Dr. Eugene L. Boudette

27 October, 2002

Brian Shoemaker

Interviewer

(Begin Tape 1A)

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BS: *This is an oral interview with Dr. Eugene Boudette, taken as part of the Polar Oral History Project of the American Polar Society and the Byrd Polar Research Center of the Ohio State University on a grant provided by the National Science Foundation. The interview was conducted by Brian Shoemaker, at Dr. Boudette's home in Gilmington, New Hampshire, on the 27th of October 2002.*

Dr. Boudette, it's a pleasure to be here at your home. I appreciate your having me here. It's a beautiful day in New Hampshire. We're interested in you as a person and what took you to the Ice and what really made you go. And what sparked your interest. Did you go to the Arctic as well?

EB: I have been to the Arctic, yes.

BS: *We'll want to cover that as well. Most people go through this chronologically from day 1, where you were raised, mentors, we're interested in mentors, some college professors, where you went to school and what happened after you stopped going to the polar regions. So, it's your interview and I'll just ask pregnant questions.*

EB: Well, I got my undergraduate degree in 1951 from the University of New Hampshire, and that was given in geology.

BS: *Are you from New Hampshire?*

EB: I was born and brought up in New Hampshire – the northwestern part of the state, not very far from Hanover, actually, in one of the towns south of Hanover. So, I had been in World War II, so I was in that curious wave of students who with the GI Bill and the war experience, and school, I was a mature student compared to . . . .

BS: *After World War II.*

EB: After World War II, because I'd had all that done before I went to college.

BS: *GI Bill.*

EB: On the GI Bill. And so, I majored in geology and in the part of the last year, of course, there's a lot of correspondence to see how you're going to start paying your bills, and actually, my idea of going to the West where all real geologists work, you know . . . There were a lot of polite letters, but I never came up with a job. But, I had this opportunity just through the connection with a professor that I had had at the University of New Hampshire, where I did my undergraduate work where somebody – a former student - needed a couple of geologists in a hurry. And this was Saturday afternoon and he was talking about Monday morning.

BS: *Which year, now?*

EB: 1951. This was 1951. And so, anyway, it was interesting and it turned out that the job was with the New England Division of the Army Corps of Engineers which needed some people particularly with some geologic background to fill in on some new projects being undertaken. And this began as civil work. This was power resources, but soon things changed and I found that I was being diverted to where the emphasis was then going to military things.

BS: *Now, you had your degree by then.*

EB: I had an undergraduate degree by then.

BS: *This would be . . .*

EB: BS.

BS: *And you went to school at . . .?*

EB: University of New Hampshire. So, I started with the Army Corps of Engineers, and the New England Division is important because of the specialty and the focus of their work, which was going to predict something that I didn't exactly know when I took the job. But anyway, I began my career by joining a project that had to do with an assessment of the long-range hydropotential of New England waters and these were programs, as you are probably aware, that usually get funded on some basis that never seems to last very long. And it didn't and that work . . . there were a few months of essentially dam site evaluation and then there was now a growing need of more military work. So, I was shifted within a few months into military, ever growing military needs.

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A lot of these had to do with additions to or construction at existing air fields and Army installations. Examples were Nike defense of Boston, but a big one in those days was the Limeston Air Force Base – the big SAC base that was being built on a very accelerated rate.

BS: *Where was that?*

EB: Limeston, Maine, in northern Brewster County, Maine. And so the important thing here was that the civilian geologic work applied to civil projects was soon phased out and I was on military assignments.

BS: *Were you married?*

EB: No, I was not. I was pretty portable and they knew it. So, these things were fitted in to the time in life when you do these things. But, one of the interesting things that happened . . . and I

began hearing things about something in Greenland that people weren't saying much about in those days. And sooner or later, I found out in a direct way. I was sent to some place that I couldn't talk about that later was known as Thule Air Force Base.

BS: *You weren't asked? You were just sent?*

EB: Well, it was a friendly request. No, obviously if you had some physical thing that made it risky or something like that it was all taken into account, but I was physically capable and it was high profile, high emphasis on the work, so I went up there, not so much to make Thule as it came to be known, a reality, although it was operational to some aircraft and I think we probably used something like a DC4 to get up there. And there was a dirt runway and so on. But, the real reason I went there was not related so much to the base itself as it was to use the base as a jump off place to go out on the ice cap and we did not go out there to solve a construction problem, but we went out to test what would be one of the first ice drills ever attempted.

BS: *Oh, really? Now, you were with the Corps of Engineers based where?*

EB: This was all before CRELL, of course, but these would be CRELL-like activities.

BS: *So, it was in Hanover then?*

EB: No, it wasn't even imagined at that point.

BS: *Way before CRELL existed.*

EB: Yeah, way before.

BS: *What year was this?*

EB: This would have been late 1951, I suppose. But, the work out of Thule and I think probably the site we went to later became known as Camp Sentry, was a reality that, although at the time I didn't know anything about this, that it would be the anchor station for the DEW line and all of the ice installations. So, this would be something that I didn't appreciate until years later when

learning to live in the ice and use the ice as a base became a reality. But, we weren't really looking at a construction project or a place at that time. It was about testing a machine. How were we going to get the foundation conditions out there. So, ice drills were being devised by the Corps and contractors and so forth. And I guess the world was a small place in those days. Somebody must have known about my father's history in drill design in construction. They knew that I probably knew a lot about drills already just from hanging around home.

BS: *What did your Dad do?*

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EB: My father was, in those years, first there was a company called Sullivan and later Joy, and their business was construction machinery and particularly drills, and Sullivan made probably the first rock drills.

BS: *Did you work while you were growing up, with the company?*

EB: I did. In the summer I did work there.

BS: *So your Dad was somewhat of a mentor in a way.*

EB: He was, yeah. And he also was a source. How do you solve a problem? And so, the world was a smaller place in those days, and so I could take problems . . .

I didn't know anything about drills. I could take problems home and he would be very helpful. Why don't you try this if that isn't working right? And so forth. So, that was part of it, but that was sort of just a convenient accident that he had had so much to do with drills because this was going to be a project not really that of a geologist, but of a mechanical engineer. How do you drill ice? But, in those days, there weren't reservoirs of people that had done this that could start in. So, everything was new and very exciting because there was a lot of experimental of labor and these works. But, basically what I did, I was just a guy starting out and we were taking a drill

with ice. Had nothing to do with up on the ice to test it, but from then on, I was going to get involved because it was not going to work perfectly and there would have to be modifications and I would be a communication between the guys out getting the data and those that were drilling the machine that's getting the data, something of that sort. So, this is really what it was about. Everybody was kind of . . . this was all new, so everybody was an expert and we didn't know, for example, what kind of progress had been made in other countries. So, it was kind of exciting. There was a lot of room for imagination and problem-solving. But, that's what that was all about.

But, very soon after that, I was just sort of getting into that problem . . .

BS: *When you went up to Greenland, you landed at Thule. And was this December, middle of summer?*

EB: Yeah, it was in summer, the early part of the summer.

BS: *What was your first impression there?*

EB: Well, first, the main runway was still under construction. So, we landed on the old dirt strip. So, this required . . . it wasn't every airplane that was going to get into Thule for a while. But, as I say, it was probably a DC6 or something. But, we landed on a short, relatively speaking, dirt runway. It would be down the coast a little bit south, but within sight of the main base. And then, everthing was happening at one time and there was great emphasis being put on getting the runways, which were . . . I didn't get involved with, but the flexible pavement design that was going to be appropriate for the latitude and materials that they had and that sort of thing. But, Thule was simply a jumping-off place.

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BS: *You didn't operate out on the sea ice at all.*

EB: Not at all. There was a place that got to be known as TUTO -Thule Take-off, it was called, and it was a ramp to get up on the hard ice, the hard glacial ice where you then radiated out from there to do things that had to be done. But, as I say, we just went up to an appropriate place to begin testing.

