

PETER: I'm Peter Brueggeman with the Scripps Institution of Oceanography Archives, and today is January 21, 2013. I'm speaking with Paul Dayton, and we're going to talk about marine biology research diving in McMurdo Station, Antarctica. This interview is part of several oral history sessions in which Paul has participated, and we've spoken with Gordon Robilliard, John Pearse, Jack Littlepage, and Jerry Kooyman. Paul spoke in the preceding oral histories about his experiences, but we haven't really focused in on Paul Dayton yet, so that is what we will do today. This oral history isn't about your whole career, so we are going to jump forward to how you became involved in Antarctic research.

PAUL: I will jump over matters that I remember from preceding oral histories [US Antarctic Research Program Oral Histories. Scripps Institution of Oceanography Archives collection 2012-14]. There are two items I'm giving to the Scripps Archives [US Antarctic Research Program Oral Histories. Scripps Institution of Oceanography Archives collection 2012-14]. One is a history that I wrote up for my children that relates to this, entitled "1963 Memories." The other, entitled "Antarctic Memories of an Old American," I wrote for an Antarctic magazine published for the layman in New Zealand in 2010. I wrote it without a lot of preparation, and I see they misspelled my name as Drayton, but it does give a bit of my own history that I typed up for them. So those are in the record, I won't really go through them. I have some agendas that I want to do. Mainly, there is some threads of change, the political change in scenery at McMurdo that I think is important and interesting. I started my interest in Arctic archaeology in 1960, so I had a polar interest as an undergraduate in Arizona. I had no thoughts of ever going to the Antarctic. In those days, in the 1950s, we really all knew about the heroic age of Antarctica. It was close to us, it was very personal in a way. And so when I got an opportunity to go work in the Antarctic for a year for Donald E. "Curly" Wohlschlag at Stanford, I jumped at the opportunity and went.

So some of my memories are written down there [1963 Memories], the types of things that I thought my children would be interested in. In those days the Antarctic polar program had an orientation meeting that everybody attended, and especially those that were wintering over, had an extra day. The winter over group was treated to a talk by Sir Charles Wright who was on the Robert Scott expedition, the last Scott expedition, and Wright and the others went down to find Scott's body, recover the diaries and things. Wright gave a talk to our group. He had some old lanternslides of penguins and things -- he was quite a famous physicist by that time. I didn't know him professionally, I just knew him as part of Scott's expedition. There was a free afternoon and people went for walks. I started out for a walk, and it was in Shenandoah Park, and it was a nice place, a nice afternoon. I saw the old man sitting there by himself, so I went and talked to him for quite a while and got a more personal glimpse of their life.

So when I got to McMurdo, I was overwhelmed with the sense of adventure and the to me very real magic of this unique history. We visited the buildings [of Antarctic exploring expeditions], and it was not like a museum, it was in my mind as though their ghosts were still there, talking, laughing and inwardly missing their families. Today they've all been cleaned up and much changed than what they were like in 1963, but to me it was Scott's home, and Sir Charles Wright's home, and it was a more personal thing back then.

PETER: It was Hut Point and Cape Evans you saw?

PAUL: Cape Evans was their home, and also they had come in and out of the Discovery hut [at Hut Point]. They were aware of and had used material at Shackleton's hut [at Cape Royds] because Shackleton was between the two Scott expeditions. The huts were pretty well talked about and known.

PETER: You went in and saw them and it resonated with you?

PAUL: Yeah, yeah. We went in and saw them before they had been completely restored. So there was still stuff from the second Shackleton expedition lying around, and all of that got erased by the New Zealanders when they cleaned up the huts. They did a wonderful job cleaning up the huts, but probably correctly reset it to the Scott occupation rather than the second Shackleton expedition that had lived in for several years.

PETER: They wanted to take it back to Scott?

PAUL: Yeah, so the things that we saw in 1963 were probably different, were I'm sure different from what John Pearce, Jack Littlepage and John Dearborn saw in the 1950s, and in 1960. But it was very different from the cleaned up buildings that you see now.

