

## Lee Wareham

Interviewed by Hilary Hilscher

July 26, 2000

### Tape 1, Side A

*Interviewer's note: The "they" Lee refers to is RCA. As the interview begins, he recalls what happened in 1969 after he signed up to work for RCA for two years in Guam.*

Lee: First thing they did is, they said we want you to leave immediately and go to (RCA Globecom) headquarters, 60 Broad Street in Manhattan and then we are going to have you... you are going to spend about a month traveling all over the country going to these schools in the different sub systems in the satellite stuff 'cause it was...

Hilary: It was new stuff at that time.

Lee: New stuff and really new. So we jumped on an airplane and flew to New York and our office used to be just down the street from the New York Stock Exchange... and I owned stocks by then but I couldn't prove there was a New York Stock Exchange. It could have been a myth for all I knew. I hadn't seen it. So that was kind of neat to be able to...at noon I would go down to the stock exchange and sit in the gallery and watch the pulse of the American economy.

But we went in there and as soon as we got there – now we're just technicians. There were five of us. And one was hired as a supervisor, Ed Maxey, and he was from the Philippines. His father had settled (there). He had been an officer in the Spanish American War and had settled there and stayed there and Ed was born and raised in the Philippines. And there was Roland O'Shea and there was a guy by the name of Bill Gronwaldt and me, and there was a guy from...not from White Alice and he didn't stay around very long but he traveled with us. He was a big black guy, very distinguished. I mean, he looked like a prophet. I mean, this guy had an awesome presence and I don't remember what his job was. He must have been an engineer.

But, anyway, we... the first crack out of the box we were taken to the president of company, the president of RCA Globecom, because this was an RCA Globecom issue. Now we had been part of the Service Company heretofore, a different subsidiary, but you know he's on the top floor there at 60 Broad Street and had a white carpet that was about an inch thick and this is pretty heady stuff for yo-yos from Alaska and he told us how important this was. There was going to be... Guam was going to become a major base for the bombing of North Vietnam, and that in order to do that, they needed communications out there, and that RCA had committed to getting the earth station up and running in six months.

Now they asked... AT&T said two years and IT&T said that they could do it in 18 months and the DOD (Department of Defense) wanted it in six months. And Howard Hawkins – who is my ultimate, absolute corporate hero even to this day – Howard said, “RCA can do it.” And he had no idea how we were going to do it, but he had faith in the company and he knew they had a lot of resources and he was bold, not foolhardy but bold. And he told us, “You know I’ve made this commitment and it is up to you guys. You know you’re a key part of being able to deliver on this.” And I thought... Jesus, you know, that sounded pretty spooky to me if the best in the world, AT&T, said it was going to take two years and we’re going to do it in six months.

So we started out and we were on Long Island. We went to school on parametric amplifiers there. We went to school in Boston on cryogenics because at that time the receivers had to be helium-cooled cause the satellites were so weak that the signals were like seeing a candle at a hundred miles. And we had to go to Texas for the antenna. We had to go to Los Angeles for tracking systems and for the receivers... and that was a crazy deal. We finished school in Boston at five o’clock in the afternoon and we had a class at eight o’clock the next morning in (Garland?), Texas.

Hilary: So you were just going all the time.

Lee: And we didn’t even know what state we were in after a while and, you know, we didn’t know what our rental car would look like, what color is our rental car? Well, it’s blue. No, we had a blue one in Boston.

Hilary: Well fast forward a bit to Guam, and then sort of what catapulted you back here?

Lee: Well, when we got to Guam there was some cement poured and there were a bunch of people there, and I’m looking at this thing and we were supposed to be on the air by October the 1<sup>st</sup> and I’m looking at this. No, we were supposed to be on the air by November the 1<sup>st</sup>. And I’m looking at this thing. Now weather wasn’t an issue there. I mean, you could work and we didn’t have freeze-up or anything like that and typhoons weren’t that common so... but I’m looking at this thing and I’m thinking, “Geez, this is an awful lot left to do because we got to build the building and erect the antenna” – and this was a 100-foot, this is a 30-meter antenna. And I was kind of intimidated. I thought, God, how are we going to do this?” And we would work until you dropped. And there were no days off. Nobody wanted a day off because very quickly you get caught up in that kind of stuff.