BS: *And that was the predecessor to Camp Sentry, basically.*

EB: Later on, this would be Camp Sentry, and even then, the word may have been used, and they probably had a rough idea of where strategically it had to be and that sort of thing, but that wasn't part . . . my whole thing was to be part of a group that was testing a brand new thing – an ice drill. Something that could do what I had been doing previously with rocks, with rock drills for dam sites or something like that.

BS: *How did you get out to the site?*

EB: With tractors.

BS: *Tractors? Were these driven by the Army?*

EB: Good question. I believe they probably were.

BS: *You don't remember Bob Rutford being there, or Bill Smith.*

EB: No, not at that point. These are all names later that I heard. There were a lot of people that I'm not even sure that I wrote their names down that I regret. But, my leader was Ken Linnell, who actually was the man fundamental in founding CRELL at Hanover, and so forth. But, I answered to Ken Linnell. He was a great guy to work with, a fine man.

BS: *Still around?*

EB: I'm not sure. I haven't been with the right people to ask.

BS: *Older.*

EB: Oh yeah. He would be in his 90s now, at least. Anyway, that was where I was. I sort of made these quick steps through what the Corps of Engineers did, from dams to Nike sites. There was an introduction to military affairs, so there was sort of a quick tour from civil applications to military applications. But, I had previously applied to the US Geological Service and sort of was on a waiting list you might say, for opportunities. And in the middle of this project, I got a call to go and interview in Washington for what I was really after and that was a classical geologic job or a job in classical geology, and of course, it had to be the West because real geology wasn't done anywhere else but in the West. But, this opportunity came to join a project in the Western US and it was really what I had done it all for, so I did do appropriate processing of terminating my work and then picked up on this new job.

BS: *You had heard about this when you were in Greenland?*

EB: No, I had no idea. I just felt that . . . I had written to oil companies. You know your senior year, you write to a lot of people.

BS: *You said that you were attached to this Army Corps of Engineers project and then the USGS called you. So, you terminated after you got . . .*

EB: Said, right, I just got a call or a letter one day saying that your letter that you submitted several months ago got you to this point and would you be interested in, and that sort of thing.

BS: *So, you terminated after one tour in Greenland?*

EB: One tour in Greenland. I can't remember, I may have brought parts of the drill back to Washington to make modifications and things like that. But, basically, it was from this project, with appropriate closing out times, I went to the job that I guess I originally was after, you might say, and that was to get into classical rock geology and so it happened.

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So, my first assignment was to report to Grand Junction, Colorado, which was a huge project about the nation developing it's reserves and knowledge about uranium. So, it was my first, in general terms, my first job in the USGS was dealing with our national reserves of uranium. And many different jobs, again . . . In one sense, I moved from one kind of a drill to another one because I was on a project where we were actually drilling out uranium reserves, so there was a lot of classical rock drilling involved in the work. Starting at the bottom of the ladder, you do a lot of logging of drill cores and that sort of thing.

BS: *You took cores of rock then.*

EB: Right.

BS: *I should have asked the question earlier. Did you take cores of ice in Greenland?*

EB: In Greenland? We certainly attempted to. In fact, that was very fundamental to the whole project, to be able to go down and log . . . just treat ice for what it is, a kind of rock. Oh yeah. And then that ice could be looked at for its mechanical properties in laboratories.

BS: *It took them a while to finally make an ice coring drill, didn't it?*

EB: It was not easy. The old problem when you put pressure on. . . . everything looked great until you start applying thrust and, of course, that would cause the ice to melt and then you freeze up and how to actually systematically cut down through ice, there was a lot to learn, beginning with zero. And, I think we were aware that the Russians, at this time, probably knew a lot more about it than we did because they had started earlier and were well into projects that we had to learn and you have to start at the bottom of the learning curve. And later on there would be the holes in Antarctica.

BS: *I interviewed Herb Ueda a couple of days ago. So, I interrupted you.*

EB: So, in rounding off, I had two years with the Corps of Engineers and then left the Corps, remaining in government service, to transfer to the Department of the Interior and the Geological Survey where I then remained for my whole career with many projects of different types.

BS: *Career in USGS, huh?*

EB: All the way to retirement with USGS. But, it's important to point out that I was with the geologic division, not the water resources division. There's two big divisions of USGS – literally water and rocks.

BS: *But, you were the geologist for New Hampshire. State geologist?*

EB: That was later.

BS: *After retirement?*

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EB: That was after retirement. So, first, I finished off pretty much of a typical career in the geologic division of the USGS where you tend to be identified with certain commodities, so the first was uranium geology, then after that, it was base metals, but largely the little diversions and chores here and there, there was not much more military work or anything like that. So, mainly it was very classical stuff.

BS: *Work with Art Ford?*

EB: Well, Art Ford . . . that came in sort of mid-career when I was asked then, or was . . . these were all suggestions that you always say "yes" to. The time came when the geologic division, topographic division had an interest in the Antarctic, of course, for many years. But, the geologic division hadn't really been . . . there'd been people on ice breakers and things of that sort, but they did not have a coherrent program.

BS: *The Arctic or the Antarctic . . . ?*

EB: Well, the Arctic, you might say, is kind of a curious range, but that's Alaskan geology. And if there is anything Arctic done or some variation on that, it's always done under the masthead of the Alaskan geology branch. Of course, then which later Art Ford was in and so forth. Tending to attract geologists who wanted to work in those latitudes. But, in long-range planning in the survey, there was always interest in the part the USGS geologic division, not topographic division, who, of course, already had to be involved because of mapping and navigation and that sort of thing. But, here's another branch of the survey keeping their eye on classical geologic research needs for Antarctic, or our national interest in Antarctica.

BS: *Basically opposed to map it. As opposed to mapping it.*

EB: Yeah. There are two kinds of mapping that sort of identify the survey. One is just making maps for navigation and illustrated by the topographic sheets, but then maps of the distribution of rocks or other geologic data upon a geographic base. And that's a good way to continue what I was saying, the time had come to apply more classical kind of research on the part of the geologic division – rock distribution, which rocks are where in Antarctica and that sort of thing. We don't know much in this time, while the logistical support is avilable, and so forth to start learning a little more about which rocks are where and what are in those rocks? And a lot of it, though, was more than the dry economic reserves, but it was more that the whole science of geology was in an explosion of information. How is Antarctica structurally put together? And, of course, this is a prediction of where things are going to be, resources are going to be, is one way of looking at it.

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It was a recognition on the part of the geologic division . . . the topographic division of the USGS was already deeply involved because nobody else could really do what had to be done,

but now with the geological division's timing such that we were learning a lot faster about geology of the world, like plate techtonics. We just had to get to the point where we need to know more about how Antarctica is put together and how it connects to the rest of the continents. By the time I went down, well ahead of that, all the predictions of plate techtonics were with us. Some people still claim to be inventing continental – we used to use the term continental drift, but we knew all of that. It was how did the world get hooked up and there was nothing, no great discoveries coming out of it. It was a matter of tying to Antarctica what we were already learning at a tremendous rate up in the more temperate parts of the Earth. So, there must have been a day about the time I got involved where we knew a lot about the other continents. We really don't know much about Antarctica because we simply haven't been there or it's covered up with ice and snow. And to go further in a reconstruction of continents and that sort of thing, we'll have to turn our attention to Antarctica which was happening. And the Survey just sort of naturally picked up on this need and it was time for the geological division then, of the Survey, to get involved in a more aggressive way than they had in the past. Not that there weren't rock geologists going down, but it was opportunities – as I say, the ice-breaker trips. But, by the time 1959-60, came along when I joined the project, worked in Antarctica, more correctly, we were beyond just the thrill of finding something nobody else . . . it was kind of predicted and things were fitting into the pattern. But, there was still work to do to sort out things on the Antarctic Continent, you might say. But, we didn't discover plate techtonics or prove plate techtonics, or anything else down there. It was just, as it's going on today, getting better at it all the time. Some people have claimed that they made marvelous discoveries that proved . . . there really weren't any surprises.

