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University of California
Berkeley, California

Global Mining and Materials Research Oral History Project

Betty Gibbs

Mining Engineering and the Software Revolution

Interviews conducted by
Paul Burnett
in 2015

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Betty Gibbs

Betty Gibbs has been involved in the minerals industry for more than 40 years. As an engineer, author, university professor and consultant, Ms. Gibbs has been at the forefront of technology development and adaptation for the mining industry. She has extensive experience in geological database development, resource modeling and is familiar with the requirements of international codes for resource modeling. Ms. Gibbs has experience with a wide variety of minerals and deposit types including seam and bedded deposits; massive, disseminated deposits; and vein deposits. Ms. Gibbs is an active participant in professional organizations and societies, has been a member of the Society of Mining, Metallurgy, and Exploration (SME) since 1960, and is currently the Executive Director of the Mining and Metallurgical Society of America (MMSA).

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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 Betty Gibbs 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 18, 2015
Audio File 1

01-00:00:06
Burnett: This is Paul Burnett interviewing Betty Gibbs for the Global Mining and Materials Research Project of the business series of the Oral History Center at the Bancroft Library. We're here in Denver, Colorado, at the Convention Center. It's February 18, 2015. This is audio file one. Welcome. I wanted to ask you a little bit, as I usually do, about your background, where you grew up, and your family.

01-00:00:37
Gibbs: I grew up in Virginia. I'm the oldest of ten kids. I left home just as the eighth one was born, so I really don't know my youngest brothers very well, but I spent my childhood in a large family. Very active and so forth. My father was a carpenter, and my mother was a court reporter. When I was nine or ten, my mother started teaching me stenotype and typing, so I spent some of my childhood time typing court cases for my mother. She also paid me, so by the time I graduated from high school, I had enough money for my first year in college.

01-00:01:29
Burnett: Really?

01-00:01:30
Gibbs: Yeah, and it was my going away money. It's like, okay, I'm out of here.

01-00:01:36
Burnett: You'd done your time as a court stenographer.

01-00:01:38
Gibbs: I did my time. I did transcribing, but I could read the notes.

01-00:01:44
Burnett: Right, you had to be able to read shorthand.

01-00:01:47
Gibbs: Well, it was machine shorthand. It's a stenotype. You see them. They have them in the Senate.

01-00:01:54
Burnett: Right, and the little machine.

01-00:01:55
Gibbs: The little machine.

01-00:01:55
Burnett: And a tape that goes into it. Great. So that was your going away money to college. Did you have an idea of what you wanted to study?

01-00:02:11
Gibbs: I didn't remember this until later, but I used to know a boy, when I was about nine or ten years old, and he was very interested in geology, and he brought rocks around and all that kind of stuff. So it was kind of like a germinating sort of idea. And then when I was a senior in high school, I was reading this book about some mining engineer in the West, and I don't think I'd ever even heard of a mining engineer before, but I had been thinking of going into engineering, because I had two uncles that were engineers. I didn't want to be a teacher, a housewife, or a secretary or a nurse, which, in the fifties, those were the things that women did. I said, no, I don't want to do any of that. I've already done that.

01-00:03:02
Burnett: Yeah, you had been supplied with, quote quote, "women's work" by your mom.

01-00:03:08
Gibbs: Plenty. It was like, no, I want to do something else.

01-00:03:13
Burnett: Were there other women role models that you had? Your uncles were role models, but did you know of women who were professionals in the fifties?

01-00:03:23
Gibbs: No.

01-00:03:24
Burnett: Nobody you knew?

01-00:03:25
Gibbs: No, it was just, this is what I want to do. I think there were probably some teachers or something that sort of tried to discourage me, but I think the thing that carried me through school and working all these years is that this is what I want to do. So, okay, you don't think maybe it's a good idea. Well, pfft. Or, "What are you doing here? Women don't belong here." It's like, yeah, yeah.

01-00:04:00
Burnett: So you just sort of took it in stride if there was some kind of hostility or opposition to your ideas?

01-00:04:07
Gibbs: Yeah.

01-00:04:08
Burnett: This would occur when you would tell people about your plans and they would have that kind of reaction?

01-00:04:13
Gibbs: Yes. So I was not particularly encouraged. There were a few people who said, "Oh, that really sounds interesting." I remember in high school, somebody must have come to the classroom, and I said I wanted to be a mining engineer,

and they said, “Oh, you’re going to go to the Colorado School of Mines?” I hadn’t even thought about it at that point. When I finished high school, I did start at Virginia Tech, because I was in state in Virginia, so it was—

01-00:04:46
Burnett: You got the regular tuition, in-state tuition.

01-00:04:47
Gibbs: Yeah, I got regular tuition. And they had a mining engineering program. Because I was also thinking about, well, maybe I can just go into geology, and then I looked in their book. Ooh, mining engineering; that’s what I really want to do. That includes a lot of geology.

01-00:05:04
Burnett: Right, of course. Do you remember what the tuition was in 1960, I guess?

01-00:05:10
Gibbs: Yeah, it was 1960. I had a thousand dollars in my bank account, and I spent it in the first year.

01-00:05:20
Burnett: But that carried you through the year?

01-00:05:21
Gibbs: That carried me through the year, including room and board, and tuition, and books, and all of that.

01-00:05:28
Burnett: Wow. Times have changed.

01-00:05:29
Gibbs: You can’t even go to school at all for a thousand dollars anymore.

01-00:05:32
Burnett: I think you can get two or three textbooks for that.

01-00:05:35
Gibbs: Right, exactly.

01-00:05:36
Burnett: Adjusted for inflation, sort of different. You went to Virginia Polytechnic—

01-00:05:43
Gibbs: Institute, in Blacksburg.

01-00:05:46
Burnett: Was that far from where you were?

01-00:05:49
Gibbs: I was from northern Virginia, and that’s down in southwest Virginia, southwest of Roanoke. It was about three hours, but at that time it was like, that’s fine. Further I’m away from home, the better it is.

01-00:06:03
Burnett: Going away for college, the proverbial break from—.

01-00:06:06
Gibbs: Right, exactly. When I started at Virginia Tech, of course I was the only woman in mining, but there were a few other women engineers there, because it was an engineering/technological school. There were about a hundred women there at that time.

01-00:06:25
Burnett: Wow. That's not insignificant in terms of—

01-00:06:28
Gibbs: And 6,000 men, and I loved it. [laughter]

01-00:06:34
Burnett: Yes, that's good.

01-00:06:36
Gibbs: It was also semi-military, so there was required military for the first two years.

01-00:06:45
Burnett: Is that—

01-00:06:47
Gibbs: Not Virginia Military Institute.

01-00:06:48
Burnett: Right, different institute.

01-00:06:49
Gibbs: That's different. That's all military. At Virginia Tech, they did have required military for the first two years, for men. Women didn't have to do it then.

01-00:07:00
Burnett: That was a big part in the 1950s. I think a lot of colleges had requirements for that, especially if they had any public money. I think that was—

01-00:07:11
Gibbs: Well, Virginia Tech is a land-grant college.

01-00:07:14
Burnett: So that was part and parcel of what you did in those days. It was different times.

01-00:07:21
Gibbs: There is an interesting story about my first few weeks at school. I went to a student—it wasn't SME then. It was AIME. I went to a student section meeting of AIME, and I walk in and they said, "Oh, great, you can be the secretary." I said, "Okay, sure. Why not?" In a lot of ways, I'm kind of oblivious to some of the—

01-00:07:59
Burnett: The coding?

01-00:08:00
Gibbs: Yeah, the coding. It's like, oh, okay, well thanks for asking. That was kind of my attitude about it.

01-00:08:08
Burnett: But that protected you in a sense, because it didn't bother you, or it didn't signify—

01-00:08:14
Gibbs: I didn't know. Any kind of a bias. And then the department head walked in, and he says, "Well, we can take you through the mining program. We can get you a degree in mining engineering. But you'll never be able to work as a mining engineer. But you can be an assistant to a president of a mining company." Again, I went—you know, because I had every intention of working as a mining engineer, not being a glorified secretary.

01-00:08:53
Burnett: Often, at those times, if there was any concession to having women in professional training, their eye was either to something, as you said, affiliated, or motherhood. You could become a scientist and help your husband with his experiments, or you could inspire your kid, your sons, to become scientists.

01-00:09:17
Gibbs: Yeah, right. Exactly.

01-00:09:21
Burnett: Princeton did not allow women in graduate school until 1963.

01-00:09:25
Gibbs: Wow.

01-00:09:28
Burnett: Those are the times.

01-00:09:29
Gibbs: Women were not allowed to work in mines in the sixties, and I think in Colorado, that didn't even change until the late sixties, early seventies. My college career was kind of disjointed, because I only had money for the first year. I worked in the summer. I had money for another quarter. Then I said, well, I don't have any more money. My mother was—they had a bunch of kids. So I said, okay, well, I'll quit. I quit school. I worked at Virginia Tech. I got a job there, doing secretarial work, which is fine. I had the skills. Then, after about six months or so, I started taking courses part-time, because if I took courses part-time, I didn't have to live in the dorm. I was independent. Always been really pretty independent anyway, I reckon. So I stayed there doing that until about 1964, and then I came out to Colorado, because it was like, oh, I want to go to Colorado School of Mines, and had an uncle that lived

in Boulder. A friend of mine was driving out that year, so I said, "I'd like to go along with you," so I came out to Colorado, worked here for a year to get in-state status, and then went back to school, and worked during school to support myself.