This feeling of intimacy never left me, even in 2010 when I revisited the huts, to me they were sacred spots where people I feel I knew and understood had spent the most important days of their lives - in some cases the last days of their lives. It is always emotional for me. Now with the book "The Lost Men" I finally understood the wall inscriptions by Joyce and Wild at Cape Royds.

So this is a sort of personal history. For me the sense of the early explorers was always there, a sense of magic. And any naturalist, especially me with all my experience and background in so called harsh environments, just has to be awestruck with the opportunity to experience the natural history of the Antarctic. It is perhaps one of the most humbling yet inspiring opportunity in the world for a young naturalist. But I sense that people know this and a discussion of spectacular and exciting nature is not really the objective of an oral history.

Because it has been on my mind from past discussions, one of the things I wanted to get into this oral history was my perspective of the train of tensions that went from the Navy to the NSF to the scientists, and it is

more of a political sense than the real research that we did. We already talked enough about the research earlier.

PETER: Yes, we want to explore your history, and you want to talk about the administration of science at McMurdo"

PAUL: Yes. First, before I go any farther, I really need to offer a disclaimer. Anybody who spends almost 70 months of their life in a place like McMurdo will have strong personal memories and this is especially true of me. Everybody who has worked at McMurdo will have memories and thoughts that are very different from mine. This is especially true of support people, and I am not sure how much opportunity they have to record their memories and that is too bad, but anybody reading this really should find a copy of the big anniversary book put out by the American Polar Society: Seven decades and seven years of service to the polar community. It is some sort of anniversary edition of the Polar Times. It is an upbeat memory written by and collected by people, largely US Navy but also civilian, who have loved the Antarctic as much as I have and they have done a great job of collating and publishing a Polar Times since 1935. In recent years Brian Shoemaker, a Navy helo pilot and then commanding officer in the 1960s retired and has dedicated the rest of his life to recording and collating history. I will put my copy of the Anniversary Edition in the archives and anybody reading my drivil really must dig it out and read it carefully and check out all the references to real history in the volume.

Sometimes I had my problems with support people, but their voices should carry equal weight with mine and it is interesting as it describes important events essentially devoid of science, so it is an alternative view to my science based perspective. Our science-based perceptions are somewhat selfish personal perspectives, and this is true of me. All scientists have a strong sense of focus and drive, and this is especially true of those working in the Antarctic where there is an almost desperate drive to accomplish as much as possible in time much limited by extreme logistics. It is not very easy for us, especially me, to take a step back and understand the tough challenges faced by the managers. But it is also interesting to evaluate the options and roles of science managers. I hope I can be balanced.

When John Pearse and Jack Littlepage talked in their oral history, I mentioned that there were tensions with the Navy, and they were surprised because they got along with the Navy okay at McMurdo. So I have been thinking about that.

I think what actually happened in the difference in perception, just between 1961 when they were there, and 1963 when I came, that the Navy was there very early in the mid 1950s building up the IGY base. It was an heroic effort that the Navy did, and they had some of their very best people. The enlisted people really were volunteers, they were pretty enthusiastic, like we heard in the earlier history. The officers were

some of the better ones in the Navy. The Admiral and high-level officers the Stanford guys knew were very good.

By the time I got there in 1963 the operation was rather routine. There was no need for the high-level publicity and heroism involved. The buildings were built and it was just keeping the place going, and the enlisted men were not volunteers. They complained a lot about being forced to be there, that they did not want to be there. Anywhere but here. IHTFP was all over the place, it's "I hate this fucking place." They scrawled that everywhere. So that was what I sort of walked into expecting that everybody worked together very happily! There were tensions at the higher levels that I didn't really understand at the time because I was just 21 or 22.

The NSF officials were trying to get control from the Navy because it really was supposed to be a science operation, not a military operation. The military was resentful, and I ran into that without understanding.

There were also unnecessary rules such as you can't go down into the dump and get the things you might want, because they didn't want civilians seen there scavenging perfectly usable material that they were throwing away; it was embarrassing to them.