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It was just a matter of tightening up, everything being predicted. I didn't really see anything sensational about it, but the systematics . . . the key word was systematics. We knew the continents fit together and how did they fit together? And so forth.

BS: *Proving announcements are still going on.*

EB: Oh yeah. Well, I read with varied interest about these great discoveries people have made and they proved this or established that. Well, it's just a little too late for that. They should have gotten in at the turn of the century, of the previous century.

BS: *In reality, there were no surprises.*

EB: No, it was just a matter of mostly snow cover, so we don't know yet and we'll find it out, but we'll have to do it the hard way. You just can't float by in canoes - four-wheel drive vehicles and do your geology. It has to be done a different way. So, we had a pretty good general idea of how everything was. It was just now a matter of pulling this together and seeing how it strengthened the models we had for plate techtonics and that sort of thing. But, I didn't look for any startling discoveries.

BS: *So, you had this big picture in mind when you went down there, and you just knew that you would probably find these places where you could verify what you were predicting..*

EB: Yeah. And there were certain things that we knew and had known for many years like Mt. Erebus was formed of the same rocks that form Mt. Kenya. So, you know that's a rift basin, more terminology in context, so you already knew from the rock type that was there at McMurdo, what the general geologic setting of that area – it's going to be a lot to be compared with the African rift, in other words.

BS: *So, McMurdo Sound is like the African rift.*

EB: Oh yeah.

BS: *How about on the far side?*

EB: No. Then you get in on the far side of the continent, then you get into the old pre-Cambrian rocks. So there's a big continental, there's a crustal boundary there .

BS: You have Mt. Discovery sort of crossing toward Victoria that's still Kenya-type . . .

EB: It's that type of rock, there's only one way you can get that. It's a very unique way that you can get a rock.

BS: Well, you have that long line from Mt. Terror to Mt. Erebus, down the Peninsula, then you can point an arrow to Mt. Discovery.

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EB: Out where I was on Crary and Tony, you're continuing in this rift environment. In fact, the '59-'60 traverse which I was associated with was mostly about a tour through that environment and it was only at the very end when we got to the Clark Mountains that we saw the other side of the rift.

BS: *OK, I'd better back you up a little. I haven't got you there yet. You went down there to study all this.*

EB: I went down to take advantage of the traverse, which . . . the real purpose of the traverse, probably to me . . . we still had a lot to learn about how much ice was stored away in Antarctica. So, the glaciological incentives were greater than any other. We knew kind of where the mountains were. We'd had the flying that went back to the turn of the century, and all of that. Now, it was a time to start beginning to draw things together and sort them out. Like I say, where do we find the Kenyite which predicts the rift environment.

BS: *So which traverse are we talking about?*

EB: Well, my first traverse in '59-'60, was simply called The 1959-'60 Byrd Land Traverse.

BS: *Where did it go?*

EB: It left Byrd Station, went down in the general direction of the Weddell Sea, went then counterclockwise to the Clark Mountains, heading for the _____ and those were different rocks and then back to Byrd Station. It was a big triangle, in other words.

BS: *I want to back you up and get you down there. You had a plan when you went, obviously. Not everybody did, but you did.*

EB: Yeah.

BS: *There had already been some traverses, so you had some indications.*

EB: Knew a lot. There'd been stops on the ice, you might say, from air landings, and the data were accumulating.

BS: *So, you had to go back and tie some of that together, I assume.*

EB: Fill in, tie together. There's no question that I felt the '59-'60 traverse was . . . Though I think of rocks, the main thing we still had a lot to learn about was the glaciology of Antarctica. How deep? We didn't know where the bottom of the ice was in the rift area.

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And predictably, there was going to be some very thick ice. So, I thought, in a way, I've told people, correctly or not, that the real incentive was to learn more about the ice. The glaciology was the big justification for that year. In fact, my instructions were, this comes first. If you can get to that mountain over there somehow to look at the rocks, fine, but you can't go and stop everything just for you to go and look at the rocks. You had to fit it in.

BS: *So, did you make a proposal for this, or did USGS make a proposal?*

EB: Yes, the USGS made a proposal to put a scientist on the traverse.

BS: *The traverse was already being conceived by . . .*

EB: Oh, I think it was a lot by Ohio State. The incentives, I suppose the most important incentive was simply geography, to start tightening up on geologic controls - where the mountains really were.

BS: *Tie them in.*

EB: Start tying them in so the geodyssey and that sort of thing was important because we had to find new things that weren't seen, we had to then get better fixes, learn elevations on some of these mountains.

BS: *How'd you position that stuff?*

EB: That was all done by solar line positions.

BS: *So, you asked to join this, then, or the USGS asked you to join it. You were sent.*

EB: Right.

BS: *OK. How'd you get down there?*

EB: OK. It was very easy the first year. Just went to McMurdo.

BS: *R4D?*

EB: That was the Super G.

BS: *C-124.*

EB: No, my first trip to Antarctica was on a constellation.

BS: *Oh.*

EB: Remember them?

BS: *I flew them. I knew them.*

EB: Well, you must have because . . . well, when actually were you in VX-6?

BS: *'66-'67.*

EB: So, you went way back. And there were these two very colorful brothers who flew the Super G, as I remember.

BS: *That would have been two Navy tours before me, so they were probably gone. See, I came back as Commander of Deepfreeze and that was from '67, all the way to '82. And it was pretty rare for guys to come back.*

EB: So, the only way you got to the Antarctic continent in those days was on a Constellation. (500)

And that didn't have the capability of a return flight. You were with a committed flight. So, it was kind of exciting.

BS*: A lot of things were committed flight, even C-130s, C-141's today. If you don't get a refueler. C-17s now can fly down and back. That's the biggest one we've got. C-5's can too. OK. So, you get to McMurdo. How do you get out to Byrd?*

EB: OK. Then there were those wonderful old airplanes flown by the likes of Captain LaBah and Joe Walker, Tackahe and . . .

BS: *R4D.*

EB: The old R4Ds. Tackahe and Willshedoit. Remember those?

BS: *Flew those, too. I flew them in the Arctic later.*

EB: So that's how the local commuting was done.

BS: *Direct from McMurdo?*

EB: So, direct from McMurdo out to the ice runways, or the snow runways at Byrd Station.

BS: *So, who was on the traverse?*

EB: The traverse was . . . there's no question, as I say, the number one priority to me was geodyssey – where are things? And how high and big are they? And the other is glaciology –

how much ice? How thick is the ice and what's the character of it for trafficability and that sort of thing. So, glaciology definitely was more important than rocks, is what I'm leading up to say. And my instructions were that as a team, everybody pitches in and does it together and you cannot commandeer the purposes of the traverse to get to that rock over there. In other words, my instructions were to be a little temperate about your promotional activities. You're not going to see all the rocks you want to see, but it's sort of in harmony with the main purposes of the survey and so, there we were with navigation, as I say, but so . . . and then Ohio State at that point, was very interested in the snows . . .

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BS: *Who'd you have out there?*

EB: Well, Doumani was the person assigned by Ohio State strictly to do the glaciological work. And my purpose was rocks.

BS: *You had some others out there too, didn't you?*

EB: Oh yeah. There was . . . the leader of the traverse was a geologist and he had a lot of experience in petroleum geology – Jacques Perrot. And he was the leader. Bill Chapman, USGS topographic division was geodyssey. Now we're talking about sort of getting things in priority. Glaciology was, as I say, more important than rocks, so now we've got three. There was Keith Marx who went out to do . . . he was an atmospheric physicist, to do certain studies related to that. And I'd have to upgrade . . . probably the most important thing next to . . . this would be high on the list, certainly geodyssey was probably, but even more it was geophysics and there were two geophysicists – literally two and there was seismic shooting. So, how thick is the ice? How much ice was down there? How deep is it? How thick? In other words, the geographic character of the ice cap.