Now the first thing we did, O’Shea and I, was what every dimwit does when they go there. We got ourselves a big sunburn. I mean, we were wearing short sleeve shirts, shorts, and sandals – and we sunburned the top of our feet and the calves of our legs and we were hobbling around. We got over that quickly and went to work.

Hilary: And you made it.

Lee: We made it but, God, just by our fingernails. If you could have... you know, we had it up and it was running, but there were so many things that were jury-rigged and...

Hilary: Just to get it on the air.

Lee: And we were manually tracking because we had a prototype tracking system and it wouldn't track satellites so we were tracking manually, which is okay. But, see, now satellites are maintained within a tenth of a degree of the center of the box. That's the international standard for station keeping. Well, that means that with a small antenna like a 4-1/2 meter antenna, you can have it fixed, bolted in place, and never have to touch it. But we had a 30-meter antenna that's a lot sharper, and at that time the satellite in a 24-hour period... the apparent motion of the satellite was in a figure-eight pattern and it was about 2-1/2 degrees in azimuth and it was 8/10ths of a degree in elevation. And this antenna, if you were .05 – 5/100ths of a degree – off, you lost the signal.

Hilary: So you had to manually track it?

Lee: We had to manually track. Now when it was going across the center of the figure eight and moving quickly, we had to lead the satellite. We had to move the antenna every 15 minutes. And when you're going around the end, we knew where it was going and we'd leave it for much longer, you could leave it for about an hour.

Hilary: Did you end up staying your full two years on Guam?

Lee: Oh, yeah.

Hilary: And then did you come here from there?

Lee: I came here.

Hilary: And at that point Alascom was up and running?

Lee: Alascom was up and running and I didn't know what my job was going to be or where I was going to be and I had talked to Chuck Robinson. I think it was Chuck I talked to and, anyway, I was told that when I got to Tok to call in and they'd know what I was going to do. So I called Chuck, who I knew from White Alice days.

Hilary: Now you had worked with him where? Or just knew him?

Lee: No.

Hilary: You had actually worked with him?

Lee: Yeah, he was the operations manager and when I went down the Aleutian Chain that was – and he was the sector manager who used to come out to Bear Creek. The first time I ever met him was at Bear Creek when he was a sector manager. He was the site supervisor at Nicholson Lake and sector manger. He wore two hats.

Hilary: And Tanana is where you met Cliff Eller?

Lee: Yeah.

Hilary: So you called Chuck from Tok?

Lee: I called him from Tok and said, “Chuck, I’m at Tok and I need to know whether to turn left and go to Anchorage or go straight ahead to go to Fairbanks.” And he said, “Well, if you come to Anchorage we’ve got lots of jobs, but if you go to Fairbanks we’ll have a job for you. I’m not sure what it is going to be.” He said, “What do you want to do?” “Well,” I said, “If I’ve got a choice, I want to go – I want to stay away from the water, okay?” I wanted to be behind the mountains and I said, “I want to go to Fairbanks ‘cause I like the Interior. I like the summers there.” He said, “Well, go ahead. I’m not sure what we’ll have you do but go in there and report to the district manager.”

So I drove to Fairbanks and I reported in to Ray Stewart. He was the district manager and he said, “Oh boy, are we glad you’re here!” I said, “Why is that?” He said, “Well, we have heard a lot of good stuff about you.” And he said, “We’ve got some problems that we need to have you get to work on.” I said, “Okay.” And I’m thinking this is not a very good deal because these guys have obviously heard a lot of good stuff about me and if I’m terrific all I’ve done is met expectations. I’m going to have to do something phenomenal here or I’m a failure. That’s kind of like being the front-running candidate.