My main mentor that year was Art DeVries. Art surely is one of the most interesting characters to spend a career in the Antarctic. He wintered-over in 1961 or 1962 and then again in 64-65. He was my mentor, and he took me to the dump and had me help him get tracks off of the weasels, because Curly's boys (us) had what we called a Polecat. It was basically two Korean War weasels put together, small tracked vehicles that blended together. I have a lot of pictures of it in the archives.

Art explained that we needed spare weasel tracks because we went through our tracks and broke them. We went in on the WinFly, and it was really pretty cold, but we went down to the dump and collected some spares. I learned how to replace tracks, and I had to do it a couple of times when I wintered over with various vehicles. Conceptually it isn't hard. The problem is, it is just cold, and you've got to break the nuts free and take the track off. My point is that we were taking care of ourselves to the point of anticipating problems, and we were recycling material from the dump, and putting it back to work.

In the 1960s then, from my first year 1963 to 1967 and 1968 when we came back, I think that the problems were not so much with the enlisted people. The enlisted people that worked with us were could be quite helpful. We had enlisted friends that came and spent a lot of time in the Bio Lab (John Svenson was an example who comes to mind), and it was common for us to have Navy guys that were good friends and helpful.

For example, when I wintered over, there was a guy who helped me with the refrigeration unit for the fishes, and he was in our lab a lot and was very helpful. They had a search and rescue program, and for that they had

to have parachute riggers. Even wintering over there was a guy that was assigned to make parachutes. Well, nobody used the parachutes, so the poor guy was pretty bored, and he became our friend, and he was a good friend of mine.

Tragically, when the winter was over, I think he went home and looked the wrong way on a New Zealand street and got run over by a bus... the dangers of looking the wrong way in New Zealand.

My point is that many of these guys were good friends. Most of the officers were great, especially the doctors, those guys at that time had to go into the military as part some deal with medical school training, it was something they owed the military, but they weren't making a career out of it, they weren't lifers by any means. Most of our officers' lower-level guys (lieutenants) were the same, it was clear that they were just putting in their time from having been in ROTC or something. They were getting out, and they talked about it all the time. It was no secret that they were getting out. They were put in the Antarctic because the military didn't really need them somewhere else.

Then the military had passed-over officers, the captains who were, in my times in the 1960s, two seeming alcoholics that were really pretty dead for the military. And so I think by 1963 or 1964, McMurdo was a dumping ground for the officers who were not committed to their program, and this is different from the earlier years when it was a high visibility and popular place to be.

PETER: Admiral Byrd... the exploring of Antarctica, the IGY, I see what you are talking about... then it became routine.

PAUL: It became routine and many did not like it, and they dumped the people who were getting out or who were deadwood in the Antarctic.

PETER: How long were their stays?

PAUL: I think that they were all committed to the program for two years.

PETER: That's got to be hard on a lot of people, whereas the scientists go in for the season. Right away, I think there would be automatic hate from some.

PAUL: Some may have hated us, probably most did not, the COs did winter over, and they were not happy campers.

PETER: They probably resented you,... the scientists coming and going.

PAUL: I am not sure if it was resentment, but they probably saw us as part of the reason they had to be there. I just was wondering what was wrong with me when Jack Littlepage was having all of these happy memories.

The exception -- and I put it in the preceding oral history interviews so I won't go into it in detail here -- in the 1960s, the helicopter pilots were just superb. They had to be some of the best pilots in the Navy. I think that they pulled rank to get out of Vietnam and come to McMurdo, and they loved it. They loved to fly and they were very good. They were all good and very enthusiastic and I wish I remembered their names. Jim Brando is the one name I remember, at least phonetically. He was amazing.

I have this one really happy memory of getting up one Sunday morning after there had been a bunch of partying, and I hadn't partied so I was getting to work and had things to do, I was up pretty early. It was a beautiful day. In the summer, the sun doesn't go down so it's always sunny and nice -- or horrible -- but it was sunny and nice and calm that day. And there were two pilots standing out there near the Bio Lab waiting for somebody to walk by, and I was the first one to walk by.

