

Slice of MIT [SLICE OF MIT THEME MUSIC]

podcast episode introduction: You're listening to this Slice of MIT Podcast, a production of the MIT Alumni Association.

Joe McGonegal: This is the MIT Alumni Books Podcast. I'm Joe McGonegal, Director of Alumni Education. Joining me from his home in Arizona is Harold Linder, a course 12 graduate from the class of 1958.

Earlier this year, Linder published, *Wild Places-- The Adventures of an Exploration Geologist*. It's a memoir that accounts for his 35 year career in earth science on seven continents. Here's an excerpt.

Harold Linder: "Too often, exploration geologists fall in love with their projects and try to continue past the point of diminishing returns. Eventually, management or the alternatives of other projects, force one to reset priorities. Even so, there are many examples of geologists returning to old prospects, either with other companies or on their own, and making major discoveries. Of course there are far more examples of geologists returning to old projects and finding nothing new.

In fact, an exploration geologist can rarely prove, conclusively, that no ore body is present, and he simply has to decide when the potential of discovery is greater elsewhere. There's always a tendency to spin more than is strictly warranted on a property partly because of the cost just to acquire that property. The more important reason is that if someone later discovers an ore body on a property a geologist had previously explored, there will be embarrassing questions.

Most geologists leave a property with nagging thoughts. But maybe there really was a deposit there, and they weren't smart enough or lucky enough to find it. And the even worse feeling that someone else might come along and discover it."

McGonegal: Well Dr. Linder, thanks for joining me. What prompted you to publish this book now?

Linder: Well, I'm retired now, and I think it's natural to look back over your career and try to put it into perspective. I think most people would agree that I had an unusual career. I explored for metal posits in remote wild areas is during the last half of the 20th century, and as you said was

fortunate to work in all seven continents.

McGonegal: So much of the book demonstrates what a DIY man you are. Do it yourself-er from exploring in Canada early, on building your own camps, chopping your own firewood, cooking your own dinners, commuting hundreds of miles on skis in Antarctica, getting yourself out of dangerous situations with bears. I'm reading the book, you realize what a DIY writer you are too.

You've chronicled your life, in journal entries, from right out of MIT in 1958 so meticulously and produced the book also. Has just stunning images, throughout, to accompany these. Who taught you to write? Who taught you to take such great photos? Did you learn that at MIT?

Linder: No, not at all. The writing, I always like to keep a diary because I knew I was doing unusual things, but it was mostly for my own purposes. Photographs, so what you see are remnants of thousands and thousands of poor photographs.

McGonegal: What kind of camera were you're using?

Linder: Different kinds of cameras. Mostly, fairly inexpensive ones because they took quite a beating in the bush, as you can imagine.

McGonegal: Your journal starts in 1958. Some of your first jobs working in Northern Quebec, in the wilds of Northern Quebec and Ontario. Tell us how that landscape has changed over a half a century later?

Linder: Well, the area I worked in mostly was Evans Lake area. That was a green stone belt about 200 miles north of the farthest north roads in settlements. Since then, mines have been discovered farther north and civilization has pushed its way north.

There's a giant hydroelectric project in northern Quebec now, and they've built an access road for that. So there is more road access, but the bulk of the area is still really a complete wilderness Bush with the muskegs, and lakes, and swamps, and rivers, and really no human beings in there.

McGonegal: Some of your journal entries make Henry David Thoreau look like a city kid. It's pretty dense wilderness you are trekking through, and you've only excerpted parts of your journal, right? There are plenty more out there that you haven't published that you say gets too technical at time.

- Linder:** Well that's true but the main problem was that I kept extensive diaries, and I had to really eliminate by far the bulk of them just to boil it down to things that readers would be interested in. I think I have probably on the order of a million words in my diaries.
- McGonegal:** In 1961, you go to the University of Minnesota where you join Ed Thiel, a University of Minnesota professor, on an Antarctic research project to measure ice flows on the Ross Ice Shelf. Have you followed the progress of the Ross Ice Shelf since you've left? It's had chunks break off of it, the size of Belgium.
- Linder:** Only in general terms. I've since been on just a tourist cruise to the panhandle of Antarctica, the peninsula. But I've not been back to the Ross Ice Shelf, and I've only kept indirect touch with the work there. Things have changed, dramatically, in the last 50 some years in Antarctica.
- McGonegal:** So it wasn't just the quantity of editing involved, here. I'm sure there was plenty of emotion involved in going back and reading a lot of this stuff. Was that challenging to wade through all this stuff again? You talk about your wife's passing, in 1981, and a lot of you know a lot of helicopter crashes, plane crashes, in the Bush.
- Linder:** Yes. I tried to keep most of the personal material out of it. This really is for the general reader and certainly, like any life, there were some very painful episodes. But the bulk of the material that I eliminated was really routine things that people would not be interested in. You know, how many line miles of the electromagnetic survey I did that day and that sort of mundane detail.
- McGonegal:** How about the field of earth science and geology. Exploration, you say, was still lower on the academic scale because this was considered even more practical and required working in industry. Is that still true Today is being an exploration geologist considered not as prestigious as academics?
- Linder:** I think that would probably be the case at most universities. The academic world has its foibles, as I'm sure you're aware.
- McGonegal:** You saved the best for last, perhaps. You do get to 1985, the discovery of gold in the Castle Mountains, south of Las Vegas and go into great detail about the seven year process of finally getting to a mine. What is the state of that mine, in 2015?
- Linder:** The mine seized operation in about 2001. There were two or three years of leaching the pads

to get the final gold out. A lot of reclamation went on and the areas dormant now.