Hilary: Absolutely. All you can do is lose.

Lee: Six months before the election, not good. So they gave me a couple of things to do and it happened that there was a guy there that I had known slightly from before by the name of McQueen, Wariner MacQueen, MacQueen, and he was pretty good technically, but he was aberrant in his (personal relationships) and, you know, I got along good with everybody. They said, “Why don’t you take Mac?” And that was because no one else wanted to work with him. Hell, he was colorful and an interesting guy. I liked him. I liked to be with him ‘cause he had done a lot of neat stuff. Now he had a tendency to kind of spin yarns, but that’s okay.

And so Mac and I went to work on this intractable problem with his battery plant and I hated battery plants. I didn’t tell him that. Battery plants are huge, crude. Some of them though are obtuse and I never really could get in the mind of power engineers very well, but Mac and I went to work on this. And Mac is actually the one that found the problem. Now I put in place... this was a good example of teamwork. I put in place a step-by-step

procedure where we would just eliminate... it was just like “how does a sculptor work?” Well, he chisels away everything that doesn’t look like a horse and he has got a horse. Well, I put the thing...and chiseled away but Mac found the horse. I told everybody I didn’t fix this, Mac did. So then I was a hero ‘cause I was modest.

Hilary: And you got Mac out of their hair.

Lee: Yeah. You know, everybody knew Mac was a dud, a troublemaker, and all that. I said, “No, he’s the one that found this. I mean, here is your guy right here.” “Oh, you’re just being modest.” Anyway...

Hilary: So you stayed in Fairbanks then how long?

Lee: I stayed in Fairbanks...now, let me tell you about my position. Ray Stewart told me to just go around here and spend a week or so and just sniff around while we figure out what you’re going to do. Find out how things work. So I knew several of the people. Larry West was there. “Hi, Larry, how have you been?” Because I hadn’t seen him since Adak.

And at the end of a week Ray called me in and said, “Well, we’ve got two choices. We can create a job and we will call it plant specialist and you’ll be kind of a field engineer or the only other thing we got right now is a technician.” He said, “We’ll have jobs.” And I told him, “Look, I don’t want to have a created job. I don’t want to be the guy that they made the job for,” and I said, “I don’t have a problem with being a technician for a while.” He said, “You will have to join the Teamsters.” I said, “That’s all right.” It cost \$300 to join then. I should have made it... not that would have been illegal. I should have got some kind of financial (break) because I didn’t intend to be a Teamster. So he said, “Well, I’ll send you down to the Union Hall and you got to be dispatched.”

So I went down there and there was a guy by the name of Rule, Bill Rule, down there who had the IQ of a salamander. You know, his neck and head were the same size and he was a classic Teamster. This is kind of negative but I didn’t have very high regard for Bill Rule. As soon as I met him, a Neanderthal fellow, but he was the business (agent) and he told me – by this time, I had nine years with the company and I was clearly earmarked for advancement – and I go down there and Bill Rule gives me this lecture about...

Hilary: How bad the company is?

Lee: About this old-boy network and the RCA-buddies thing and the Teamsters has the authority to do the dispatching and we ain’t going to have no more of this, old buddy. You’re damn lucky to have a job. I told him, I said, “I really appreciate you helping me out. I didn’t know how things worked.” I mean I didn’t argue with him. And I was very grateful and humble and I got dispatched. And I was a technician for about three months and I did, well, I went and did the stuff nobody else wanted to do. I went up to Bettles. They had some stuff that needed to be done up there and I worked mid-shift and I did this

and did that and got to know everybody and on December 3<sup>rd</sup> I went up to Deadhorse 'cause of (filling in for people on) vacation.

Hilary: And this was '62 at this point?

Lee: No, no. This was '71.

Hilary: Oh this was way in '71 at this point?

Lee: Yeah, this is '71.

Hilary: Okay.

Lee: Well, there were 50 people on the Slope. The world had ended. They had the false start (on the pipeline) and of all the things that stand out in my memory the most striking was the ambiance from the North Slope on December 3<sup>rd</sup> – because that's the day the sun goes down.