They grabbed me, and they said, "Look, it's a great day for flying ... can't you think of something you want to do?" I had been all over the place because I was friends with Tom Berg and other geologists and the insect people, so they knew me very well. I had helped all of those other guys, so I knew some places to go, oh yeah. I suggested how about Don Juan pond and the sand dunes?

PETER: In the dry valleys?

PAUL: The dry valleys, yeah. So I found Tom Berg who made it legitimate and off we went, and we spent the day. I went to Don Juan pond, which is a really interesting place that they don't let anybody go there anymore. The sand dunes were really interesting. It was that sort of life for the pilots. So the helo pilots in the 60s and the 70s were really wonderful.

And again, in the early years when I was running Curly's fish, we had to keep the tanks at -1.5 [deg C] is what we were aiming for, and that's very, very close to freezing [for seawater]. And if the cooling coils started to ice over, it changed the salinity and screwed up the fish. So it was a really delicate balance of maintaining those horrible tanks. So we had to change the water often, and we had to keep the temperature just right, so the refrigerator guy was really helpful to me because I had the chore of keeping the tanks going.

So that was my sense of this job that I had in 1963 and 1964, I was just a fairly humble technician for Curly doing his work. But again, to me it was an adventure. That year was just hugely important to me. I was very enthusiastic, and I learned to become self-reliant. With Art's help, I learned to repair the Homelite generators, chainsaws and pump as well as the snow machines. They were Polaris at the time.

PETER: It so different from today where all of those things are provided and supported.

PAUL: That's one of my main things is that I think that ecologists and the field people should be able to care of themselves to some extent. I had to do it myself, and if I needed to cut a hole and that was my job, the saw was there, there was a general workplace that you could go in and the tools were there. We all left them there and it was a fairly orderly place, and I fixed things when they needed fixing. I knew some things, I was a field person, but with Art who could do anything, it was just the necessity of breaking things down and figuring out how carburetors worked. It was really good for me, I became self-reliant.

One event I remember, it's one of my memories that is really in clear Technicolor in my mind. In those days the winter got much colder than now. And we several days that it was -70 or below on the ice or over by Scott Base. And -40 is cold enough, at -40 things are different. But at -70 or -75, it is a pretty interesting place.

I was way out, probably four or five miles from the McMurdo base at the fish house where I was trapping the deep-water fish. Thermometer bottomed out at -70 and I don't know the real temperature. We had an old Dodge Power Wagon that I used because it had big balloon tires, it could go fast and it was nice. It was a World War II truck that had stayed alive at McMurdo, so it had its problems with just being worn out. You always left your vehicles running. So it was running, and I was heading back to the base from my house when the old Power Wagon just stopped. At that temperature you know to be careful. My memory was that it was really pink, it was just that twilight zone and sort of in the middle of the day, it was maybe mid-August. But when it is that cold, it is really still and clear. And it's interesting, because the ice is cracking, the air is cracking - there is a lot of noise. So while it was very still, there are noises and pastel colors. My memory is that there was sort of a little fog, which I think is ice crystals in the air that had frozen out from the atmosphere and were sort of floating around. So it was a little hazy, but just really cold, and the vehicle was stopped. My memory is not of concern but of the magical almost ethereal beauty of the place and situation being a challenge, but a comfortable one.

I wasn't worried because I had survival gear. I had the bear claw mittens and all my gear, and I could walk back, but I wanted to bring the truck back because how else was I going to get back? We didn't have anybody coming to rescue us in those days. It was up to me to fix it if I could, and if I couldn't, walk back and then find another vehicle and tow it back and work in in the garage where Graeme could help me if necessary.

PETER: You had a radio with you though, right?

PAUL: No, we didn't have radios... there was nothing.

PETER: It's so different than today... you're really out there.

PAUL: You really are out there, and you had to be sort of self-sufficient. I wanted to drive it home so I didn't have to spend a whole

bunch of effort towing it back and putting it in the garage and fixing it there. So I just figured that like the fuel lines to the fish house, that there was some condensation and freezing in the fuel line.