01-00:11:07
Burnett: From that first time it was mentioned to you, Colorado School of Mines was kind of the Harvard of the mining industry?

01-00:11:13
Gibbs: It was kind of in the background there, yeah.

01-00:11:17
Burnett: If you really want to do it, this is the place to do it.

01-00:11:19
Gibbs: Yeah, exactly.

01-00:11:20
Burnett: And there were fantastic professors there as well.

01-00:11:24
Gibbs: Yeah, very good. School of Mines had professors then, and they still do, that have actual industry experience. It's a very strong culture of, when you get out of school here, you can go to work directly in a company and be productive from day one.

01-00:11:46
Burnett: It's strong academically, but it has its own—

01-00:11:50
Gibbs: A practical side.

01-00:11:54
Burnett: One of the other people I interviewed talked about—and this is a bit before your time—talked about the kind of culture of the students. Nobody put on any airs, except it was common for them to wear, I guess, their engineering boots, and wear them all the time. Basically, this is—

01-00:12:14
Gibbs: Yeah, and you're always carrying your slide rule on your belt.

01-00:12:19
Burnett: So how was that? That sounds like a pretty masculine kind of culture.

01-00:12:25
Gibbs: It was. Again, it was like—I don't know how to say it exactly. It was like, I want to do this; I'm going to do it. People, I think, probably made fun of me for a while, but eventually they realized that I was serious about it, that I wasn't just there to find a husband. I was there to get a degree in mining engineering and work as a mining engineer.

01-00:13:00
Burnett: Did you establish friendships with classmates and things?

01-00:13:05
Gibbs: Yeah, and I still kind of keep up with a few of them.

01-00:13:09
Burnett: I guess they just didn't know what to make of you.

01-00:13:11
Gibbs: That's true. That's true. They called women "pigs." I had this comment one time. This guy kept looking at me and looking at me, and he says, "You're feminine." I said, "Yeah?" I didn't know what he was talking—I sort of knew. They expected women engineers to be these big, hulky—

01-00:13:38
Burnett: Butch, I guess.

01-00:13:39
Gibbs: —sort of people. I didn't fit their viewpoint of what a woman engineer ought to look like. Not only that, I liked to wear frilly blouses, and I love embroidery.

01-00:13:57
Burnett: Wonderful.

01-00:14:00
Gibbs: In a way, I kind of did that deliberately, too.

01-00:14:02
Burnett: You had a persona.

01-00:14:04
Gibbs: Yeah.

01-00:14:04
Burnett: And that was a way to kind of stake out some territory, identity-wise, right? You can't pin me down. I'm here to work.

01-00:14:15
Gibbs: I don't need to be able to lift a jackleg by myself. But with help and with somebody else—there was another woman there that I got to be really good friends with, and she and I took a lot of mining courses together. She was a geologist, and also started taking mining courses, and ended up getting a dual degree, one in geology and one in mining. She and I took the school mining course together, and between the two of us, we could carry a jackleg down the drift.

01-00:14:53
Burnett: How much does a jackleg weigh?

01-00:14:56
Gibbs: More than I do. Probably seventy-five, a hundred pounds. It's all dead weight. It's a big, long thing with an arm.

01-00:15:09
Burnett: It's unwieldy and awkward as well as being heavy.

01-00:15:11
Gibbs: Yeah, very much. But she and I could carry it down the drift, and we would take it. There is an interesting story there, too, because in the first class, Sam Shaw was the professor, and we all were sitting outside the mine, and he says, "Well, it's really hard to get As in this class. If you've worked in a mine for a couple of summers, you might get an A. But otherwise, don't expect As here." Pat [Mosch] and I, we loved it. We just had such a good time. We tried everything, we did everything. I came up with an idea of, oh, I want to take photos underground, so she and I did that. Well, we ended up getting As. We couldn't hardly handle one of those jacklegs by ourselves, but we got As, but I think it was because of our enthusiasm and our willingness to try everything and just be part of the group.

01-00:16:15
Burnett: And you did everything with gusto, and you learned about the different aspects of the mine. We could go on the gender track for a while, talking about how you were kind of entering the, quote quote, "man's world," and there's that excitement, I suppose. But more than that, there's an excitement about this is the real thing.

01-00:16:44
Gibbs: I even hate to say "entering a man's world," because to me, that isn't what it was at all. It was like, wow, I really like this stuff, I'm really interested in it, and this is what I want to do. Being male or female didn't seem to have anything to do with it.

01-00:17:02
Burnett: Even though there's all that coding out there.

01-00:17:04
Gibbs: There were certain reactions that came around that reflected that gender difference. But still, I think I was more focused on, "let's do the work. Hey, I want to learn about this, and, oh, this is cool." Yeah, the dust is blowing all over the place and I'm trying to climb up a raise, but I loved it.

01-00:17:30
Burnett: Did it snap into focus the, quote quote, "book learning" that you had been doing thus far? Did it make real some of the theoretical and mathematical stuff that you had been doing before?

01-00:17:46
Gibbs: Yeah, sort of, in a way, but it was more like, well, the book learning is fine, but this is the real thing, and it's—I don't know quite how to express it.

There's almost a disconnect between what's in the book and the actual practice.

01-00:18:07
Burnett: And that hooked you at that moment?

01-00:18:09
Gibbs: Oh, yeah.

01-00:18:11
Burnett: If you had any doubts before, this cemented your commitment to doing this.

01-00:18:17
Gibbs: Pat was also a great mentor, because she and her husband had mining claims outside of Idaho Springs. They had kids and I had a little girl at that time, and they used to take us up to their claims. Pat was always talking about, "We've got these claims, and it has these kind of minerals in it, and we'd like to develop them." She probably did as much or more for me than anybody else. We were peers for sure, but it was the interest. It was the interest.

01-00:18:57
Burnett: And enthusiasm, and someone you could talk to about your enthusiasm for the work. That's also interesting, too, that others from that period and before, that as an individual, you could have a mine claim, and there were just groups of people, just a couple of people, who were working an old, abandoned mine, which was—I can't remember the term for it, but you're basically kind of pulling out pillars and continuing to work something that's long been abandoned, or a new claim. It's just hard to fathom. When you think of mining, you just think of giant, merged corporations today that have large equipment and a billion dollars of investment to develop a mine, and permitting and all that. And here is this kind of wild-cat approach to mining. Can you tell me about how that's done, or how that was done at the time, and what people did?

01-00:20:00
Gibbs: There weren't so many regulations. There certainly were some. In Colorado, there was a Division of Mines. This was also very interesting, because of course with Pat and Al having all of these mining claims, they knew the mine inspector very well, and the mine inspector was very supportive of both Pat and I in our studies and getting into the mining business. He was the one who actually helped get the legislation passed so that women could work underground.

01-00:20:37
Burnett: Oh, really?

01-00:20:38
Gibbs: Yeah.

01-00:20:39
Burnett: So in a small way, you two were kind of a part of that impetus, perhaps. He may have been doing it anyway, but he saw that you were there and that you were—

01-00:20:48
Gibbs: Yeah, and he saw that we were serious about it. We weren't throwing our bras across the room or anything like that. We were just sort of matter-of-factly doing these things. He was a good guy. He lived a long time.

01-00:21:04
Burnett: So you stayed in touch with him?

01-00:21:06
Gibbs: Yeah.

01-00:21:10
Burnett: It's an interesting history. We could talk about that a lot. But just perhaps one more question. Did anything you learn about that domain of the kind of, I don't know, call it amateur claims, but this kind of DIY mining—

01-00:21:32
Gibbs: Do it yourself.

01-00:21:32
Burnett: Did that translate over to what you learned in the mining school and what you did subsequently at all?

01-00:21:43
Gibbs: I think that what it did as much as anything was it sort of connected me with the real mining, the reality of mining, that we dig rocks out of the mountain.

01-00:21:55
Burnett: In a very elemental way.

01-00:21:59
Gibbs: There's something in them that we can get out, that's worth something. It sort of all started hanging together.

01-00:22:10
Burnett: There's something kind of mythic about it, too.

01-00:22:13
Gibbs: Oh, the Tommyknockers.

01-00:22:16
Burnett: Another person I talked to, he was reading adventure stories as a kid, and there's something romantic about mining at that level, as part of stories.

01-00:22:32
Gibbs: My high school story that I was reading was about a mining engineer who was going out to some claims, and there were prospectors, and he was proving that

these claims were worth mining and all of that sort of stuff. It's like the old-time prospector image and the guy who goes out and beats on the rock, and he doesn't necessarily know very much about the technology, other than, okay, I can pound this rock into small pieces and get some gold out of it. I loved adventure stories when I was growing up.

01-00:23:15
Burnett: So there is that a little bit.

01-00:23:17
Gibbs: Oh, yeah, definitely.

01-00:23:20
Burnett: So you were at Colorado School of Mines in the mid-sixties, 1966 until 1969.

01-00:23:28
Gibbs: Sixty-nine, yeah.

01-00:23:29
Burnett: Those were heady times in the United States. You're in Golden, Colorado at that time, so perhaps a bit removed from that, but it's on the radio, it's on the television. What was it like? Was it just kind of in the background, or was it—because so much is happening. We just did the fiftieth anniversary of the Free Speech Movement at Berkeley, and all that was going down in 1964. Berkeley got its reputation for this place where unrest happens.

