadership
- ◆ Leadership Development Program; The Center for Creative Leadership/Eckerd College

PUBLICATIONS, PRESENTATIONS, PATENTS

Thirty-five+ publications and/or presentations.

Co-holder of two patents related to the recovery of elemental phosphorus from sludge.