BS: *Who were those guys?*

EB: That was Frank Chang and Perry Parks. They were geophysicists. A lot of reflection shooting. We carried lots of dynamite and it was shot every 30 nautical miles.

BS: *OK. We're going to stop here.*

(End of Tape 1A)

(Begin Tape 1B)

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BS: *OK. You just mentioned Frank Chang, Perry Parks as geophyscists.*

EB: And then there was another man, that was Howie Lavaux who was an atmospheric physicist.

BS*: Howie? You said Keith Marx was . . . was he an atmospheric physicist, too?*

EB: Keith Marx was a physicist. He was an atmospheric physicist. But, the real reason he was there was to cook. But, he helped everybody and he just wanted to go on the traverse.

BS: *Oh, he was actually the cook, huh?*

EB: He was the cook.

BS: *A lot of aurora guys who wintered over went along.*

EB: Yeah, he . . . yeah, that was his winter over.

BS: *Yeah, they didn't want to sit in camp all summer. And they're pretty good scientists. They contributed.*

EB: They certain have . . . everybody. Then we had, of course, the physicists – the seismic physicists were under Frank Chang.

BS: *Frank Chang and Perry Parks.*

EB: And Howie Lavaux. Howie Lavaux, his name was.

BS: *How do you spell his name?*

EB: L-a-v-a-u-x, as I remember.

BS: *Where were these people from? The seismic guys. Were they from Wisconsin? The guys with Charlie Bentley?*

EB: Yeah, I think they so.

BS: *Bentley sent them.*

EB: Yeah, they were Bentley's people. And there were two important people on the traverse. One was the cook and the other was the mechanic that kept the damn machines going.

BS: *Was that Jack Long?*

EB: No. It began . . . he couldn't handle the traverse life very well. George Woodick finished up and then he was relieved by the R4Ds on traverse. The first guy who was, I can't remember his name now. Well, I'll think of it later.

BS: *And you were the only geologist.*

EB: I was the only geologist.

BS: *OK. So you're out at Byrd Station. This was the old Byrd.*

EB: The old Byrd.

BS: *Who was the station leader there, when you got there? Barnes?*

EB: Probably.

BS: *Barnes. Pretty sure he was if you went out in '59. He was '59-'60. No he wouldn't have been. He was the tail end of IGY. He was the year before. He was the second guy during IGY. You came the year after IGY ended. OK. That dates it. So, tell me about the traverse.*

EB: As I said, essentially, it was a three-legged traverse with some minor variations to get in better positions to get on the mountains and that sort of thing. So we went in the general

direction of the Weddell Sea. How do I get to the Weddell Sea? Seeing the Executive Committee Range, but not going to it. It was some distance. It was visited, I think, the next year, but we did not do anything about it. But, we could see it and there was a lot of triangulation that could be done for positions on the mountains.

BS: *Did you lay out a base trying to do that for positions on the mountain?*

EB: Yeah. Basically, you get a fix, a solar line of position fix, and then you take a jump and make another and so basically, that's how it's done. But, we did encounter, in other words, we set collision courses for Crary and Tony, which I personally got on to.

(50)

And it was important to point out that . . .

BS: *This was Mt. Crary and Mt. Tony?*

EB : Yeah, Mt. Crary and Mt. Tony, and then later, we would be at the Clark Mountains and then there was another, before we got there, there were some mountains not very far from Mt. Clark that had never been visited as I remember. They were volcanic.

BS: *You hauled the first rocks back from Crary, Tony, and other places.*

EB: That's correct.

BS: *Any surprises?*

EB: No, because it was Kenyite. It was just confirmation of what had been predicted. And it wasn't until we had been to the Weddell Sea, and with a lot of pretty rough ice down there, we had to come back in a way.

BS: *Did you make it all the way to the Weddell?*

EB: Oh yeah. We were on the barrier ice there.

BS: *You were on the ice shelf.*

EB: Yeah, we got on to the ice shelf.

BS: *To the edge*?

EB: Right to the edge. In fact, I think that there were crevasses that easily could have separated while we were there, but we had all the tractors at a respectable distance away from the edge, but within walking distance from the edge of the barrier.

BS: *On the Ronie Ice Shelf, huh?*

EB: And that was a very important stop for another reason. That was the ability to set out a base line and triangulate to the bottoms of bergs sitting off of the barrier in order to get sea level. As we approached the Weddell Sea, we began going below sea level.

BS: *From the original . . .*

EB: From the assumed elevation. So, we knew something was wrong, but it was important now to get out there a bench mark, which we did.

BS*: Then you could back it up all along. I never thought of that, but starting at Byrd, didn't they run a line of benchmarks from Little America*?

EB: They did, but something went wrong.

BS: *OK.*

EB: We knew that. That had already been known. It's why they kept building up. Byrd was too low, I remember.

BS: *So you approached the Weddell Sea below sea level. That's important.*

EB: Yeah, that was kind of . . . it was an event for the traverse. We could see it was going to happen and what's the reality going to be? Because in order to triangulate to the base of an iceberg, you had to set out a baseline so you knew how long it was when your triangulating, you

know the distance. And then you get the elevation that way. And so that was a good hard benchmark set, unfortunately, on a moving mass of ice.

Once we had that elevation to carry with us from the Weddell Sea, we began to get some notion of what the disparity was going to be with Byrd Station. We already had inklings of the problem before we left, but once establishing this, now we could work backwards and see what we ended up with when we got back to Byrd.

BS: *Let me ask a question here. Approximately where were you on the Weddell Sea? You were not over towards the old camp that they had in IGY.*

(100)

EB: No.

BS: *Which was Ellsworth. West of that?*

EB: We were closer to the Clark Mountains.

BS: *Than you were over to Berkner Island. OK. So, here you are starting leg two.*

EB: So now, leg 2, to go along the coast line, so to speak, although that's the last place we saw the ocean. We were staying well inland then, picking up a lot more rock, a lot more detail on bedrock as we did that bottom leg, the bottom of the triangle.

BS: *This was under the Ronie Ice Shelf?*

EB: Well, this was all at the surface, but we were getting the thinning of the ice cap. And so, of the . . . you might say a lot more bedrock control on things than we had had up until that point. But, it was still a story mostly of volcanic rocks, except for one very significant discovery, but it was in the right assemblage, including the volcanic rocks. I may have found a major copper deposit there – literally stumbled into it.

BS: *Kenyite?*

EB: Not so much kenyite, no, but volcanic certainly was a type of copper deposit that we know well now – generally call it volcanogenic, but there were some interesting . . . there was one . . . I'd have to have a map now to remember names of things, but there was one variation from this continuing story of volcanic rocks of one type or another.

BS: *Now, these are in the Clark Mountains?*

EB: Not quite in the Clark Mountains.

BS: *In the foothills.*

EB: Yeah. It was approaching the Clark Mountains. I'd really have to go back to maps now and reconstruct all of this, but it was a different . . . the Clark Mountains are going to be a wonderful experience for me and I'll tell you why. But, these were on the way to the Clarks, you might say. I think after that, we just went back to Byrd Station. But, we'd been seeing a lot of volcanic rocks, but these were a different kind of volcanic rocks, and I'm not sure. I think on balance, they were much older rocks than would be associated with the Kenyite, which is essentially modern.

BS: *I see.*

EB: But, then we came to an old friend. We drove up to the Clark Mountains just sort of a wonderful – you could see it miles away, the group – and here were the rocks of the White Mountains of New Hampshire. I was at home.

BS: *In . . .?*

EB: The same rocks we have here in New Hampshire. There was a granite there.

BS: *And these were in the Clarks?*

EB: These were in the Clarks.