It's since been acquired by another company. They've announced plans to go back and try to reopen the mine because the price of gold is much higher, now. However, as you're probably aware, price of gold is relatively low now. The mining industry is in a classic bust so I'm not aware that they're doing much work now.

If we certainly left a lot of gold in the Castle Mountains, it wasn't economic 20 years ago. Whether they able to continue mining there, because now it's mostly surrounded by a National Preserve, that remains open. Finding the mine was it was very exciting, but as I detail, the problems just start after you found a deposit. You have to permit it and that involves an awful lot of money and time and paperwork.

McGonegal: You were an independent consultant at the time.

Linder: That's correct. No, I was a full time consultant for them.

McGonegal: The Castle Mountains had been staked and re-staked, claimed and reclaimed. What drew you to them that plenty of other geologists had ignored?

Linder: It was an old mining district, the Hart mining district. It was mined in about 1906-1907. It was a classic boom town. Some narrow vertical quartz veins had high grade gold in them. The old timers came in, set up a tent city, mined for three or four years, and basically the mines petered out because the gold didn't continue at depth.

Other mining companies came along later and looked at it and thought it was only steep vertical veins and therefore not open to bolt mining. I went in and looked for about three days and was very impressed with the amount of brecciation and the amount of salification in the rocks. To me, that suggested there was a good chance that there had been mineralization between the vertical veins and that turned out to be the case. It was a large, bolt deposit.

McGonegal: You wouldn't have those same hunches back in 1961?

Linder: Oh, no. Experience is very important in economic geology, exploration geology, and the more deposits you've seen, the more places you've worked, the better your judgment generally.

McGonegal: Of course in the seven years between drilling whole number 150, you call it, is the lucky hole that was led to the biggest deposit. In 1992, the opening the mine, you had the Sierra Club to

contend with. You know, category 1 tortoise habitat on roads there. A healthy dose of local opposition to it.

Linder: To be fair, the locals were mostly in favor. It was the outside environmental groups, so called, that were the real opposition. The usual cast of characters, who basically were opposed to mining anywhere. Well, this was an area that had been very disturbed by all clay mining and gold mining.

There was still opposition and I detailed the problems we had permitted. I think you can see some of the objections are raised were fairly silly. But the object, of course, was just to delay things and make it too expensive to continue.

McGonegal: You close the book with a chapter on looking back. I wonder if you could read an excerpt?

Linder: OK. One second. "Exploration geology remains a boom and bust career, depended upon metal prices, and some geologists find they and their families cannot deal with the lack of job security. Because of this the industry faces a shortage of younger scientists and only a few universities now offer an education in exploration geology. However, women are now welcomed and are numerous in the field. A few, very large companies still performs sophisticated mineral exploration, but at the cost of increased bureaucracy and decreased flexibility.

Most successful exploration is carried out by relatively small and flexible junior companies. This has the advantage that their geologists often share in the rewards, but with the downside that the geologists sometimes become too promotional."

McGonegal: Tell me what else needs to be written on the subject of exploration geology? Will you write another book?

Linder: I won't write a book, but certainly others should. Every exploration geologist has his own stories to tell. We're an interesting bunch, by and large, with a lot of unusual experiences. I think the big thing, the public just has to understand the truism that if it didn't grow, it had to be mined. Civilization is simply impossible without metals and metal deposits have to be found before they can be mined.

But paradoxically, the growth of population has also increased people's appreciation of wilderness and governments therefore continue to set aside, in large areas, where you can't explore or mine. The bottom line is the balance between preserving wild areas and

responsible access to natural resources is difficult and it's one that society will continue to struggle with.

McGonegal: Don't complain about mining with your iPhone in your hand.

Linder: Yeah, that's right. There are so many inconsistencies and I couldn't understand the opposition to permit in this mine. But once I realized it wasn't rational, it all began to make sense.

McGonegal: Tell me how your MIT education is alive and well in this book.

Linder: Well, I have a lengthy chapter on the MIT, what it was like in the 1950s. I think it's a very different place today. In the example, my entering class of 1958 had 950 men and only 12 women. The atmosphere of MIT was completely masculine. The Cold War influenced everything. Research, we had compulsory ROTC, and of course, the military draft.

I was a senior at MIT in October '57, when the Russians launch Sputnik. Suddenly the public was interested in science, and engineering, and the people who did it I think Sputnik was a real turning point in American science. My MIT education taught me to concentrate on the facts and reality of a situation and to try and keep things in perspective.

McGonegal: You mentioned Space exploration. Do minerals out there interest you?

Linder: Oh, they interest me but the talked of mining asteroids is ridiculous, frankly. We have enough trouble here on earth and in the sea floor, mining things. So it's going to be a long time before we mine any minerals in space. Just as a geologist, I enjoy reading about the discoveries on the various planets. It's quite interesting to see geology expanded.

McGonegal: Tell me what else are you reading, right now?

Linder: Oh, I read a wide range of nonfiction. I find reality far more interesting than fiction. I recently read, *Max Tegmark*, or mathematical universe. *My quest for the Ultimate Nature of Reality*. It's a very ambitious book. I've read, Nicholas Wade, *A Troublesome Inheritance: Genes, Race, and Human History*. It's a brave and politically incorrect book. And I've just finished, *Charles Murray, By The People: Rebuilding Liberty Without Permission*. It's basically a libertarian manifesto for civil disobedience.

McGonegal: Well, Harold Linder's book, *Wild Places-- The Adventures of an Exploration Geologist* is now available online. Harold, thanks for joining me.

Linder:

Well, I appreciate that.

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