We always had a little propane torch that I used to thaw out the fuel lines. Fairly often the stove went out in the fish house, and I would propane-heat the fuel line, they were just metal, and I would heat it up and melt the ice that blocked the line. So I just set about doing that with the pickup. I opened the hood up, removed the air cleaner, and was in there with my little propane torch.

PETER: You were heating the carburetor float tank too?

PAUL: Yeah, that's right, first the fuel line and I sort of hosed it down with the torch and then the base of the carburetor, got it nice and hot, with the gasoline hopefully coming in. For these contingencies we had spray cans of ether, so I sprayed that in the carburetor. I didn't put the air cleaner back on because that was going to take some time, I was more interested in starting it, so the air cleaner was in the truck. I filled the carb up with ether, jumped in, and cranked it over, and vroom, it went fine... and went home.

But this is the way it was. Twice I had tracks fall off. They never fell off the polecat, but they fell off Nodwells. So now you are driving along on a tracked vehicle and the track falls off. So again, you just have to fix it. We had jacks, I knew how to do it. It just takes a ratchet wrench and maybe four or six or maybe eight little bolts on the track to undo it. You jack the thing up and put the track back on, do the bolts, and it's good to go. The tracks fell off because they were old and expanded, but they got me home. I could do that, I did it twice and it was like an hour, and you were dressed for it, and you were unhappy. You got frostbit and your face would freeze a little bit, but you got home.

Graeme Johnson, the really heroic Kiwi guy who was wintering over and could do anything for me, looked at and figured that it is just stretching, but we only had two tracks for the Nodwells that we had removed from the dump. We had three Nodwells and we were saving the new tracks, and so the trick was then to drill more holes in the old track and just tighten it up a little bit.

It was that sort of a situation, and a kid like me that was enthusiastic about being there just learned. It changed my life, because when I came home and had children and we would go camping all over the place in my old Volkswagen, I knew I could fix it.

PETER: It must've had some ramifications for your science too. You must've had a real attitude of trying to make things work, whether it's gear or field equipment or whatever. I don't mean in Antarctica, I mean here.

PAUL: Maybe, I am pretty lame with modern things.



PETER: Building things.

PAUL: Yes and no, I am pretty lame, period, and have been pretty dependent on competent people like Jim Barry and Ed Parnell to hold my hand. But the year on the ice at least made me a much more independent person and self-reliant than I had been.

Another example for the science-related stuff, I mentioned that we had to have fresh seawater for the fish tanks, and we changed it very often, like every week for these big tanks where the fish were. There was a big plastic tub that we put into the back of a Nodwell. The Nodwells are a big tracked vehicle that had a bigger carrying space in the back, and we would trundle that down to wherever I could find open water, which eventually became the fish houses. It was a fairly long trundle because they were out in deeper water.

The one time I'm thinking of was when the ice had gone out and there was a thin layer of ice that was hard enough to walk on, I thought. But again, you put the water into that tank with a Homelite pump, which because it is metal, the impeller and things are all in a metal case, and it was colder than hell. So you had to blowtorch the bejesus out of that before you primed and started the pump. You have to open it up with a wrench and have to have it warm so it doesn't freeze, pour the seawater in to prime it, and then crank it and get it going, and it has to start fairly quickly.

So it's fairly important to get it going, and you don't want to spend a lot of time fooling with the hoses. You get the hoses and everything all prepared, and then you do that routine. So it was all sitting there ready to go, everything was prepared, but the hose -- I had to walk out on that thin ice, and it was down at Winter Quarters Bay right near the Discovery Hut. I had the Nodwell there idling away, it was about -30 or -35, and it was windy, it was cold. The ice seemed to be about three or four inches thick, I did not know for sure how thick it was, but I needed to get the hose out there into the water. So I carefully walked out maybe 10 or 15 feet, and fell through. So now I'm in the water, and I've got some boots on. Instead of my thermal boots, I used regular boots because the operation was so messy, and the boots were hanging me up and I couldn't swim. So I had to take them off and throw them up on shore, and then I had to break ice. The shore was all broken up, I couldn't get out of the water there. I was actually sort of flopping through the ice. I was remembering that people said, oh, you're going to die in 30 seconds. I was dead many times over because I was in the water probably for 10 minutes, and this 30 second rule is just crap. So I was in there for quite a while before I found a place where I could actually climb out, with my icy fingers.