01-00:24:02
Gibbs: I moved to Boulder in 1964. That was kind of before the hippie movement, and the hippie movement started coming around about '67 or so. I was kind of drawn to that, but I still had this thing about wanting to get this degree. In Boulder, I was very conservative, and at the School of Mines, I was kind of a hippie.

01-00:24:31
Burnett: Interesting. Were you drawn to the music at all and that kind of thing?

01-00:24:41
Gibbs: Some. Not so much the music, but just kind of the counterculture thing. Rebellion against the rigid ideas about things.

01-00:24:54
Burnett: And that resonated with you, obviously, because you were breaking those boundaries.

01-00:24:57
Gibbs: Yeah, because I'm a little strange and I don't follow the norm and things like that. I think that was it. Because it wasn't the drug thing. I was not very much into the drug thing.

01-00:25:14
Burnett: That comes to Colorado maybe a bit later.

01-00:25:17
Gibbs: Well, no, it was here then.

01-00:25:18
Burnett: It was there?

01-00:25:18
Gibbs: Oh, yeah. It was here. It was big. Another thing to me at that time was I said, I'm in school. Don't party during the week, don't do anything. I don't drink during the week. If I want to drink and have fun, I'll do it on the weekends. I never really got into it, drinking and things, in a big way. Oh, I was also interested in folk dancing at the time, and that's a pretty clean-living kind of group. I would come up to Boulder on Friday nights to go folk dancing, and that was sort of my life.

01-00:26:03
Burnett: A social outlet that is not school. It's important for a lot of people to have one thing, one group of people—

01-00:26:10
Gibbs: It wasn't talking with engineers. It was talking with all sorts of other people, and I really loved the dancing.

01-00:26:17
Burnett: What kind of folk dancing?

01-00:26:18
Gibbs: International. Russian and Greek were some of my favorites, and Israeli and Scandinavian. There was Eastern European, like Yugoslavian and Hungarian and Ukrainian and all sorts of other cool stuff like that.

01-00:26:40
Burnett: That's great. So you're able to finish your BS in mining engineering.

01-00:26:48
Gibbs: It was actually Engineer of Mines degree.

01-00:26:50
Burnett: An Engineer of Mines degree.

01-00:26:51
Gibbs: Yeah, because it required more hours than a bachelor's. We got a little silver diploma at the time. I have two silver diplomas, because a couple of years later, I went on to graduate school. I worked for Consol for coal for two years, and then went to graduate school and got another one.

01-00:27:14
Burnett: As you had been told, what was good about Colorado School of Mines is that it's kind of a direct conduit to the workforce. That happened for you. As you finished your first degree, you were right in it.

01-00:27:25
Gibbs: I pretty much figured I could get a job, and I did.

01-00:27:31
Burnett: Did you apply to a posting, or were you—sometimes it's informal things, like a friend is working there.

01-00:27:39
Gibbs: No, they had recruiters come to the school. I interviewed several places. I walked into the interview with this guy from Consol—it was Consolidation Coal at the time—and I guess I impressed him, because they offered me a job. Some people were sort of put off by a woman who was in engineering, but every now and then, I would come across somebody who really was, oh, this is good.

01-00:28:18
Burnett: Supportive. So they hired you. What was the nature of the first position?

01-00:28:25
Gibbs: I was hired in the exploration department at Consol, and they, I think, did not quite know what to do with me. They put me on this project. It was building a geological database. This was sort of the beginning of my interest in computers, because I'm kind of lazy. I don't like to sit around punching a calculator. I'd rather put it in a computer and let the computer do the work. That was my first job. It was kind of interesting, because they had had, I don't know, several people that had started working on this project, and they really never quite got it off the ground. I went in there and just started doing it. Their database project is still going to this day. Of course, it's changed a lot, but somebody had to get in there and go through the old printed records and get them into punchcards.

01-00:29:29
Burnett: And this is core data and that kind of stuff?

01-00:29:32
Gibbs: Yeah, like drill-hole data.

01-00:29:35
Burnett: That's a massive transition, and that happened—that's something that—

01-00:29:40
Gibbs: This was like 1970.

01-00:29:44
Burnett: Did you have to write the code for the data? Did you create the database?

01-00:29:2348
Gibbs: I created the database. They had a computer department, and the computer department actually wrote the code. They built the database system. They were working on programs to plot the drill logs, and they had a program that would do some contouring. But I supplied the data that went into that. What I

did was I worked with them to develop some data forms, because I knew what kind of data there was, so I developed the forms kind of back and forth with the computer department. I think probably what my initial contribution was is, okay, here's the data, here's what we want to do with it. My creative part was how do I go from here to what we want to do with it, and what kind of information is needed from this original paper data to satisfy what goes into the computer program.

01-00:31:03
Burnett: So it's an iterative process back and forth a little bit.

01-00:31:06
Gibbs: There were some other database things going on at the time. I did some research around. I also visited a lot of the Consol mines and said, "This is what we're doing. We're going to build this database. How does this fit with what you are doing here?"

01-00:31:32
Burnett: Presumably, you have to sample, over time, what kinds of records were being kept, because I imagine they changed. They would add columns in particular areas.

01-00:31:43
Gibbs: Right. I think it was even the USGS at that time had some codes for—SH for shale, SS for sandstone, LS for limestone, and so forth. So I incorporated those, and then started sitting down. I started writing stuff into these forms. Then that kind of got going, and then the head of the department hired a couple of people to just do that straight coding, because that's a clerical thing, and I guess he realized I had more to offer than just writing stuff in little columns.

01-00:32:28
Burnett: That may have been part of it initially, because historically, computing as tabulation work had been, quote quote, "women's work." It was a way for them to sort of translate in their heads where does this person fit. But coding and writing software and doing some of the higher-end stuff that you were getting involved in was different.

01-00:32:53
Gibbs: I did start writing some software at the time, and I really had not studied any programming languages. A couple of guys in the computing department sort of took me under their wing and said, "Oh, you can do this. We have this time-sharing system. Here's how you make a basic program." I learned that part. The department head knew what I was doing, so he showed me this big, long kind of accounting sheet that had all these calculations in it. It was float-sink calculations, something you do with coal. How much you do certain things to it, and get rid of the bad stuff and keep the good stuff. Anyway, there were probably maybe fifteen or twenty columns of this thing. He knew I was

playing around with learning some programming, and he says, “Can you write a program for this?” I did it in a couple of hours.

01-00:34:01
Burnett: Is that what they call a flow sheet?

01-00:34:04
Gibbs: No, that’s different. That’s different. He had—it was like what you would put into a spreadsheet now. It was basically a spreadsheet on paper.

01-00:34:14
Burnett: So you wrote the code for that.

01-00:34:16
Gibbs: I wrote the code for it in just a couple of hours, I think maybe an afternoon or something, and took it into him. He was, “Oh. Oh. Oh.” Boy, was he impressed. For me, it seemed like a little thing, but it was a transition point, I think.

01-00:34:34
Burnett: He realized, and you got that really positive feedback. It was so relatively simple for you, but they were amazed that you could do this. Was that an aptitude that you had been aware of?

01-00:34:48
Gibbs: No, not at all.

01-00:34:50
Burnett: What is that? How would you describe that aptitude? Organizational?

01-00:34:54
Gibbs: It’s an ability to see what needs to be done, break it down into parts, and do it a bit at a time, and say, let’s see, I need to do this calculation, and how would I do that in BASIC, or how would I do that in Fortran? It’s, I don't know, development, I guess.

01-00:35:19
Burnett: Development, and you’re solving a puzzle. Definitely. Did you excel at mathematics? Is it something—

01-00:35:28
Gibbs: No. I wasn’t all that good at math. I’m much better at text. And I love literature. I almost switched over to English major at one point, but then I decided, well, no, I’ll stay in engineering, because I can always read. I still read. I’m reading Chaucer again right now.

01-00:35:53
Burnett: Oh, wonderful. So you’ve kept that interest.

01-00:35:56
Gibbs: Oh, yeah. I have a wide variety of interests.

01-00:36:00
Burnett: Great. We definitely need to fit that in there, for sure. As we go along, if you have interests that you want to talk about. I guess your hobbies evolved over time. Or did they stay the same pretty much? Reading, of course.

01-00:36:14
Gibbs: Reading. I still love science-fiction, so I've been doing that for fifty years.

01-00:36:20
Burnett: What do you love about science-fiction?

01-00:36:22
Gibbs: It's exploring new avenues of things and different ways of looking at things. Okay, suppose there's this situation; how might it evolve if something happened? Like alternative histories sort of thing.

01-00:36:41
Burnett: Right, counterfactual kind of things.

01-00:36:43
Gibbs: Or going to the stars. I think it really expands the mind.

01-00:36:50
Burnett: It does. Not to reference any stereotypes, but it does seem particularly resonant with engineers, that there's this—yeah, exactly the way you say it. You start from an alternative point, and then you develop it with your imagination, and you follow a trajectory.

01-00:37:13
Gibbs: Right now, I'm reading some of the older science fiction, because I have these books from the fifties and sixties, and they're projecting technology, so it's very interesting to see what they thought might have happened. Almost none of them had the vision of our computer technology, the level of computer technology that we have by now.

01-00:37:41
Burnett: And overestimated others. The flying cars and all of that stuff.

01-00:37:44
Gibbs: Right, exactly. Probably Arthur C. Clarke got the closest. This is kind of off the topic, I guess.