BS: *Now this is the primary rock?*

EB: We didn't have the time to do the whole area, but obviously we were in a different kind of

rock in a province of rocks which was then was extent, was not completely known, but a lot better control than anything else we'd seen on the traverse. But, it was a different kind. We were truly in a different kind of geologic environment. And so, I did a lot of work with that granite because of the type of granite it is and because we understand so well from the same rock in New Hampshire how, geologically, it fits into the whole system. So, I actually ended up dating that rock and wrote about it. It was kind of a highlight for me on the traverse. The copper deposit rock was, again, quite a thrill because I had been working in Maine on these very same kind of rocks before I went to Antarctica.

BS: *So, that was your high point – that and the copper.*

EB: Yeah. Sort of when you can begin to say, well, in Maine, this fits into this environment and I kinda feel now I know where I am geologically, whatever the rest of the story may be, which we'll have to work out by a lot of hard work. But, it was sort of a homecoming, a scientific homecoming. And then after that, of course, it was . . . from then on out, it was a hope and a prayer – a wing and a prayer back to Byrd Station. Those darn tractors were falling apart. So, it was really after the Clark Mountains, there was nothing. No other really important geologic contributions.

BS: *Doing seismic work, though.*

EB: The seismic work continued.

BS: *So, you get back to Byrd – what time of year was that when you got back?*

EB: It was right at the end of the Antarctic field season which is the opposite, you know, just turned around from us. So, this was . . . we were going back in the fall which was the spring. The end of field season here.

BS: *So, you left Byrd in February.*

EB: January, February. I was trying to remember this morning the exact date.

BS: *Flew out by R4D again, I assume.*

(100)

EB: Yes, then back to McMurdo with the Willshedoit. Now there were two reconnaisance flights during . . . I should mention, during the traverse. First, before we left Byrd Station, we did an aerial reconnaisance of the traverse route to the limit of fuel.

BS: *From Byrd.*

EB: From Byrd. We went out and did a reconnaisance flight of the proposed traverse route.

BS: *So you flew the whole route?*

EB: Well no. We didn't have enough to get all the way to the Weddell Sea and back. But, we went out a considerable distance and I went on that flight. I was the only geologist on that flight. Later, from a tractor gas resupply, we did a reconnaisance, we had a very good place for air operations and we did a reconnaisance, then, of the proposed traverse route while we were out on traverse.

BS: *Of the next leg.*

EB: Yes, heading for the Weddell Sea. We went out and did a not quite as elegant a job, but we covered, we had a good – it was a very significant reconnaisance though because we had never imagined how difficult the approach to the Weddell Sea was going to be and we actually shifted the traverse route from what had been planned. We learned very important information from that reconnaisance that made it possible to deploy, to replan the route of the traverse much more effectively.

BS: *George Doumani on that?*

EB: No, he went on none of the reconnaisance trips, that I can remember.

BS: *So, that was mid-trip, so to speak.*

EB: Mid-trip.

BS: *Who were the pilots? Do you remember?*

EB: Oh yeah. It was Capt LaBas.

BS: *How do you spell that?*

EB: L-a-capital B-a-s, I think. LaBas.

BS: *Marine?*

EB: They both were Marines. And Joe Walker, as I remember.

BS: *Not the famous Joe Walker.*

EB: Well, he was famous. Both of these guys were.

BS: *I mean the famous test pilot.*

EB: Oh. No, no.

BS: *Both of them were captains?*

EB: I believe so. I believe so.

BS: *How did the military, basically the Navy, controlled military, whoever they were, how did they interface with you? Was it good service?*

EB: For my purposes, very well.

BS: *It ran hot and cold. Some guys could care less.*

EB: I had a lot of fun with these people. They had enough confidence in me one day, so I was up in the right hand seat during the reconnaisance and I think it was Joe Walker was in the left hand seat, and he just got up and walked out and went back and I was in charge of the R4D for a while. I'd been in World War II in Navy flying, and so . . .

BS: *Were you a pilot?*

EB: I wasn't . . . I'm not a pilot, no. But, I had had some flying experience here and there over the years. No, I never had a pilot's license.

BS: *I thought I'd explore this a little bit more because it's interesting. It's a different experience than the scientific community has – the flyers and other Naval personnel, like traverse work. And it was good and bad. Basically it boiled down to personalities, I think.*

(150)

EB: Oh yeah. They flared and . . .

BS: *Some of them went to the point where they said, the military people said, you know, I think that's wrong , you've gotta go up here.*

EB: Yeah.

BS: *That type stuff, because they kind of had the big picture, flying all over the place. If you're looking for this kind of rock, I think there's a mountain that I know of that looks like . . . So, these guys would bust their hump for you, in other words.*

EB: We spoke the same language. I had been in Navy air in World War II, and we just sort of, without . . . I don't even know if they knew this or not . . . we just understood one another.

BS: *Wonderful marriage*.

EB: Yeah, it was the rapport that we had and the trust. So, to me, one of the highlights of the traverse was the interface, particularly with the VX-6 guys. We had no complaints at all. And if they said they couldn't do it, I knew they said it for a reason. But, most of the time, they went right to the limit on things and in today's context, they could be humorous, but they weren't then. Like the day we aborted a jado take-off at Byrd Station that covered the airplane with frozen goo. Holy Cow! What a mess that was. I can't tell you how much alcohol they required to clean the airplane. There were things like that. They were all part of flying and we just spoke the same

language. I was never a pilot, but you won't believe . . . I was actually an aviation electronics major in the Navy, but ended up, because of a funny circumstance, as a control tower operator. I was retrained by the Army.

A Navy group took over the control tower at _____Point on Saipan.

BS: *Saipan.*

EB: So, when I went up in that tower, I didn't know what went on in the tower, but the time came to learn because . . .

BS: *Well, you had a good feel for aircraft capabilities in Antarctica, then. Better than the average scientist.*

EB: Oh yeah. As a kid, we lived right next to an airport and my brother flew. Then there was the bush flying up in Maine that I'd done a lot of. But I'd never had a pilot's license or anything. But in an emergency, I could probably get in and out – without much style, but anyway.

BS: *So, you're back at Byrd and you're leaving. Back to McMurdo.*

EB: It was the Willshedoit, back to McMurdo. Routine. Routine flights.

BS: *C-121 back to Christchurch?*

EB: Yep. Christchurch, would have been . . . no,actually, I went out on a heavy transport ship. Heavy hulled transport ship. Went back . . . it wasn't an ice breaker, but it was an ice capable transport.

BS: *Arneb?*

EB: *Arneb*. Back on the *Arneb.*

BS: *Just to Christchurch?*

EB: To Christchurch, yep, and then after that, just commercial air.

BS: *OK. That was 1960.*

EB: 1960, yeah.

BS: *Where were you headquartered?*

EB: In those years I was headquartered in Washington, DC., in the USGS.

BS: A*nd you spent the off-season there.*

(200)

EB: Yeah. I went back and there was interest on the part of the Geologic Division of the Survey to have a place at the table in Antarctic geologic research recognizing that they needed topo. They needed topo to do what they did. But, it was the starting of an initiative on the part of the geologic division. What should the USGS be doing about Antarctica? And I think our interest was to do the thing we traditionally do and that's mapping. Large scale mapping. Not mining geology or anything like that, but which rocks are where and what do they tell us, fitting in to all the questions that then were being asked, and the rapidly moving concepts of plate techtonics. In a way, taking the same questions I had in Maine, where the meat and potatoes were large scale copper and lead zinc deposits, down to Antarctica. There were sharp differences of opinion, I must say, in the geologic division of the Survey from we shouldn't even be near this stuff to people that said it is a commitment on the part of the Survey to take it's mapping expertise out and applying and contributing to this Antarctic research.

BS: *Flying out the deposits, or different types of rock*s?

EB: Yeah, basically because of the international treaty, you weren't down there to find ore deposits and you didn't even talk about this, which was not appropriate. That was quite obvious. It was to learn about and contribute to the larger purposes, you might say, of geologic research at a very interesting time in the profession, when we were coming up with some very exciting things.