At this point I'm in my socks, and I'm completely soaked. By the time I got back to my boots and poured out the slushy water that was in them, all of the rest of my clothes were frozen - that is the outer layer was

covered with ice. It was like armor as the ice protected me from the wind. I realized that my feet were ok, I got them into the boots. I stomped around a little bit and I realized I was okay. I didn't need to panic, I didn't need to get in the truck and I didn't need to do all of the panicky things that I thought I might have to do while I was swimming. So I just went ahead and filled the damn tank. I cracked and crunched, and every time I moved, something sort of broke in my clothes.

This is the way we did things, and I'm sure that Dearborn, Littlepage and Pearse and those guys did the same thing. We all were self-reliant, and it really, I think, was a character building experience.

PETER: And you have a whole continuum of personal observation, because you were there in the 1960s and then in the 1970s and 1980s, and then recently in 2010. So you really got a sense of how it has changed.

PAUL: Things change. I see here in my notes that I had written down someplace else that I actually made it 150 feet along the shore when I fell in before I was able to get out. So that was a fair amount of thrashing around. I was nowhere near death. This whole business of dying so quickly is just a myth. I wasn't heroic. I got out and I realized that the practical thing to do was to finish the job because at that point I wasn't cold anymore with the ice on my clothes blocking the wind.

One of the other things was the problem with getting fresh water on the McMurdo base. The nuclear power plant was just going online, and it was mostly irrelevant to us. Eventually the nuclear power plant made fresh water, but in the early years, all the fresh water on the base came from snow. The Antarctic doesn't have that much snow really. So it was really hard, and in this case they were Navy guys that were no longer volunteers, and they didn't like their job. They had to go around with a front loader and get snow, and then they would trundle the snow back and put it into snow melters, which were big tubs with big fires underneath them, diesel blowtorches sort of. It melted the snow and made the water for the galley. There were three snow melters for the whole base. One was the galley, one for the biolab, and the other one was in the laundry, and when I wintered over, there were two showers for the entire base, even in the summer.

We couldn't have more than one shower a week, and most of us didn't do that because the water would be muddy from the dirty snow and things, and you knew it was a problem because they were still doing laundry and everything else in there. The Bio Lab had the other snow melter, and we needed fresh water. We had to get it for the work. The work was only Curly's and my work in there. So when I needed it I would phone, and the unhappy guy would go get it, but he hated civilians and he hated doing his job, he hated me, he hated everything. He would ram the front loader really hard into my snow melter, and it would shake the whole building, and things would fall off the shelves, and eventually he would break the snow melter.

Then the guys from the shop would have to come over and weld the snow melter. Finally I heard some of the shop guys threatening to break his neck if he did it again, so he stopped banging my building.

That was our source of water even into the 1960s. In the late 1960s when Gordy Robilliard and I went down to dive, fresh water was still a big deal although I think that they had some coming from Nooky Poo (the nuclear generating station that also distilled sea water). We were taking water out to warm ourselves up after a dive, we had to sneak it. It was not right for us to waste fresh water. That is something that people don't even think about anymore ... the trials of getting water from snow.

Okay, so more wintering over memories... The pilots that wintered over were wintering over unhappily. We had two helicopter pilots, and two R4D pilots... the R4D is the Navy version of a DC3 on skis. They had to winter over in case something happened at one of the other bases. We had the only doctor in the Antarctic. I think they were mostly worried about Byrd station up on the plateau or South Pole.