Hilary: Right.

Lee: It sets and doesn't come back until January 17<sup>th</sup>. And it is 40 below zero and dark and there is always... I don't know if you remember the picture of the three huge (construction) cranes sitting there together. I mean that was a classic for years and there were these Hovercraft up there. I mean, it was like a science fiction novel. You would go in these deserted camps and I didn't have much to do up there. I was the communications guy for the Slope and there wasn't much happening, Jack! And I'd wander around and go in these Hovercraft and go to these places and literally it was...

Hilary: Like a ghost town.

Lee: It was like aliens had come and snatched everybody away. And when we... we didn't have telephones between... I stayed at Frontier Camp, which was about nine miles out and when you wanted to go to the airport, for example, there was a common VHF frequency and we'd get on the radio and call Wien. And there was one woman on the Slope, the lady over at Wien, and (we'd) call her and tell her we're leaving here in about 10 minutes.

Hilary: Wait for us.

Lee: If we're not there in half an hour, 45 minutes, send somebody out because you never went anywhere without telling somebody, and we didn't have radios in the vehicles then so we couldn't call from the vehicles, and if the weather was bad you just stayed home. There were five people at Frontier Camp. It was a 200-man camp and you can't operate a 200-man camp with five people because the sewer outfall will freeze up. Now I didn't

work for Frontier and I was an assistant, well, a lodger there, I guess you call it, but it didn't make any difference. I hauled water. I worked on heaters. I repeatedly (warned) Herman Nelson (about) the sewer outfall to get it thawed. I worked on trucks, whatever. We had to survive, man. And something was always going wrong. There just weren't enough of us. We just didn't generate enough of anything to keep the camp running.

But while I was up there, I got a call from Ray Stewart and he told me that a guy by the name of Fred Johnson, who looked good but didn't work... I mean, Fred was a nice guy and he was at the toll center. Now he was the outlying-area supervisor and Fred was about a volt-and-a-half. I mean, he wasn't forceful. He was a nice guy and he was bright, but he would never go in and kick anybody's ass. And I don't mean to be mean to him, but if somebody wasn't doing anything, wasn't doing their job Fred would analyze it very carefully and he'd understand exactly what was the matter but he couldn't go tell him, "Look, either shape up, you know, or hit the road, drag up." And Ray told me, he said, "Fred Johnson is stepping down. He wants to go back to the craft. And my question to you is, do you want to be the outlying supervisor?" I said, "There are two parts to the answer of that. I want to be your outlying supervisor but I don't want to be the guy that took Fred's job." And Ray took pains to reassure me that Fred was stepping down anyway and it had nothing to do with me, and these should be separated.

So I became the outlying-area supervisor, which was... I was interested in anyway because I had people at Kotzebue, had people at Nome, and somebody at Deadhorse, and somebody at Galena, Tok and Delta, can't remember where else. I had people... I wouldn't have very many people because we didn't have...

Hilary: Didn't have that much yet, yeah.

Lee: Didn't have that much stuff. I mean, White Alice still was operational and was separate from us. So I did that until the spring of 1974, and when we finally got the notice to proceed on the pipeline, now I got to... in the fall of 1973 RCA, through legal maneuvering, had knocked COMSAT out of the tub at Bartlett (earth station).

Hilary: Right.

Lee: We had forced the FCC to turn that Bartlett earth station over to us. Now we had to pay for it. We didn't steal it, but because I was the only one in the company, me and O'Shea, that had COMSAT credentials, I was the titular station manager for the Bartlett earth station during the transition. And I spent most of that winter of '73-'74 in Talkeetna when we took over that earth station on January 1<sup>st</sup>. Now I was offered the job, the station manager there at Talkeetna. Del Birch was the operations manager of the company then and Del was the salesman. Del and I got along very well. I have very high regard for Del and Del kind of regarded me as a son. And he really wanted me to take that job and I told him, I said, "Del, you know the pipeline is going to break loose here and this is, you know, Bartlett is a wonderful billet. It is comfortable. It is interesting. It is sexy."