BS: *OK. And so, did you have a special division you were attached to in Washington, DC – a group that was dedicated to Antarctic stuff?*

EB: No, not yet. The topographic division was nucleating a defined group or learning the specialties of geodetic work in those climates in particular. But, there was no . . . that was a good question, which branch do you draw from? It was less what the branch did than what people in some kind of a position where they could be moved on to this research. Some of this I'm very hesitant to talk about because it was very emotional . . . like, should the military geology branch, which the Survey had, be involved in this because of the Antarctic Treaty? And there was this by-play created to face the reality of the Russians being involved and the type of mentality that you were responsible for in that situation.

BS: *Actually, you could. Article I of the Treaty says that the military could be used for logistics and any other peaceful purpose.*

EB: See, I don't think we had that then.

BS: *The Treaty came in . . . well, it was written by the time you went down there - 1959. November of '59, and it was ratified in June of 1961.*

EB: Well, this was all cooking, you see, and there was a lot of delicate things that a person like myself, I just had no right to try to interpret. There were sources I should have to ask these questions, and so forth, because there was the sensitivity and so this had to be accommodated at that time and while the relationships were growing and so forth. Today, it seems easy and benign, but there was sensitivity then. You had to be very careful.

BS: *Oh yeah.*

EB: Now, who adminsiters to you when you come from a project in Maine in Antarctica, well, of course, it can't be the New England branch any more like it was in those days or some other

branch of ore deposits or something. There were some things I'd like to talk to you about, but it would have to be totally off the record, what happened in those days. But, this would still be very sensitive. This is all about the larger scale politics of Antarctic research and our identity, because of course, the USGS was identified with the military geology branch. And how there could not be any . . . although they were good at organizing foreign travel and things of that sort, we had to be very careful not to have this identity. Better that I be associated with the domestic geologic.

BS: *You were associated with the domestic.*

EB: Projects, yeah.

BS: *You had nothing to do with the military's geology?*

EB: No.

BS*: They wanted to make sure that no one misinterpreted your purpose down there.*

EB: That's right.

BS: *We did more misinterpretation of the Russians than they ever did of us.*

EB: Yeah, I know. I remember . . . to me it was just something that was very obvious. You knew it because you were in the organization and knew how it ran and so forth and had no problem, but somebody on the outside might mistake just from how you – you know, I did foreign things. And there were people you know who knew how to organize foreign travel. But, in later years we had an international geology branch, so it was a lot easier than it was in those days.

BS*: So, you're back home. What do you do once you're back home from the first trip?*

EB: Well, after the first trip and remembering one of the reasons I went down there, was to see if it was appropriate to think for the geologic division of the United States Geological Survey to think about projects down there, correlated to or coinciding with domestic programs.

(300)

In other words, should we be thinking about energetic geologic mapping projects and how and say what scale of thinking is appropriate for this sort of thing? That was kind of one of the reasons I went down there, to see if it was practical for the USGS to think about applying it's regional mapping expertise to the Antarctic in a national context. So, that was . . . see there was more to it than just '59-'60. What's going to happen after that? And was I going to come back and say, "Look, let's get the hell out of there." But we didn't. We decided that it was appropriate for the Survey to bring it's experts and expertise into national use. There was a national responsibility that was obviously identified with the USGS. Because good geology and geology sort of appropriate for the times and this was at a time when particularly because of plate techtonics, that geology was moving very rapidly. We were learning a lot. And so, my recommendation, consistent with other people, was that the USGS should proceed to plan programs and ask for funding that coincided with our national commitments and programs. There was a place for what I call regional mapping on the part of the geologic division of the United States in Antarctica. And not everybody in the Survey shared this opinion at all. But, there was a fairly large group that felt very strongly about it and I certainly was identified with that group.

BS: *Who were some of the others that shared your opinion?*

EB: Well, the year I went down, 1959-60, involved only two . . . there was an icebreaker opportunity, which a Survey person went down for, and that was literally to go to things you could see from the icebreaker and fly the helcopter to them. And then there was the Victoria Land traverse that would involve another Geological Survey person who kind of did things like I did. And that was not successful. Physically, he had some serious problems out in what was a much more difficult climate than I was working in.

BS: *Was this Weihaupt and company?*

EB: Let's see. Who was it that year? Vanderhoven was, I think.

BS: *Yeah. Weihaupt and Chris Vanderhoven.*

EB: And then the Survey . . . I didn't know about this because I was out in Byrd Land, but he had to be brought in from the traverse, as I remember. His name was, I've forgotten his name now. Al Taylor, his name was. But, he did not finish the traverse. But, I'll have to admit, we were in the banana belt.

BS: *We just had a reunion out behind Denver there at Weihaupt's home. He put a lot into that. I stayed with Weihaupt and interviewed him. OK. So, others shared your opinion. But, in the Survey, Art Ford . . . ?*

EB: Yeah, well, one of the things . . . I came back with all of the things you do, you know, things to write up and try to get a leg up on publications. But, then there was the next year and the decision to go forward with a modest program on the part of the Survey. And who would do it and that sort of thing.

BS: *This is 1960-61?*

EB: It would be '60-'61. And I would go back to Antarctica as part of this second year and so we wrote proposals according to the larger scale plans that were on the table at that time. And that's when I hired Art Ford and John Aaron and other people as well. And this was when we had advanced our philosophy to something that was more traditional USGS work, and that is to do regional mapping. In other words, this is going to tell us more. We'll have a priority of when we, how we do things regionally speaking. But, here's a place we should begin. We'll learn more about it and we can use that to expand further years beyond that from what you learn. So, this is when we decided that our greatest contribution would probably be, with our capability, would be

in the Transantarctic Mountains. So, there appeared almost automatically a concept of the Transantarctic Mountain Project and this is when I started hiring people like Art Ford and John Aaron and others, particularly to support them, but they were the scientific heft of this project. But, of course, '59-'60, was a relatively successful year. 1960-61 was not.

BS: *Where did you go?*

EB: Well, the first thing is, we got along pretty well.

BS: *What was the concept on that trip, the '60-'61? What were you going to do?*

EB: 1960-61 was to go in to the Transantarctic Mountains and set up a permanent camp.

BS: *OK.*

EB: That's basically where we were, to take a look at what, in the context of what we knew about the Transantarctic Mountain, where should we go to get the most payback? And so, a site was picked, but later it was in a part of the Thiel mountains and so forth where more could be seen. In other words, the idea over the years when there would be fill in, but basically to start there and then work out. So, that's when Art came into the picture. As I say, there were others, but principally, I would have to go back to records to talk about other people, but Art and John Aaron were the principal geologists and they were going to carry the load anyway, the bulk of the load. But, if you remember, '59-'60 was a cake walk, continentally speaking, compared to '60-'61, when everything went wrong. Bad weather, blackouts, communication blackouts. We never did really have a field season. It was a matter of . . . literally, all we did that year the way things worked out, was to get everything flown in for what would have been used that year, but for continuing years. So, there was very little geology done that year, but the camp was established for the following years.

BS: *This was in the Thiel mountains?*

EB: Generally, in the Thiel mountains area. Art could probably give you a . . . I'd have to go back to records or consult Art specifically about what to call it.

BS: *He's going to come up and camp on my doorstep for a couple or three days.*

EB: Well, he can clean up my act on a lot of this stuff because he remembers it better. Not everybody saw a higher purpose of the effort down there, the initiative. They were there, some, for self-serving purposes and not looking ahead.

BS: *You're talking about in the USGS or personal?*

EB: Both sides, yeah.

BS: *NSF people, or . . . ?*

EB: Yeah. There were . . . this gets very delicate because there were people who, without mentioning any names, who I don't think saw the higher purpose or the continuing purpose. It was sort of down for a quick kill, or something like that.