So they were wintering over for emergency evacuations, and they were just there. They were good enough guys, but they weren't the gung ho pilots from the summer. When it got light they actually flew, and as soon as it was light I took the helo across the valleys into Taylor Valley to change Tom Berg's batteries, for example and the R4D flew around the island to check out the Crozier hut that had blown away. So we had flying capability all winter. I don't remember exactly when it happened, but it was I think in June, right in the middle of the winter, the doctor, or maybe it was a medic, at Hallett Station burst his appendix, and he had to be medevaced.

Neither the helo pilots nor the R4D pilots had ever been out of the wardroom and their bunkhouse and the galley when it was dark. They did not know what it was like. To them it was Antarctica, it was dark, it was cold, if they went out and tried to fly a plane in the dark to Hallett, they would die, and they wouldn't do it. If I could get them out on the ice away from the base and the lights and their wardroom, I knew that they would see how easy it was. I could count the strata even without a moon on the other side of McMurdo Sound in the middle of the winter because there is that much ambient light just from the sky and all the reflection of ice and things. There is a heck of a lot of light. It's not pitch-dark when the weather is clear. You can see a long ways, and it is pretty easy to fly a plane. I tried to get them out, and I couldn't get them out. And so the guy up there, we all thought he was dying. There were a couple of Navy guys that ran the radio, which at that point was up on the top of the hill behind McMurdo. They didn't have a vehicle that would get them up the snowfield, and my polecat would. So he was my buddy and I would run him up there, and we would sit around and talk a little bit, and then I would come back and pick him up later.

During this time, I got the impression from the things he said that perhaps he shouldn't have told me is that the Navy had a nuclear submarine down there in position to rise up, break the ice at Hallett and rescue the

guy. However it was in violation of all of the Antarctic Treaty, so it was very, very hush-hush. I never really knew for sure, but he kept talking about the messages he got, it was all in some code about where something was, and that is what he guessed was going on.

The guy's situation at Hallett was all over the open radio traffic, and it was the worst of the Cold War, and the Soviets were listening in and even commenting on it. In fact, the Soviets were involved with us a lot. They played radio chess, moving chess pieces by radio, and they were playing chess with some of our men. I think that the submarine rescue was vetoed. And these pilots just wouldn't go up there. Apparently there is a way of getting into some sort of fetal position and taking huge amounts of antibiotics that your body will maybe seal off the poison from the burst appendix, and he survived. They hustled in when the fights started in the spring and got him. That was interesting.

Another memory from that era was the midwinter party -- Scott had a midwinter party, it means you are over the hump, the sun is going to come up, so everybody celebrates.

PETER: When is that held?

PAUL: On June 21, it's the solstice, so it's the middle of the winter. So McMurdo had a fairly big amount of partying. The enlisted men had their parties which were a little out of control. The officers just went to the wardroom and watched a movie and drank fairly heavily.

At this movie screening - held in the same place where you bought coffee, it's the same building, the bar is in the back and the movie screen was at the far end, and they had little chairs lined up for people to sit in. It was pretty full of people because it was a party and we had been drinking. Our good captain, the CO, Captain Riley, was in the back, and I think he had passed out. The R4D pilot was sort of sitting up near the front. Everybody smoked in those days, and he had this big pipe. He had a huge lighter, a veritable blowtorch to light his pipe. He is in the middle of lighting his damned pipe, ruining the picture with Kim Novak, whom I was really interested in seeing. When he lit up his pipe, it looked like a bonfire, it was a great big cigarette lighter, but it looked like a blowtorch from the back.

So I was sitting there trying to see around the blowtorch to admire Kim Novak. Suddenly there was "Fire, fire!" from behind me. It wasn't very loud, and I don't think anybody looked because the movie was pretty loud, and they were all sort of drunk. I looked around, and it's bloody Captain Riley. He'd come to, seen the blowtorch up in front, and by the time I'd looked he had already turned over the acid soda fire extinguisher, which is sulfuric acid and some sort of soda, and it reacts and sulfuric acid and soda come squirting out. And the damn thing was starting to go! He was thrashing around squirting stuff all over, the R4D pilot was up there with his pipe getting lit. I saw this happening, and I dove under the chair so I didn't get any of the sulfuric acid. The CO sprayed the

officers with sulfuric acid, and he sort of hosed down the R4D pilot who stood up all angry, and everybody else was yelling and screaming. The enlisted bartender was trying to control the extinguisher, "Sir, may I please take that? Sir?" "No, fire, fire!" And I'm under the chair, and there was all this bitching and moaning above me. Finally, the bartender got the fire extinguisher and was spraying it into a corner someplace, but the damage was done. I pulled myself out from under the chair carefully so I didn't get too much on my shirt.