Hilary: Put me on the edge...

Lee: But it ain't where the 'what's happening' is. And Del did such a job of trying to sell me on Bartlett. Now Del was not a bureaucrat. Del was like me. He was an action guy, but he was very senior. He had been in the 82<sup>nd</sup> Airborne during the war and jumped at St Mer Iglese in Normandy and during the Korean War and all this stuff. Been at ACS (was a hell of a man.) And he called me one day and he said, "This is going to be a strange thing to say." I said, "Okay." He said, "I'm thinking about stepping down as the operations manager and becoming the station manager at Bartlett." And he said, "But I don't (know) anything about satellites." He said, "My question to you, is will that work?" And I said, "Sure it will and I'll tell you why. The people at Bartlett are outstanding and one thing about COMSAT, boy, they did a superb job of finding talent and good people." That crew at Bartlett when we took that earth station over, the ones that stayed – and almost everybody stayed except the station manager and station engineer and maybe one guy – but they were solid gold. And I said, "Del, those are wonderful people as human beings. They are superb technically and you go in there and be your normal self and tell them, 'I don't know anything about this. If you guys will help me to learn this technology and to master this technology, I can do a better job for you as the manager here. Help me.'" And he did that and it worked.

Hilary: And you got to go to the pipeline?

Lee: And I got to go to the pipeline. And those guys loved Del and he did an outstanding job. But see, Del Birch was the guy... I had no problem working with him, working for him, and later on he worked for me and it didn't matter. I mean, I could work for him or he could work for me because we never gave each other orders, just this is what needs to be done and stay out of the way. I mean, that was a very collegial relationship.

Hilary: Now you sort of wove in and out with Chuck Robinson's career, too, your career and his at the time.

Lee: Yeah, during the pipeline I had – and I've still got it somewhere, I'm sure, in my files – I had a letter from the president of the company that said "you will report to the district manager in Fairbanks, you will take directions from the operations vice president". This was before they separated the pipeline, and made it (the north half) a separate district. In the beginning, I reported to the district manager in Fairbanks, Ray Stewart, who was also one of my heroes, and I took directions from the executive vice president, Chuck Robinson. And you know, you have to be very, very careful when you have those kind of deals not to get crossways between your superiors but, because Ray Stewart is such an outstanding individual and Chuck sure as hell wasn't concerned about protocol he wanted to get things done that worked, it was ok.



And I don't know if I told you the story about the trucks. You know, buying vehicles in the early days of RCA was a big deal. It took two years. You had to get them in the plan, in the business plan, and then you had to get them approved, and then the next year you bought them and by the time you actually got them... Anyway, when the pipeline took off and I figured out that I needed six vehicles and I needed them and I sent... I used to send telegrams, believe it or not, 'cause the company was a nut house in those days in the sense that everybody was busy and you'd try to call Chuck and you can't get him on the phone. I'd send him a telegram. And I sent him two or three telegrams about needing vehicles, and I (was) getting a little bit antsy. So I sent him a telegram that said, "I need six four-wheel drive pick-up trucks and if I don't hear from you by noon tomorrow, I'm going to go buy them."

So that got an answer. He sent me a telegram that said, "Understand the need for the vehicles but we got to have purchase orders." Get a hold of so and so. And I went and the next day, I mean, I went and bought six trucks. I just walked into the Ford dealer and said, "I need six trucks." He said... you know, we had a company car and all that stuff. And he said, "What color do you want?" I said, "I don't care. I mean, just give me six trucks. I want to drive them out of here this afternoon." So we did. So that was kind of fun.

Hilary: That's great.

Lee: I went and got airplanes and helicopters because we had... everything we did was on top of the mountains. And I'm kind of jumping ahead here...

Hilary: That's fine.