BS: *You mean they wanted to get their name identified with Antarctica without doing it forever.*

EB: Yeah, without much investment. But, anyway, that happens no matter where you are. But, anyway, to continue about '60-'61, there were the sun spots. There was the stack up of the logistics. And finally, as I say, speaking specifically for the USGS purposes, the best we could do was to get the logistical end of the field area of the Thiel work set up. We didn't really do that much geology that year. But, so if everything went off well . . . the flying got stacked up terribly.

BS: *Downed planes? Were you hurting for downed planes on top of all this?*

EB: No, it wasn't the downed planes. It was just that there was no communication for flying for a long time.

BS: *I understand. You can't go.*

EB: You just can't do it and particularly, I remember, they were still using the Super-G, and there were limitations of those days. And so, for us, it was a long wait in New Zealand. But, then for me, an interesting thing happened. Navy medical caught up with me and my diabetic problems.

BS: *While you were down there?*

EB: No. While I was in New Zealand. And so, Navy medical said that I was not going to go to the Ice. That they had decided that my situation was degenerating.

BS: *You knew about this?*

EB: No, I didn't. Well, what happened was that the Navy in the 11th hour, called for a private evaluation of my blood sugar and my capablity for handling sugar and they didn't have the information before I actually went to New Zealand. But, they did catch up with Navy medical down there. And it was decided without any equivocation that my diabetic history was just too risky even to go to the Ice.

BS: *This was when you were in Chi-chi? You recognize Chi-chi?*

EB: Chi-chi, yeah.

BS: *The pilots named it that.*

EB: But, this was after we were down there. But, anyway I couldn't have gone under any circumstances because there just was no flying. And actually I was sitting, looking for things to look busy in New Zealand, so we sort of ran mountain camps. All I could do with Art and John's good help and most of the other people were support people, was to set up and learn how to use skis and learn to adapt to Antarctic climate and territorial . . .

BS: *But, they all got to go, did they not?*

EB: In the end, I think it was only John and Art that took the stuff in.

(End of Tape 1B).

(Begin Tape 2A)

(000)

BS: *This is Tape 2 of the Dr. Eugene Boudette interview, taken at his home in New Hampshire. Dr. Boudette.*

EB: OK. So, in ’60, we’re talking about a delay that was so significant, that very little geologic work was accomplished. But, we ended up with a leg up on the next year because we had everything in, so really, all we had to do was fly to it and start working. So, that’s how the Transantarctic Mountain Project began. And I was obviously not going to go to the Ice, and my Antarctic field days were over because of my diabetic problem.

BS: *You never got back.*

EB: No, I never got back. But, I had an interest in the project and was able to support it while turning to other work, but I still had some part of my time set aside to get Art ready to take over completely from me. What I was doing was grooming Art to take over what I was doing.

BS: *Now, you’re talking at kind of a level above field researcher. You went back and were organizing this stuff.*

EB: Yeah.

BS: *So, was there a position attached with this, or since you were the first to go, did this just fall on you?*

EB: No, there was no defined position. There was still sort of slow steps into this on the part of the geologic division of the Survey. Still people believing that we’re a domestically oriented group. This wasn’t true, because we had this big foreign geology group that was people in embassies and so forth and a lot of places. The geologic division certainly had international

experience – what was called foreign geology. But, the foreign geology branch did not want . . . their type of thinking and approach was not appropriate for Antarctica. So, it fell to more traditional branches, and I think at that point, when Art really took over from me completely, and it was an interface, then it was the Eastern Regional Geology. In other words, only because it was in Reston, Virginia. But, for travel and a lot of other logistical purposes, that's the way the Survey operates. The key person is the branch chief, so you identify with a branch, and for years, and Art would have to take over here, the association was with the eastern regional geology just because people were in Reston, Virginia, at that point.

BS: *So, he basically tied his projects to the eastern regional geology division.*

EB: Yes, or branch. The division . . . this was all under the great umbrella of the Geologic Division. The Survey is split into water resources division, topographic division and geologic division.

BS: *I understand. OK. So, Art would continue this story.*

EB: Yes. Art should be beside me now because he was sort of . . . I was very fortunate that he was available to take over because he had the geologic background. He had the background of experience to be able to . . . you didn't have to doctrinate him about Antarctica and what was going to be demanded of him. So, we became great friends and he was a really good guy to work with.

BS: *John Aaron?*

(50)

EB: John Aaron as well. Because there is a physical demand to Antarctic work and it's just not available for a lot of people who otherwise would probably have an awfully good time there.

BS: *Were you involved in an administrative sense after that?*

EB: There was a phase out. I went back to more traditional work.

BS: *Did you go back to the Arctic?*

EB: I never went back to the Arctic.

BS: *Alaska?*

EB: I always thought I would like to have had a project in Alaska, but never did. So, I ended up making kind of a full circle in the Survey in that there was a rebirth of interest in the uranium reserve, so eventually I circled back to the uranium and thorium branch of the Survey where I began. My first job with the Survey, not the one I had intended to get, was in uranium resources.

BS: *Were you involved with the work that Ed Zeller was doing in Antarctica for many years after that?Flying around with the Geiger counter in the helicopter?*

EB: Not really. I remember Art speaking of it, but I was not involved.

(Seems to be a break in the interview).

One might say, I simply flunked my glucose tolerance test, So, I went back after this and took steps to go further to probe the problem deeper. And I went for years without any problems. I went to a man who was known internationally for his work in diabetes. He was than, fortunately, at the Hanover hospital. And he said, "You've got no problem. You don't sit around the candy store all day, but you've got no problem." And I went for years without problems.

BS: *Back in my day, we would probably have agreed with him.*

EB: It was only in very late life when the reality, as predicted, was there.

BS: *My grandmother had diabetes, that she knew about, from age 60 to 102. I didn't recall anything. I knew about it. Didn't know what it was when I was a little kid.*

EB: Well, I could see the Navy's thinking was in the worst case scenario, you're marrooned and all you've got to keep yourself alive on there were high calorie kinds of things that were dropped

to you, or whatever. It was real. I'll give them that. That I posed a type of risk. Once you're in Antarctica and the worst case scenario, there's really nothing that can be done for you. You really have no fall back position.

BS: *Well, I've got a retrospective question. Two of them. Polar work. Would you do it again like you did it? Sounds like you were on the forefront of two ends of the world – the drilling up in the Arctic and the geology of the Antarctic.*

EB: I would do it.

BS: *You laid the ground work for the future programs.*

EB: I would say I went in and used what experience I had from previous work to evaluate the practicality of logic of field work. And I believe that the Survey is the biggest geologic research organization in the world – the US Geological Survey, Geologic Division. And there was the capability and there was the logic of an association – in other words, if there's going to be a national geologic effort, then I really felt that the Geologic Division, as well as the Topographic Division – there was no question about the Topographic Division – there was nobody else that could do it otherwise. But, I think there was a place at the table and a place for the tremendous – it isn't an individual thing with the Survey. You're in the largest geologic research organization in the world, and to the extent that people can communicate, it's not a one-man sideshow. It is a place where you communicate and to me, this arrangement was very attractive. In other words, I don't know everything about this problem, but I know the guy to ask. Or, I'm one step away from, "If you ask this question, I'll tell you to go see him." That was what the Geological Survey was all about and why, I think, in an overview position where so much national money was being spent for this purpose of classical geology, then we had a place, at least in an advisory capacity – geologists don't take advice very good sometimes – but, there was a place. So, I'd still

say that going back to the original incentive, the question was answered and I really was bullish on the idea of continuing to have the Survey as part of the national effort.

BS: *And how did your work in Antarctica . . . was there any contribution from your experience to your work later on?*

EB: Oh, yes. There was, yes. Clearly, the regional type thinking was certainly, my ability to think in those terms was reinforced by Antarctic experience. And later, it was even used. Like later on when the time came for sort of a national effort in uranium resources. In other words, particularly with respect not to military, but to heat, of energy generation. There was the fundamental question, "Can we do this on uranium alone, if we had to?" and that sort of thing. Reactors for energy, not bombs. We weren't worried about bombs any more, but what is the national capacity for electric generation.