01-00:37:55
Burnett: No, not at all. Not at all. It's all part of it. Early on, you showed this aptitude for working with computers. Do you remember how old the computer department at Consolidated was when you started, roughly?

01-00:38:19
Gibbs: That was in 1970. It had probably been there for as much as ten years.

01-00:38:28
Burnett: When they got the first mainframes out—

01-00:38:31
Gibbs: Right. They were doing business computing. The technical computing was probably only a couple years old at that time.

01-00:38:39
Burnett: So ground floor.

01-00:38:40
Gibbs: Yeah, ground floor.

01-00:38:43
Burnett: And it mushrooms into all kinds of different applications as the seventies move on, as computer processing power evolves.

01-00:38:53
Gibbs: But what really made the big difference was the introduction of the PCs, because then we as engineers could have them on our desks.

01-00:39:05
Burnett: You didn't have to share time.

01-00:39:06
Gibbs: Right. We had a little computer there. It was very basic, but it was a start. I remember at the beginning, it was like, boy, I'd really like to see a picture of this whole deposit, and I want to look at it from different angles. Then I want to put a drift in there. Boy, we can do those things now. It is so exciting to me to have started from that point and see these things that I dreamed about then that are common today.

01-00:39:48
Burnett: When did you first have the vision of a three-dimensional, rotatable model for a mine?

01-00:39:59
Gibbs: That was probably in the seventies. I was working at Climax. There were two companies that were doing mining computing sort of things, and one of them is still around. That's Mintec. They had a system, and it was still two-dimensional, but they had some basic graphics, and not just—we used to get contour maps that had little numbers in them, little numbers in a square, because it was like a printer sort of thing. So you'd print numbers, and that represents a contour. They had some graphics. It wasn't all my original ideas, because we would sit around in these sessions and talk about it. The developers were saying, "Well, yeah, this is what we'd really like to do," and gradually the graphics capabilities got better, and there were starting to be more companies that were developing mining software and incorporating these graphics that were being used for other things. I think that the space

program had a lot to do with improvement of the technology. So the mining software developers were adapting that technology into their work.

01-00:41:46
Burnett: I'm curious about how mine maps prior to this represented the—how did they show the necessarily three-dimensional—because you really need that.

01-00:42:01
Gibbs: Well, they didn't. They were two-dimensional. They were two-dimensional maps. You'd have a series of maps, one for each level, say, in a mine. I did drafting, a lot of drafting, too. The maps would have the outlines of—say if it's a vein mine, or a vein deposit, then you would have the outlines of the drifts, and you would have numbers on there that represent the grade of the material, or maybe the volume and things like that. Then you would write those on a sheet, and then you just kind of put it all together. But most of those pictures were right here.

01-00:42:51
Burnett: There would be numbers, or some kind of representation, to signify the Z axis that would give you a sense of—

01-00:42:58
Gibbs: Well, yeah, sort of.

01-00:42:59
Burnett: Sort of, but not quite.

01-00:43:03
Gibbs: Right, because you could do cross sections and you could do plans, but it was very difficult to manually convert those into a three-dimensional drawing. What happened a lot during that time, and actually before that, years and years before that, was people would make models out of plastic sheets. They would take the cross sections that the geologists put together, and then take these plastic sheets and put them in a frame. In some of the mining museums, you can still see those.

01-00:43:34
Burnett: Oh, that's phenomenal.

01-00:43:38
Gibbs: In fact, I was out at a company in Utah a few years ago and they had one of these three-dimensional models of their mining process.

01-00:43:51
Burnett: Wow, that's extraordinary. There are all these kind of different efforts to sort of represent what is kind of this blind world underground, and it's so essential to understand the three-dimensional dimensions of this, right? You can run into another—

01-00:44:11
Gibbs: It is three-dimensional. You're there in this little drift.

01-00:44:15
Burnett: If you go too far, you can collapse a roof.

01-00:44:19
Gibbs: I think this is one thing that served me pretty well, is that I have a good spacial sense. So I can visualize what it looks like in three dimensions. It's almost like the technology is to the point where you can lose that ability if you don't exercise it.

01-00:44:44
Burnett: We're just reflecting right now, but this is a common conversation that I've been having with a number of folks about the educational value and challenge of the incredible representational power of computing today. The notion that we can drop a laptop into a classroom and students will learn because they're using, quote quote, "technology," but they're not anywhere near the machine itself. They're not anywhere near the design, and everything is just kind of pre-digested apps that they use, and they lose a sense. Do you think about that sometimes?

01-00:45:33
Gibbs: Oh, yeah. Right. I have not been in those classrooms where they're teaching. The schools now teach the mining students, and they use some of those programs to do the mining development. They have senior projects where they are given a set of data at the beginning of the year and they have to develop the mine plan. They have to do the orebody model and develop the mine plan and so forth. A good friend of mine teaches one of those, or he's involved with one of those classes, and he says that the students just do these things, and they're kind of missing the reality of what they're doing. It's like having an electronic calculator and forgetting how to add a column of numbers.

01-00:46:38
Burnett: Are there any dangers with that, do you think?

01-00:46:44
Gibbs: Yeah, but when the students get out of school and they go to work in a mine, they kind of wake up.

01-00:46:53
Burnett: So there's a little bit of on-the-job reckoning, shall we say.

01-00:46:58
Gibbs: Right. I am so impressed with the students these days, because most of them are able to make that transition. So they have the computer skills, and they're also learning the physical part of how do we get this rock out of the ground and make something of it. It's so way cool. There are more women, which I think is absolutely fantastic. These are women that you'd look at and you'd think they were maybe some kind of model or something.

01-00:47:37
Burnett: So there's none of the old stereotype that you had to deal with. We should talk about that in more detail. Let's go back again. You've got a couple of years there where you're at Consolidated Coal, 1969 to '71, and then you go back to school.

01-00:48:05
Gibbs: To graduate school.

01-00:48:06
Burnett: Can you talk about that? Was that a natural foregone conclusion that you needed to do?

01-00:48:13
Gibbs: No. I just wanted to go a little bit further. I was living in Pittsburgh and I wanted to come back to Colorado. I thought that would be a good excuse, no more complicated than that. Then it would give me more credentials out in the mining world. So some of both.

01-00:48:40
Burnett: You need both, it seems. You don't get respect unless you've actually been in the mines, and you don't get respect unless you have the credentials, and you kind of need to dance between those two worlds. Was there a thesis component of the masters?

01-00:48:57
Gibbs: Yes. I wrote a thesis on ventilation. That was something that I had worked on some at Consolidation Coal, was a ventilation project, and that was kind of in addition to the exploration database thing that I was working on.

01-00:49:15
Burnett: In terms of next steps, were you always thinking, I want to be in the industry, I want to be in the mines?

01-00:49:23
Gibbs: Yeah. After graduate school, I said, I don't want another office job. I'm going to apply for jobs in mines. When I got out of school—and this is kind of an interesting story also, because I was out of school. I had been so busy getting the degree that I hadn't really looked around for jobs. I went to the school placement—the school had a placement office at that time. So I went over there and I said, "I'm out of money. I really need a job. What do you suggest?" At that time, Climax Molybdenum had an office just across the road, across Sixth Avenue, from the school. He says, "I'll just send you over to Bill Distler and you can talk to him," because I said, "Really want to work in a mine. I've got the desk stuff. I want to work in a mine, get the mining experience." So I went over, and I just walked in, no appointment, because my Volkswagen bus was just about to break down. [laughter] Those were the days.

01-00:50:36
Burnett: That's right. I don't think there's any scene in the early seventies that doesn't have a Volkswagen bus in it somewhere.

01-00:50:43
Gibbs: I had one. So anyway, I walked in and told the secretary I would like to talk to Bill Distler, and so-and-so at the School of Mines had sent me over. He must not have been terribly busy, because he did let me in to talk to him. So I sat down, and I could feel this hostility from him. So I just sat there and just talked. Yeah, I've done this, and I've done that. I really want some in-mine experience, and blah, blah, blah. Gradually, I could see him kind of changing, and he was kind of warming up to the idea that, oh, maybe we can give this a try. That's how I got my job at Climax. I was the first woman to work underground there. I started as an underground engineer. It was very interesting, because, first, they didn't have a place for women to change, because I was the only woman that was working there. They did find a separate dry for me. The first day, I remember they had these windows where the miners come up and they get their brass for the day to go—

01-00:52:05
Burnett: Identification.

01-00:52:06
Gibbs: Their underground ID. I was putting my diggers on and walked behind the windows there and was talking to some of the other engineers or the managers or shift bosses or something or other. All these guys kept looking through the window. Saying, "What are they looking at?" Because I didn't think of myself as anything other than, oh, here I am going to work in a mine, I'm so excited about it. I've got this engineering job, and yeah, I know how to survey underground, and stuff like that.

01-00:52:42
Burnett: Was it the proverbial dropped jaws and stares kind of thing?

01-00:52:46
Gibbs: Yeah, very much! Of course, they knew I was coming.

01-00:52:51
Burnett: But still, there was a cognitive dissonance for them. Something here doesn't make sense, and they're processing.

01-00:53:06
Gibbs: I did have the job as an underground engineer, so I knew that I would be surveying, but I think that the company was not sure how it was going to work out. I treated people underground just like I treated everybody, a little bit sarcastic. Lay some shit on me, I'll lay it back, and stuff like that. So I got along.