Lee: To the really active days of the pipeline. I had to have the fastest helicopters I could get. I didn't care about image or prestige or ostentation. Everything we did was for a reason and there was an atmosphere where these section managers in the pipeline tried to outdo each other. They tried to have a bigger, faster airplane and a nicer pickup truck and their living quarters were nicer. We didn't care about any of that stuff. I went and ransacked the world for our helicopters and I settled on... it was a French, and I didn't know anything about helicopters going into this because I'd always... I knew about fixed winged aircraft, but I had never used helicopters other than incidentally. Then I found that the fastest light turbine helicopter in the world was an Aérospatiale Gazelle. And I started sniffing around to see who had (some) and there weren't any in the state but there was an outfit called International Air Taxi that would get them for me. So I went out and got two Gazelles and what a magnificent machine they are... You know the "frogs" they leave a lot to be desired in a lot of areas, but they build the best helicopters in the world. And I went and got pilots that had been in Nam, everybody was just back from Vietnam, and we did a lot of things with those helicopters.

Let me tell you one time... see there were a lot of things we didn't know because nobody knew. There were microwave issues and fuel consumption rates at repeater sites and all that stuff.

Hilary: And you were doing microwave at this point, mountaintop to mountaintop?

Lee: There was an interim system in place and a permanent system being built... there were two communication systems on the pipeline. There was an interim system that was put in place to support construction and then there was a permanent system that was built during pipeline construction for the actual operation and maintenance of the pipeline. Well, Alyeska already had the sites for the interim system. It was a thin 900 megahertz system that they had in place. *[Wareham addition after taping: We took over their sites, buildings and the existing diesel generators. We put in 2GHz microwave to replace their 900 MHz thin system. West Repeater was the southernmost of their sites located on a ridge near Livengood Camp and it had gone off the air in bad weather due to running out of fuel. At the time we didn't know why it was down. It turned out we had under estimated higher fuel consumption as the weather got colder. All the pipeline camps north of there, clear to Deadhorse were cut off from the outside world. It was a disaster! To make matters worse, the weather was bad every where and as we were soon to learn, the other sites were running out of fuel too. Mac MacQueen and I had tried to get in there with a little Cushman Trackster tracked vehicle and failed. The snow was too soft and too deep. We went back to trying the helicopter. After three days we finally slipped in under the clouds to a ridge about half mile from the Repeater and were forced to land on the ridge line when the clouds moved back in. I was pretty sure where I was so I took snowshoes, had Herb Newman and the pilot wait in the helicopter and told them I'd go out 30 minutes toward where I thought the Repeater was. If I didn't find it I would follow my tracks back to the helicopter. Visibility was about 50 yards in fog and blowing snow. I found it after 22 minutes, went back and got my two comrades and we made our way, with our gear, to the Repeater. We were definitely out of fuel in the roof top fuel tank. There were about 20 empty 55-gallon drums stacked near the power building. We decided to get every drop out of each of them and see how much fuel we had. We came up with about 35 gallons. The temperature was + 14 degrees and the engine start batteries for the 4 kW Lister Diesel generators were dead. We'd have to hand crank. We had a small Bernz-o-matic propane torch. One of us would heat the head of the single cylinder while the other spun the hand crank. Just before we both had heart attacks, we got one of the generators to start. We got to sleep on the cramped radio room floor about 1 AM after getting everything back on the air. Next morning when we woke up the weather was still bad.]*

**End of Tape 1, Side A**

**Tape 2, Side B**

Lee: We were burning about 10 gallons of fuel a day [*Wareham addition: and we only had 150 gallons on site with a full tank*] so we had to go get some fuel. I mean, 35 gallons was all the fuel that was there. We'd be down again in 3 days. We had to go get fuel and so we had to get out of there. So we walked down over the hill in the fog to the helicopter and wow, it was covered with heavy frost: Herb Newman and the pilot cleaned the ice off of the bubble so we could see and cleaned up the rotor blades – 'cause we always (had two of us working together). I went down over the hill on snowshoes to see how far it was down to (get out of the clouds) and it was only about 350 yards. Now we are still all whited-out there, and you got to have a visual reference to fly a helicopter, like you do any other airplane. And we weren't willing to just pull up into this stuff because it was serious icing and you would ice up the blades and crash. So we had to get out of this cloud. We knew from sticking our nose in it before that climbing out through it wasn't the answer. So I went down to the edge of the clouds and I made a trail. I packed the trail and I came back and I said, "Okay..."