BS: *So, the broad picture, you gained in the Antarctic helped you.*

EB: Yeah. I gained experience from looking at that geologic resources in a global or regional national context, or a global context. But, not that Antarctica would be a source of the uranium, but consistent with the treaty, would there be times when energy demands would be such that there would be people in an international context that would be thinking about what is the capacity. Where is the energy coming from? This is not an unusual question these days either because where do we go after the oil is gone?

BS: *Did USGS look at oil in Antarctica, or potential oil?*

EB: Not at that time. No, there was never in my experience, or in my overview where oil . . . I think you reported if you found the environment of oil reserves to be, but generally, even what we knew back in 1959 and '60, it was not a high probability of vast oil reserves simply because of what we already knew about the geology.

BS: *I see.*

EB: So, it was never a question . . . it was a question that you keep handy, that was there, but the probabilities were also realized at the time, that this was not a Black Sea basin situation or something of that sort. I think it's automatic to keep this in the overview, but it was not a drive. I didn't see it as a large important drive in resource-type thinking.

BS: *You're career. Sounds like you were moving up in management. Is that correct?*

EB: In Antarctic affairs, certainly there was a management demand.

BS: *And when you left?*

EB: When I left, I preferred research. There's always an element of research application, research demand and that sort of thing, which, after all, how are we going to do it, recognizing the problem. And then obvious, certainly in uranium resources, to me, because I've done a lot of work in uranium resources. But, I've also done an equivalent amount in _____ resources. A lot of the work I did in the east and in Maine involved copper/lead/zinc.

BS: *How long were you with USGS?*

EB: Well, I worked with some academic leave. I was with the USGS from 1960 through my retirement, which was in 19 . . . I became the state geologist of New Hampshire in the '70s.

BS: *So, you had 25 or so years with USGS?*

(200)

EB: Oh, I had more than that, actually. I started in, from 1953 on until I retired.

BS: *You retired when?*

EB: When did I retire?

BS: *This will come out in the transcription. (Bonnie: Leave that one blank.)*

EB: I left to become State Geologist.

BS: *So, you got your doctorate?*

EB: Doctorate was. . . I did it in stages. I did undergraduate, than a masters, and then later a Ph.D.

BS: *At UNH? All of them?*

EB: No, all of my graduate degrees were at Dartmouth.

BS: *Were you on academic leave?*

EB: Some of the time. It was a combination of academic leave or re-headquarters.

BS: *Oh, I see. You were here.*

EB: Yeah.

BS: *You were here. Go to school at night . . .*

EB: Yeah.

BS: *Now, how do you fall into State Geologist of New Hampshire. You retired from US Government and you went to work for the state?*

EB: Right. And took that position that was available as a state geologist.

BS: *And how long were you there?*

EB: Well, quite a few years. And it was . . . you know to answer this accurately, I should have paper in front of me.

BS: *It's totally unimportant. I'm trying to capture . . . You're very astute and sharp and thoughtful. A lot of guys are having a tough time. Bad at my age.*

EB: I'm not a milestone type person, so I tend to . . . when I did it, when I became State Geologist is less important as what I did with the program. That sort of thing.

BS: *Is it a big organization?*

EB: In fact, when I took it, it was a one-man show.

BS: *Ha-ha-ha-ha. Did you have a secretary?*

EB: No. I shared a secretary. When I took the job, the UNH provided a service. So, I did it as a Professor of Geology at UNH. It's a very different approach than other states have used.

BS: *At first you did. Professor of Geology.*

EB: Yeah. UNH provided the services. And I brought it up to the status of a recognized position in the state of New Hampshire.

BS: *In other words, you made the job. You developed the job.*

(250)

EB: Yeah. This is one of the things I was supposed to do. To bring it up to a job comparable to other states, where there was a commitment on the part of the state that was literally a__ of commitment, but it was a state commitment, and not a UNH commitment.

BS: *You retired from that, and . . . ?*

EB: I really haven't done much since I retired as State Geologist except to win my first . . . and I couldn't do that. I decided like all other people, I'll take a shot at consultation. And so, if you're going to be a consulting geologist, based upon your outlook, are you . . . well, I will specalize in it and my care will probably . . . there will be something on my card which I haven't prepared yet, specializing in forensic applications. From my experience, I could see . . .

BS: *Forensic?*

EB: Forensic, yeah. Legal applications. And so, the first job in anticipation of retiring with a date in mind, I got my first opportunity to use geology in a forensic . . .

BS: *When you say forensics, you mean geological forensics, or . . . ?*

EB: Well, just a forensic application. My first potential job, which I couldn't take because things didn't transpire when I thought they would, related to a legal case.

BS: *For . . .*

EB: This was a very simple argument over who owned the land kind of thing. Where geology was part of the response, but I wasn't ready yet. So, I got a friend of mine to do it.

BS: *I asked one of the guys I interviewed. He said, "You're retired from the Navy." I said, "Yes." "You in the Navy Reserves?" I said, "Well, I was until I was 60 in the Navy Reserves," but then they just say "Retired," after that. And he says, "And I'm Emeritus and you're Reserve, or were," and he says, "Most business men are consultants. That's the soft landing for retiring." And he said you back off eventually, but some don't. I was in the deep sea salvage business.*

(Space)

EB: It was very easy for the Topographic Division because they were a one-man show. And the real expertise for the type of navigation and so forth that had to be done then was . . . they had it. Now geology . . . anybody could do it. Why should the US Geological Survey, therefore, get involved? And there were sharp differences of opinion within the US Geological Survey from 'I wouldn't touch this with a 10 foot pole,' kind of thing to 'It is necessary for the Geologic Division to be involved to bring their standards into play, that we use for other things.'

(300)

BS: *How did the Geologic Division fit in with, say, well . . . you had George Doumani from Ohio State. How did you all fit together with the geology they were doing? Or how did they fit with you?*

EB: Well, this is a delicate question. There were people who felt that there should be the presence and implementation of Geologic Division standards. In other words, it is felt that the US Geological Survey always had a purpose for what standards we were working to in this work.

BS: *For the nation.*

EB: Yeah. For the nation.

BS: *And universities and other geology groups would fit into that.*

EB: Yes. Now it should be guided by the standardes the Geologic Division of the Survey uses for itself. What it inflicts upon itself as standards.

BS: *The highest standards.*

EB: I feel strongly about this, but having worked for them and having worked in the context of an organization, there has to be a standard of performance.

BS: *The standards should have been set in Antarctica by the USGS.*

EB: The USGS Geologic Division is recognized for its application of standards and because the Antarctic show is a good place to apply and adhere to the standards that are used, particularly in publications.

BS: *OK. Now, how did the universities like Ohio State feel about that?*

EB: Well, you got me on the spot. I think you saw it coming. They wouldn't, they sort of are sensitive about what are called "geologic standards.

BS*: Are you talking about David Elliott? Tom Gold? Elliott is still going down there as a geologist.*

EB: Yeah.

BS: *He was there in '61. Pete Rowley. Do you know Pete Rowley.*

EB: I've met him. I don't know him very well.

BS*: I put him out on the English coast and he stayed all summer. He had a wonderful time. OK. I think that's a nice close – setting standards for the nation. I would suspect that Ohio State and others would adhere to your standards out of self defense, if nothing else. So, you set them. OK, don't pursue it, then if they fall on their face and haven't used your standards, then . . .*

EB: There's no question that in many respects, the Survey, it's not always right and sometimes, personal feelings get involved in the middle of this. But, I think there has to be a standard, and standards adhered to. And I think the Geologic Division of the Survey, like the Topographic Division, has a responsibility to the nation.

(End of Interview)