01-00:53:34
Burnett: One of the others I interviewed talked about respect down in the mine, and it has to be earned. You're technically in a senior position, but you need buy-in from the miners and the people, and mutual respect has to be established. Is that similar in your case?

01-00:54:00
Gibbs: Oh, yeah, very much. They knew that I had the degrees, and they respected that, the miners did, and I think that the managers did and the other engineers did as well. It was just like, well, can she really do the job? She's got the degrees; can she really do the job? And I really could do the job. I don't know. There's more to it than that, I suppose, but—

01-00:54:31
Burnett: But overall.

01-00:54:32
Gibbs: Overall, it went pretty well.

01-00:54:35
Burnett: I think, for you, it was really focusing on the work, and focusing on communicating your capabilities, and being confident. It sounds like you didn't have much of a confidence problem.

01-00:54:50
Gibbs: Yeah, I do.

01-00:54:52
Burnett: You do?

01-00:54:52
Gibbs: Yeah, but I don't let it show on the outside very much.

01-00:54:58
Burnett: You knew that you had to show no fear and go in—

01-00:55:01
Gibbs: Not exactly. I didn't know that. It was just that's how it was. Kind of in perspective, my mother was very disciplinarian and really pretty harsh with us kids, and all of this seemed easy in comparison to that. [laughter] I certainly loved my mother, and she did an amazing job of raising ten kids, but she was tough. I think that probably carried me through an awful lot of stuff, because it just didn't seem as bad.

01-00:55:45
Burnett: Take note, helicopter parents. [laughter] You didn't have deliberate strategies for doing it. You just knew you were going to do it, because you really liked it.

01-00:56:02
Gibbs: Yeah. I loved it. I loved being underground. I loved doing the work. It was very exciting to me.

01-00:56:12
Burnett: It's surveying work, so you were gathering data about the—

01-00:56:18
Gibbs: I carried the transit around underground and set it up and did the work, did the surveying. Because you had to survey drifts, make sure they were staying straight.

01-00:56:33
Burnett: That was your first position. It wasn't anything to do with mine ventilation. It was—

01-00:56:41
Gibbs: It was later. I worked underground for about six months, and they were just starting the open pit there. When I had interviewed up there, I had talked to a guy who was doing some computer programming for open-pit design. We kind of connected, so he knew that I understood the computing part of it. After about six months, he needed some help in the mine planning department, so I went to work in the mine planning department and worked there for a couple of years. I had one summer as shift boss for an environmental crew, and then I worked in the ventilation department about the last year that I was there.

01-00:57:35
Burnett: What work did an environmental engineer do in the mid-1970s?

01-00:57:41
Gibbs: We planted trees. We did seeding of the tailings ponds. Our crew did—

01-00:57:53
Burnett: Remediation, basically.

01-00:57:54
Gibbs: Yeah, remediation sort of things. There was maybe a little bit of water testing, but not very much.

01-00:58:03
Burnett: So it wasn't in response to federal regulations so much?

01-00:58:09
Gibbs: Not so much.

01-00:58:10
Burnett: It was kind of, this is how you do it, and part of the practice of the mines that has evolved over time.

01-00:58:17
Gibbs: Yeah, and there were some that were kind of starting, because this was the early seventies, so it was just getting started. You didn't have to learn all of these convoluted, contradictory regulations.

01-00:58:30
Burnett: Some of the regulations were contradictory?

01-00:58:32
Gibbs: Oh, yeah. Yeah, they still are. It's gotten worse.

01-00:58:37
Burnett: Can you tell me an example of a contradictory set of regulations for environment remediation and clean up?

01-00:58:44
Gibbs: I'm not really up on that, but I've had experiences in Boulder County with land-use regulations there, and a contradictory regulation would be something like, well, we have to do wildfire mitigation, but you can't cut down your trees. That sort of thing.

01-00:59:03
Burnett: Okay, gotcha. So you're working from 1973 to 1976 for Climax, or the Molybdenum Company, as a senior mining engineer. Did you start as a senior mining engineer?

01-00:59:21
Gibbs: No, I started as an engineer three, I think. I think it was three, two, one. Then I moved up to a two. But I don't think I was a senior mining engineer until I went to work for Gulf Mineral Resources.

01-00:59:41
Burnett: How did that transition happen?

01-00:59:45
Gibbs: I decided that I needed a change. When I was in school, I used to go to local AIME section meetings, so I had some contacts there. I called up this one guy I knew and I said, "I'm thinking really about leaving Climax," or I might have seen him at a CMA conference or something. "I'm thinking about leaving Climax. Do you have any ideas?" He sent me to this guy at Gulf Mineral Resources, and pretty soon I had a job.

01-01:00:23
Burnett: So the face-to-face networking of AIME and—

01-01:00:27
Gibbs: Yeah, right. Recommendations from somebody, or knowing somebody, those have always been the best way to get jobs.

01-01:00:37
Burnett: I ask people, "So how did you find out about this job?" "A friend of mine." The answer is always, "A friend of mine. Met them at the meeting."

01-01:00:49
Gibbs: It's a great networking opportunity.

01-01:00:51
Burnett: It is. It does sound like it. Even to this day, it's hard to believe now with 8,000 people coming to a conference—it sounds a bit intimidating—but it's an opportunity for old friends to meet, and old contacts to meet, and new contacts to be developed. At Gulf Mineral Resources, the title is senior mining engineer now, and application analyst.

01-01:01:19
Gibbs: What I was doing was—and that's another interesting story, technology-wise, because they had had someone there who was doing, quote, "operations research" sort of stuff, which is a big overall thing. This first project I worked on there was on the Crow Indian Reservation. This operations research guy had done this computer work and said, "Oh, there's three billion tons of coal under there." I guess it was Mineral Resources Department or something. There were some people that were a little bit skeptical of that, because it was just too much.

01-01:02:11
Burnett: Such a high estimate.

01-01:02:13
Gibbs: Yeah, it was high level sort of stuff. This operations research stuff kind of started in the sixties. He was like, this is the answer to everything, and this can be mined. It has an overall stripping ratio of 2 to 1. No problem, blah, blah, blah. We can mine three billion tons of coal, and all that kind of stuff. Some of the people there were kind of skeptical, so I was given the job of saying this is realistic. Basically, I discovered that it wasn't very realistic, and not only that, the Crows wanted a huge royalty. It just would not have been economic. That's what moved me more into the computer-resource calculation thing. We did have mainframes, but the mainframes were in Pittsburgh, so it was a little bit awkward. Oh, yeah, I forgot, while I was in graduate school, I worked for Conoco Minerals doing—I wrote a program to do open-pit design. I calculated the resource and then did an open pit design. I was doing some Fortran programming at that time to do that. This kind of carried on into Gulf Minerals. Again, I was having to fight this perception that, oh, we can't do things on computer. It doesn't really answer everything.

01-01:04:12
Burnett: Can you talk a little bit about resistance to computing in the mining industry? Where does that come from and what were their fears? Was there anything justified? Had they had bad experiences with—

01-01:04:30
Gibbs: Some did, and some of it was from people who were saying, "Oh, we can do everything. We can solve all your problems with this computer program." They got kind of a bad taste in their mouth about computing, so when I moved into Gulf Minerals, they had a pretty bad taste. I kept saying, "We can do these things on computer. There's this company, Mintec, that has these programs." Climax, or AMAX at that time, was starting to use them, and we

could do it. They would say, “Yeah, but the geological part is more of an art, and the geologist does this design. We can’t reproduce that on computer.” Kind of what I ended up doing was saying, “No, you can’t reproduce that on computer, but you can take what they’re doing and use the computer to do a lot of the calculations that people used to have to sit around with a little calculator, or with their slide rules, and do those calculations, but we can do that part on the computer, and the geologist needs to interface. The geologist needs to do their work, and we can take that and put it into a program.” This is exactly what’s happening these days, but back then, there was, “Oh, a computer can’t do a contour map that we could accept.” There is still some caution about that, that just because you can do all of this fancy stuff with a computer doesn’t mean it has anything to do with reality. That’s kind of hard for these kids, I think, because they tend to get overly dependent on what the computer is doing. It was the same thing back then, too. It was like, well, the computer puts it out; it must be the right thing. There were still a lot of skeptics at that time that said, “No, just because the computer drew it, I don’t even trust what the computer does.” But now, it’s sort of the other way. People tend to think, oh, the computer did it; it must be right. It’s hard to say, “Maybe so, maybe not.” This is some of the training that I’ve done with a friend of mine, and we’ve done quite a bit of training on what’s reality about contouring and what kind of trouble can you get into if you don’t do things right.

01-01:07:36
Burnett: The term in science studies is technological progressivism. It’s a blind faith in technology, just assuming that because it’s high technology, it will result in a better outcome, without any engagement in, well, part of it might be better, but it might be worse in some respects, and we still need to tweak it, and we still need to do certain kinds of real time or real interface with testing the actual mine site. That’s a challenge in education these days. It’s critical thinking.

01-01:08:21
Gibbs: It’s something that you can only really learn by experience.

01-01:08:26
Burnett: You can try and teach by examples, but unless they encounter it, it’s difficult. Going back to your first example of the open-pit design, your first one, you were starting with the measured or expected deposit?

01-01:08:52
Gibbs: With drill-hole data. Starting with drill-hole data.

01-01:08:57
Burnett: So you would have a certain number of variables in your program that you could input, and you’d input these variables. It was to kind of semi-automate some of the process of pit design?