Hilary: Follow it?

Lee: Follow **me**. No, don't try to follow that (trail because) you can't see it. I had a blue parka and a ... [*Wareham addition: dark pair of snow pants. They were going to follow me and use me as both a vertical and horizontal reference.*]

Hilary: The trail was for you?

Lee: The trail was for me. And I said, "Okay, you guys start her up and I'll lead you out of here." So they fired up – and you got to turn the blades to warm things up and they are icing up in the clouds we're in so everything has got to be done in a hurry. And I told them, "When you're ready to go, you turn on the light..." We had a 500,000-candlepower articulated (spot) light. "You turn on the light and lift off and I'll hot-foot it down over the hill here, and then I'll snatch off my snowshoes and jump in." And away you go. So this is the only time I ever led a helicopter like a guy leads a cow out of the pasture. And I took down off over there with this Gazelle right behind me and they had to stay close to see me 'cause he is kicking up snow too. And I got down out of the clouds and snatched off my snowshoes and threw them in and we had picked up enough ice that the helicopter was kind of wobbling like this, but when you get in the clear air, it will suck the ice off the blades pretty quick.

Now we knew we had to get fuel in there so we went and got a Thiokol, big tracked vehicle, 140 horsepower industrial engine, carries six guys. And we put three drums of fuel in the Thiokol and trucked it up there (to the nearest point on the Pipeline Haul Road,) and all we had to do was follow the ridge about eight miles from the road and we took off. And it is the very worst (visibility) now. And the snow was chest deep and we got stuck (repeatedly) until we got out of the trees and got up above. And we got on top of a hill in the dark and we were just following the high ground. Well, if you follow the high ground and follow the high ground – pretty soon we came to another set of Thiokol

tracks and we thought somebody else was out there to help us. We had gone around the top of this hill. It was our own tracks. We had gone up to the top of it and went around the top. And we had a compass in the Thiokol, but there was so much metal in the Thiokol, ferrous metal, that we couldn't compensate with the compass, so it was pretty much useless.

We had two snowmachines and I was scouting on one of the snowmachines. And we'd get away from the snowmachines and take a compass bearing and I knew what the compass bearing needed to be to go down over the hill. So we (headed) down over the hill. We had been going for hours and we tore the exhaust off the Thiokol and it had become a gas chamber. John Martinik and Dave Ogden were running this thing with the doors open and their heads hanging out and they're dizzy and their lips were turning blue. And I had thought this was going to be pretty straightforward deal – and we didn't have much survival gear and I thought, "Jesus, we are in trouble now." And (on the) odometer, we only had nine miles to go. The Thiokol had a speedometer in it and it showed we had gone 40 miles. And I thought, even allowing for going around the hill and track spinning and all that, Jesus Christ, we have overshot and we are down in the White Mountains. We're going to die down here.

And Ogden and I were way out in front and it was dark and we went up this ridge that was kind of blown clear and kind of messed up (to navigate) on snow machines with the rocks. And we got on top and we were going along and the repeater antenna kind of loomed up and we were there. Now, I'm not very demonstrative about stuff but, by God, we whooped and hollered like little kids. Yee-haw! And we were there and we had enough fuel. And after that, I redesigned fuel tanks (for refueling the sites) to be carried by the Gazelles that carry 180 gallons and we redid the power systems and a whole bunch of stuff.

But that's the kind of stuff we did routinely on the pipeline and nobody knew about that. Nobody...we were in a war situation and everybody else is doing their time in the flats in their warm office, doing their telephone company stuff.

**End of Tape 1, Side B**