01-01:09:11
Gibbs: Yeah. Something like that. [laughter]

01-01:09:17
Burnett: I'm sure it's more complicated than that, but I was just trying to get a sense of what Fortran programming was useful for at that time.

01-01:09:29
Gibbs: At that time, what I was writing was a program to do inverse distance estimation for determining what ore grade would be in a particular block. At that time, there was the Lerchs-Grossman concept, and it was a pit-design sort of thing. They were working on it at the Bureau of Mines at that time. I kind of researched that and tried to understand it. It's a very difficult kind of thing. Eventually, there were some people that have developed some real nice software based on those techniques.

01-01:10:19
Burnett: On those principles and techniques.

01-01:10:21
Gibbs: But at that time, it was a two-dimensional thing. What's optimal in one cross section can be very different from what's optimal in the next cross section. That was the sort of thing we were struggling with then. Things were done two-dimensionally then. Now, the estimations are done three-dimensionally. I was in the two-dimensional world at that time, wishing for a three-dimensional world.

01-01:10:57
Burnett: People were calling it into being at that point, wishing for it, and as soon as the processing power was there—

01-01:11:03
Gibbs: I could see it. I could see it happening, but it wasn't there yet.

01-01:11:10
Burnett: And in so many fields. In other fields, biology, being able to image a molecule, that kind of thing. So you can see the transition—

01-01:11:18
Gibbs: MRIs. MRIs are a very good example, because those turn into three-dimensional pictures for doctors.

01-01:11:28
Burnett: That imaging capability of seeing something in three dimensions and being able to rotate it sounds like a tremendous tool for the mining industry as it begins to come online. We'll talk our way through it as we migrate our way through your career here.

01-01:11:44
Gibbs: Yeah, because we've been kind of jumping around a lot.

01-01:11:46
Burnett: We have. You were doing feasibility studies for coal and uranium properties. That was part of the time at Gulf Mineral Resources?

01-01:11:58
Gibbs: Yeah, right. I did some work in coal. We were doing more work in uranium at that time. They had a project down in Texas called Conquista and I worked on that a little bit. I did some work on that with a geologist who I still know. He lives up in Casper, and we've worked on uranium projects in the last few years as consultants.

01-00:12:29
Burnett: You've kind of come back to that area a little bit, or you never really left it.

01-01:12:32
Gibbs: That and others. I've just done a lot of different commodities at this point.

01-01:12:38
Burnett: One of the things that jumped out at me during this period, in the late seventies, early eighties, you develop software for economic risk and sensitivity analysis.

01-01:12:50
Gibbs: Risk analysis, yes.

01-01:12:52
Burnett: Can you talk a little bit about that, and how that work was done? Do we have ten hours?

01-01:13:03
Gibbs: That was kind of like a project sort of thing. I was just interested in doing something with that, because it's sort of a statistical thing. You can develop graphs, essentially graphs. Here's a particular event, and how do we describe that mathematically. Once you describe that mathematically, okay, that fits in here. We define something else mathematically. That fits in there. Then all of that fits into a cash flow. What the risk analysis does is it—you go through it, and basically you're saying, in this particular iteration, I'm going to pick a random number that represents a point on this either discrete or continuous graph, and then run it based on that. You run 1,000 or 2,000 or 10,000 of those, and you start getting a feel for where your sensitivity points are.

01-01:14:22
Burnett: Right, and get a sense of a range or thresholds for certain kinds of activities.

01-01:14:29
Gibbs: The simple thing is, let's see how it works at 0 percent return, minus 5, plus 5, minus 10, plus 10. You do more calculations inside.

01-01:14:48
Burnett: You can see that processing power is important. Increasing processing power is important.

01-01:14:54
Gibbs: I took an economic analysis course, and when I took it, I didn't really have a computer, so I did all the calculations on a big accounting sheet, and then I learned how to use Excel, and it was like, oh, wow, this is fantastic! Actually, it wasn't Excel at the time. It was Quattro Pro, I think. It was like, oh, wow, I love this. I'd spend a whole afternoon doing one. Here I could do ten in ten minutes.

01-01:15:28
Burnett: This dovetails into the next phase here, because, if I'm correct, you return to the Colorado School of Mines in the early eighties. Is that right?

01-01:15:39
Gibbs: I taught there for three and a half years.

01-01:15:41
Burnett: You were an assistant professor at the School of Mines. Can you talk about that transition? It's a brief period, so it's something you tried for a while and then moved out of it.

01-01:15:56
Gibbs: I got tired of working for Gulf Mineral Resources also.

01-01:16:03
Burnett: Where was that based? Did you have to move? Were you still in Denver?

01-01:16:04
Gibbs: No, I was in Denver. I said I'd really like to do some consulting work, but I didn't quite know how to get started. I considered going to teach, because at the School of Mines they encourage professors to do consulting work. I thought, well, that would be a good transition. I taught there, but I also found out that that wasn't really my best thing either. But during that time, I started in the software evaluation thing, because the early eighties was when these companies were really starting to expand. PCs were starting to take off. They were lower-priced. You could do stuff on your desktop that required big, huge computer installations before that, and now engineers could sit at their desks and do some of this work there. The market just expanded like crazy there in the early eighties. There was also a group called the Computer-Oriented Geological Society that started up about that time that I was involved in. It was a bunch of people. It started with a lot of geologists, and they had these PCs, and there wasn't any geological software, so they were developing their own. I was kind of part of that group also. I did some software development too, but again, I realized that I'm not the best programmer in the world, but I really liked using the programs. That kind of worked into just researching the software that was out there, evaluating it, what's the real thing, what's happening here, and what are all these programs that people are starting to use. I started a newsletter and a software directory and wrote articles. The interest in computing for geology and mining was getting more mainstream, a little bit

more mainstream, but there weren't very many people writing about it, and there weren't very many people consolidating the information.

01-01:18:59
Burnett: The history of computing in the late seventies and early eighties, it's these very, very kind of closed communities of the developers themselves, and they were very, very tightly connected. It sounds like, from the lists of papers you were doing in the mid-eighties, that you were almost a bit of a proselytizer, is that—

01-01:19:26
Gibbs: Yeah, because I said, "Hey, you guys, here's some cool software, and you can do these things with it. What are you still using a hand calculator for?'

01-01:19:41
Burnett: I'm just interpreting this data. During the time that you were an assistant professor at the Colorado School of Mines, you did some postgraduate coursework in mineral economics?

01-01:19:56
Gibbs: Right.

01-01:19:58
Burnett: Can you talk a little bit about the discipline of mineral economics? How is mineral economics different from mainstream economics? Is it just that it's focused on the mining industry, or there's some differences?

01-01:20:10
Gibbs: There are differences. It does focus more on commodities. In mineral economics, you take the basic micro/macroeconomics, but when you get through the basics, then you start in specific courses. One of the most well-known courses is Frank Stermole's—I can't remember what it's called now, but it's basically an economics course that teaches you how to evaluate mineral properties. There are a lot of examples, because mineral properties are not easy to evaluate, because it's all virtual until you actually dig it, and by the time you dig it, it's done, it's gone. You use the same basic economic techniques, the same cash flow kind of things, but you have to be aware of the risks and the uncertainties. I can say I think this deposit has this particular grade, but eh. If you don't realize that, well, it may be there and it may not be, then you can—people have gotten in a lot of trouble.

01-01:21:34
Burnett: I bet. I guess part of that is also risk analysis. You're trying to develop a range of estimates. At the lowest end, the orebody could be this, and at the highest end, it could be this.

01-01:21:48
Gibbs: And the probabilities. You work with probabilities. Geostatistics is very good with that. You're saying that doing these techniques, and with the data that I have, I can have this degree of confidence that this is probably pretty close to

what it really is. Then when you actually get into the mining of it, then you go back and compare what you did to—you reconcile with what you're actually mining with your original model, and then you can adjust your model in that same mine, so you can adjust your model so you get closer.

01-01:22:42
Burnett: It's adjusted in an iterative process. It's like project management, it sounds like. You have your estimated costs as you start, and then, as you go along, you make adjustments.

01-01:22:57
Gibbs: You have to adjust.

01-01:23:04
Burnett: Taking that coursework, you had questions in your mind that derive from your initial efforts to model mines and model new mines? Is that what you were thinking? Or were you thinking ahead to wanting to consult and you want to have credentials in that area?

01-01:23:22
Gibbs: Some of both.

01-01:23:23
Burnett: Some of both?

01-01:23:23
Gibbs: Some of both. I wanted the credentials because I thought that this would give me some skills to add to my resume to get jobs.

01-01:23:35
Burnett: Was mineral economics at Colorado School of Mines, was that fairly new as a discipline or it had been around for a while?

01-01:23:42
Gibbs: It was pretty new back then.

01-01:23:46
Burnett: So this is while you're an assistant professor at the School of Mines. You take this graduate course.

01-01:23:51
Gibbs: I could take one course a semester for no charge.

01-01:23:57
Burnett: That's the other motivation, I suppose.

01-01:23:58
Gibbs: Yeah, right. I was interested in it, and I've done a little bit of work as a consultant on mineral commodities and supply/demand sort of things.

01-01:24:10
Burnett: It sounds like it helped. It kind of fit part of your repertoire of techniques. You're interested in estimation, assessment, ongoing assessment, planning. It seems to be all a part of that.

01-01:24:26
Gibbs: Right, and I'm interested in a lot of different things, so I didn't particularly want to go and do mine planning at a single mine for the next thirty years. I like doing different things and having different challenges.

01-01:24:41
Burnett: Well, speaking of that, that's a good segue. This is right around the time of the genesis of Gibbs Associates. Can you talk about how that came about? Obviously, you wanted to strike out on your own. What were the ingredients that made that an option for you?

01-01:25:08
Gibbs: Part of it was I was out there talking to people about computer applications, and I was getting very familiar with the software that was available, and I was starting to write articles about that time. I got to be known as the person to go to. The vendors knew me, because they said, "Go see Betty. You've got a mining product. Go see Betty, and she'll write about your stuff." Then that led into some consulting jobs for companies like—I've done database cleanups for some companies, where they just had a bunch of data and they didn't know quite what to do with it, but they needed to get it into some kind of digital format. So I've done some of that. I did some old uranium data. The uranium data had been sitting around for thirty years in these old magnetic tapes. How do you retrieve that? Because that's thousands of drill holes, and it's expensive to do the drilling. If we can retrieve them from these old tapes, then that saves us a lot.

01-01:26:31
Burnett: So you had to mount those on an old mainframe?

01-01:26:35
Gibbs: Yeah. I had to go around finding somebody who had one of those old tape drives, and then be able to interpret the data that was on them, because IBM had its format, Control Data had its format, and so forth. I didn't do all of it myself, but I found people who had the skills to do that, and then I would interpret the data, because I knew what the data should look like and what it meant. These computer guys had no clue, but they could read it and give it to me in an ASCII format so I could do something with it. Then I did a lot of evaluation of software for companies, because a company would say, "We want to put in one of these packages," and not very many companies had them at that time. Some did, for sure. But a company would say, "I want to know what's the right package," because there were five or six different ones. I would go to the company and look at what they were doing and say, "Okay, let's see. I think this package A, B, and C would probably be suitable." Then I

would do a comparison of the capabilities, and I would talk to the users. Of course, I understood how things work, so that helped a lot.

01-01:28:11
Burnett: You fulfilled an enormous role in mining at that time, because mining has this problem. You explained that there was thirty-year-old uranium data on these dusty old tapes. I'm guessing here, but that's part of the problem of the industry, is that there will be exploration and development. It will then lie dormant because the funding doesn't come together, the company gets sold, there's a merger. There are all these kinds of reasons. The market collapses.

01-01:28:46
Gibbs: And then the technology changes.

01-01:28:48
Burnett: And then the technology changes in the interim.

01-01:28:50
Gibbs: Right, and they don't keep up with transferring that data into other formats, because there's no money for it.

01-01:28:59
Burnett: Right, or there's no institution anymore. They have these properties, and it's on the books, but the institutional memory is only as alive as the management that says, "This needs to be constantly updated and constantly translated."

01-01:29:22
Gibbs: They took these tapes and old printouts and just threw them in a warehouse somewhere.

01-01:29:28
Burnett: Did you ever have any problems with damaged tapes? Lost tapes?

01-01:29:32
Gibbs: Yeah. There were some. A couple of the projects I worked on were pretty good, because the magnetic media, of course, kind of deteriorates after a while. The ones in that project were pretty good, and we were able to get the data captured. But then I worked on another one, and the tapes were okay, but we couldn't decipher the data, because you have to know something about the format. If the guys who make the tapes don't put something on there about what the format looks like, whew, who knows?

01-01:30:19
Burnett: In some ways, those problems don't go away, right? You're in business for the foreseeable future.

01-01:30:28
Gibbs: Right. I have worked on some projects where they had some stuff on computer, but then they had all of these old drill holes that were still just on

paper. But now there are pretty easy ways to digitize that information and get it into digital format.

01-01:30:54
Burnett: They were in punchcard format, so they were actually written by hand?

01-01:30:57
Gibbs: No, these were drawings.

01-01:30:59
Burnett: Oh, I see.

01-01:31:01
Gibbs: And handwritten logs. There are still companies that have that.

01-01:31:09
Burnett: It's astonishing. What do you think of some of these—

01-01:31:12
Gibbs: It's a small company. Small companies especially, they do a lot of things by hand.

01-01:31:19
Burnett: Properties are sometimes a hundred years old and have been worked and reworked and abandoned and taken up again. It's a real challenge for the mining companies, large and small, to maintain the knowledge of what they have. I don't know if I can confirm this at all. I heard a rumor that the archives and records of Anaconda Copper, which was one of the largest copper companies in the world, are in somebody's basement.

01-01:31:51
Gibbs: Some of them are, yeah. Some of them are also at the University of Wyoming in Laramie, because I have dug into those.

01-01:32:00
Burnett: So this is actually relevant to the work that you've done.

01-01:32:02
Gibbs: Oh, yeah. Definitely some are still in somebody's basement. I know that some of these uranium properties are still in people's basements.

01-01:32:16
Burnett: So there's work to be done, in other words. In 1984, Gibbs Associates starts. Who are the associates?

01-01:32:27
Gibbs: Me, and whoever else I can get to work with me. A guy named Steve Krajewski is a person that—he and I started out in the early eighties, and I met him through the Computer-Oriented Geological Society, COGS. We did some workshops together, and we've maintained a good friendship over the years. We still occasionally will do something together.

01-01:33:06
Burnett: Processing power really takes off at this time.

01-01:33:09
Gibbs: It's wonderful.

01-01:33:12
Burnett: Now I think we can venture into talking about 3D modeling and that kind of stuff. When does that really become a reality for computing in the industry?

01-01:22:23
Gibbs: Well, it was kind of gradual. Probably mid-eighties to mid-nineties is when the vendors were really starting to—really working on developing those 3D capabilities. It's really only in the past ten years where it's just mushroomed completely. Now, I have a program that I spent probably, I don't know, $15,000 on, which does more than what programs in the early eighties would do that would cost $50,000 or $100,000.

01-01:34:14
Burnett: So some of the early software programs were that expensive?

01-01:34:20
Gibbs: Oh, yeah. And a couple of them still are.

01-01:34:24
Burnett: Would you sell the car to get one of these? Would you partner with others to share the cost of this software, to share the cost of a license? Those were expensive for a single operation.

01-01:34:48
Gibbs: Things are a little different now, because you can actually almost rent them by the hour. But back then, when I worked on that kind of software, I worked on the company's programs, because they could afford to buy them.

01-01:35:07
Burnett: So you could use them and—

01-01:35:11
Gibbs: I was well-known enough in the vendors that I could get demo versions and stuff like that. The people at RockWare, they always give me a license. I say, "Hey, Molly, I got this project, and I'd be glad to pay for the software." "Oh, no, you don't owe me anything for the software," and then they give me a license.

01-01:35:40
Burnett: Oh, nice. That company is called Rock—

01-01:35:43
Gibbs: RockWare. They're out in Golden. Computer software for rocks. They've always been the low-cost, inexpensive geological software. They also started out in the early eighties with the PCs. Jim Reed was one of the founders of the

COGS group also. They were actually a fairly early adopter of three-dimensional things, and again the three-dimensional images, and they got software, some graphical software, and incorporated it into their system.

01-01:36:26
Burnett: I know early nineties, this is like Sigraph machines [Silicon Graphics, Inc.]. Did they have to use special PCs that were souped up for this kind of work?

01-01:36:36
Gibbs: I don't remember exactly when it changed, but as PCs got more capable then—early on, yeah, you had to have a souped-up computer for that. But then the technology kept progressing, and you don't have to have a special computer anymore. It is good to have more memory and good graphics capabilities, but now things work on just about any graphics thing, and we have eight gigabytes and a little flash drive, and almost a terabyte of memory. I don't remember the exact dates, but it was in the nineties, probably, that the personal computing power got strong enough to actually run some of the bigger programs.

01-01:37:39
Burnett: You'd be in a position to know the kind of geography for mining software in the United States and maybe in the world.

01-01:37:49
Gibbs: In the world. It's a worldwide thing.

01-01:37:51
Burnett: It's a worldwide thing. Was Denver a major epicenter for this kind of thing, or was it stuff that was being adapted from Silicon Valley or MIT?

01-01:38:03
Gibbs: No, not so much. The people that were developing this software were writing stuff from scratch, like the Mintec people. They're based in Tuscon. There were several companies in Denver that were developing stuff. A couple in Canada and Australia. Oh, and there was one based out of England. There were these kind of centers of mining software development.

01-01:38:35
Burnett: So two large mining states in the United States produced this, and two large mining countries, Canada and Australia, and England is—who knows?

01-01:38:47
Gibbs: Well, they're all over.

01-01:38:51
Burnett: That's fascinating. So you continue to do data rescue and conversion. That was something you've been doing from the beginning.

01-01:39:03
Gibbs: And ore reserves. In other words, determining the orebody models.

01-01:39:10
Burnett: Yeah, geological modeling

01-01:39:12
Gibbs: Geological modeling

01-01:39:14
Burnett: And GIS mapping.

01-01:39:17
Gibbs: Yeah, I dabbled in that for a while. It has some use in the mining industry, but it's very useful for environmental stuff, because you can basically build layers of information. You'd have a wildlife layer, you'd have a plant layer, you'd have a water layer, and so forth.

01-01:39:45
Burnett: So it's discrete and you can layer them on top of each other.

01-01:39:47
Gibbs: Yeah, right. There are some mining companies that use GIS. I dabbled in that. I've dabbled in this, dabbled in that.

01-01:40:00
Burnett: Since 2006—or I may be misinterpreting this, maybe just in 2006, but it looks like since 2006, you've been also consulting for a consulting company?

01-01:40:11
Gibbs: Yeah, with Behre Dolbear. I'm a senior associate with them. Their model is they have a few people that are salaried, and then they hire associates depending on the job. I get a job from them and they say, "Okay, you're going to team with these three or four other people," and you go out to these properties and we do different things. Every year, we do an audit of a particular mine. We go up, and I'm the ore reserves person, so I kind of look at what they're doing that way. The nice thing about that is I also get to hear all the rest of it, too. It's a very broad-based sort of thing, and I'm working with teams almost always.

01-01:41:14
Burnett: It sounds like what motivates you in part is that you need things to be different, need to change up. You don't like routine. Consulting gives you that—you can come in, there's a big mess somewhere, and you can clean it up and move on to the next thing.

01-01:41:31
Gibbs: Yeah, I've done that a few times. I go in and I—"Oh, this is awful. You can't use this data. You're using five different names for the same thing." That sort of thing.

01-01:41:47
Burnett: A lot of the discipline of protocols. It's something my—

01-01:41:53
Gibbs: Yeah, like in this hundred-year-old mine that I did some work for, they changed how they did things over the years. They didn't go back and really clean things up.

01-01:42:06
Burnett: That requires some sleuthing. You have to sort of identify at what point it changes. You sample, I imagine, at different years, and then you say, okay, now it's different, and you have to go back and find when it changed, and then incorporate that parameter into the series?

01-01420:22
Gibbs: Sort of. When I put this stuff in a database, then—I don't know, it's pretty simple. You just kind of sort on the formation name, and okay, what's this one, what's that one? Sometimes they know and sometimes they don't. Sometimes you have to just put things as a big question mark, and, oh, this is all seam three. Okay, but here's another way that they said the same thing. Sometimes it's just doing visual checks, because you can't always rate routines to find things. If you don't know what you're looking for, you can't write a routine to find it.

01-01:43:09
Burnett: Right. So that's what people call cleaning the data? You have to clean up the data so that it's consistent.

01-01:43:15
Gibbs: Yeah, and I have an eye for it. Because I can take a sheet like this. If there's an error anywhere, I go right to it.

01-01:43:24
Burnett: You just kind of scan, almost, with peripheral vision?

01-01:43:27
Gibbs: No, I don't know what I do. I really don't. This even happened with the lawyer one time. He was just flabbergasted, because—and I hadn't looked at it for more than a couple minutes and said, "Oh, there's a spelling error there. A typo."

01-01:43:47
Burnett: You see something that just doesn't fit, and it's almost like a—

01-01:43:50
Gibbs: Maybe that's because I do so much reading. It's not something that I control. It just happens.

01-01:44:03
Burnett: It's part of the repertoire that you've developed from training. You've trained your mind. You've had an aptitude, I'm sure, and then you've trained your mind to work in certain ways, and so, at this point, I think certain stuff is automatic.

01-01:44:14
Gibbs: Right, but when you say trained my mind, I didn't do it consciously. I didn't sit down and say, okay, I'm going to learn how to do this. It just developed.

01-01:44:25
Burnett: Well, in the course of doing work. I think you've got a time constraint, you're working late on something, and you're just hitting that activity over and over again. Your brain adapts to that activity, and before you know it, it's kind of automatic and you excel at that, just because of repetition and effort.

01-01:44:44
Gibbs: Yeah, it just happened. Sometimes I think my whole life just happened. Whatever.

01-01:44:53
Burnett: People have made references to fate and things like that. But there's other pieces to your career. There's service. You've done service to the profession, and you've done other kinds of service as well. Can you talk a little bit about the United Nations stuff?

01-01:45:10
Gibbs: Oh, right. Those were fun jobs.

01-01:45:14
Burnett: What happened there?

01-01:45:16
Gibbs: I knew this guy. I had known him because he was part of a company in Canada that—they didn't develop software, but they did consulting using software or something. Anyway, I knew him from all of this activity with the evaluation stuff. So he went to work for the United Nations, and then he said he was working on getting computer applications in various countries around the world and developing countries, and would I be interested in making proposals to go and help these people get started with computer applications? So I did, and I did. I went to a bunch of African countries, and China once.

01-01:46:13
Burnett: Is this a part of a travel inclination, or is that—

01-01:46:18
Gibbs: I love to travel. Yes. Which is probably why I thought mining would be a good career, because I could travel.

01-01:46:27
Burnett: Have you done consulting in other countries, or do you just like to take a big, long trip sometimes?

01-01:46:33
Gibbs: Most of my travel has been in doing consulting work in other countries. In the past few years, I've started just taking trips.

01-01:46:48
Burnett: South America? Canada?

01-01:46:51
Gibbs: My husband and I went to Scotland last fall, and several years ago, I went on a trip—well, actually, no, about 1998, I went on a trip with some Gibbs family and we had a Gibbs family tour of southern England, because that's where the Gibbs originally came from. I met a guy there named George Gibbs, and he was having an eightieth birthday a few years ago, so I said, "I'm going to go to this eightieth birthday party."

01-01:47:28
Burnett: Wow, that's great.

01-01:47:32
Gibbs: But before that, I didn't have the money to do that, so most of my trips were paid for by somebody else. Which is great. It's a great way to travel.

01-01:47:42
Burnett: Absolutely. When were you in China?

01-01:47:47
Gibbs: It was probably early nineties.

01-01:47:50
Burnett: So you were doing, basically, database consulting for modeling?

01-01:47:53
Gibbs: No. Well, it was, again, computer application training. Because they were using computers pretty well then, so I did some geostatistics work with them, and I took along a lot of public domain software, open source. We call it open source now, but it was public domain. Because they were interested in developing some things, but they have such a huge country that they can't afford to buy a thousand data mines. They wanted to know what the technology was and what these programs could do so that they could develop it themselves.

01-01:48:45
Burnett: Also, you went to Kenya, is that right? Kenya?

01-01:48:48
Gibbs: No, it was Malawi, Tanzania, Ethiopia, and Ghana.

01-01:48:57
Burnett: Wow. What years, roughly, were you doing that traveling?

01-01:49:00
Gibbs: That was mid-eighties to mid-nineties. I loved it. It was great.

01-01:49:08
Burnett: What were some of the most fascinating aspects of that consulting work?

01-01:49:18
Gibbs: The African people are different, and I realized this because I was doing some training. Some of it was just basic, this is how you use a PC. It didn't take me too long to realize that, in their cultures, they learn things by rote, because they don't have very many books. Paper is a valuable commodity. I saw this in several places where I was. The teacher would say, blah, blah, blah. The students would say, blah, blah, blah. So they learned a lot of things by rote, and I realized that some of why they couldn't understand certain concepts about how to use a computer was that they didn't really understand a variable. If you want to find a document that's XYZ.doc, then you look for XYZ.doc. They didn't quite get that you could use an asterisk for the XYZ part. That was a very interesting revelation for me.

01-01:50:41
Burnett: So you had to make changes in your pedagogy in order to reach them a bit better.

01-01:50:47
Gibbs: Yeah. So that was a challenge.

01-01:50:51
Burnett: You've had service to the mining associations as well. You received the SME Distinguished Service Award. When was that?

01-01:51:04
Gibbs: That must have been in the nineties sometime. That was because of all of the work that I had done on making the industry more aware of the capabilities of computing. That's what that was about.

01-01:51:21
Burnett: Great. So you were recognized for that.

01-01:51:23
Gibbs: Yeah. I didn't seek it out. This guy did it.

01-01:51:31
Burnett: You were a member of SME?

01-01:51:33
Gibbs: I've been a member of SME for over fifty years. I started in 1960, when I was a student. They consider that. I stayed a member the whole time.

01-01:51:42
Burnett: Wow.

01-01:51:44
Gibbs: That's amazing. Totally amazing. It's like, how did that happen?

01-01:51:52
Burnett: One of the other important associations is the Mining and Metallurgical Society of America, and you're executive director since—

01-01:52:01
Gibbs: Since 2008. And how did that happen? Well, that's another interesting story. I was invited to join in 1993. I became a member of MMSA in 1993. I happened to go to one of the annual meetings one time, because we do our annual meetings during SME. I went to the annual meeting one time and they were talking about website. I had been doing website work for Mineral Information Institute, so I kind of stuck my head in and spoke up and said, "Oh, I can help with that." I was doing that for—I don't even remember what years. Anyway, I was doing that for some years, and then the executive director—oh, and then I would say—because I said, "I really ought to sit in on the executive committee meetings so that I get an idea of what's going on, so that I can do the right kind of thing for the webpage." When the previous executive director retired, then they asked me if I would do it, because I was already kind of clued in to how things worked. And I'm still learning.

01-01:53:43
Burnett: The societies seem to be an important social and, I guess, cultural glue for the industries. It brings people together, it allows people to network, and it seems to be a pretty tight community.

01-01:54:00
Gibbs: It is. It is.

01-01:54:04
Burnett: I want to thank you for taking the time. We're running out of time here, unfortunately.

01-01:54:11
Burnett: We don't have the story yet about—there's, I think, more to be done on the history of computing in the industry.

01-01:54:24
Gibbs: I'd be glad to help however I can.

01-01:54:26
Burnett: That would be great. That would be great. We'll talk more, and thank you very much for sitting down to talk with the Oral History Center.

01-01:54:35
Gibbs: Thank you.

[End Audio File 1]