At that point, the captain was now aware of what he had done. He was all apologetic. The R4D pilot stood up, a tall guy, and his shirt was just dissolving as he turned around, it was falling off his chest. And the captain was, "Oh, I'm so sorry."

"Oh, it doesn't matter, Sir, think nothing of it, Sir, these things happen, Sir." It was hilarious. So I went back to my room eventually, left those guys to clean up the wardroom.

Something else was happening at the same time with the enlisted men in the firehouse. The chief of the firehouse got really drunk, and he was up on the place where they slept. They had a pipe, because all firemen go down pipes, it is part of the tradition. It does get you down pretty fast. So there was a pipe and a nice little landing place, and the firemen, if there was a fire, would slither down the pipe and go out and fight the fire.

The chief of the firehouse was just blind drunk, and he showed somebody how to go down the pipe and he missed it by about five feet and took a header onto the floor and broke his neck and scalped himself.

Fortunately, the doctor who had been in the wardroom wasn't drinking because he was a doctor and very responsible -- I think he and the dentist anticipated some adventures that night -- so I knew they were sober. They kept the guy alive, but I think his brain was probably permanently addled, because his skull was broken and things. Then there was the issue of getting him out. Meanwhile, the poor doctor up in Hallett who was in his vegetable state and not coming out, they organized a midwinter flight of a 130 to come down and get this guy. That took about five days, and it was a huge big deal for us at McMurdo. It was a mail opportunity, for one thing.

At that point, the helo pilot was quite willing to fly his helicopter out to the strip. When they brought a plane in, there was a lot of concern because you get past the point of no return, and our weather forecasting's were not good, we didn't know what was going on. So people were pretty nervous. We didn't know what was going to go on, so everybody that had a vehicle was down there to help in case it crashed. We often did go down there when there were airplane problems because there was no way of moving people around if they were injured except for our various vehicles on the base. For this event, they had spent four or five days plowing the strip, and the strip was in good shape at that point. They put big 55 gallon

drums with diesel on fire to light the runway. We were all there, and it was pretty remarkable to see the little blinking lights of the airplane come out of the night where you thought you were stuck forever.

PETER: And the runway is all lit up with fires like luminarias.

PAUL: Yes, with fires and the smoke and all of that, ... it was pretty smoky too. We were all lined up with our vehicle headlights on the runway for him too. It must've been pretty interesting from the pilot's perspective. It was really exciting for us because we really thought we were there for the duration, and suddenly we weren't... you can bring a plane in. They had filled up the 130 with several huge fuel tanks in case, so that the point of no return was much longer. And it made just a really perfect landing. It was about -30, it wasn't one of those -70s, but it was -30 or so, it was pretty cold.

PETER: And they brought in mail?

PAUL: They brought in mail.

PETER: Did they bring in anything else like fresh produce?

PAUL: Yes, they did, they brought in fresh produce for us too, which was a huge big deal. But at any rate, there were all sort of things that happened in 1964.

PETER: Did you go to the enlisted men's bar?

PAUL: Not very often. It was really drunk and pretty obnoxious, and they weren't friendly. The chiefs were very businesslike, they drank more professionally. And the officers in the military have a wardroom posture of being stiff and upright, with their chest out and their shoulders back, looking really macho.

PETER: How many scientists were there over the winter?

PAUL: We had five. There was the cosmos guy, Evan Deardorff, there was another physicist that was listening to ionic noise, Ernie Svata or something - he mostly stayed in his lab on the ridge and rarely came down. Kelly Rennell, who wintered to look at insects in the winter and was always very helpful to me. Then John McDonald and me. That was it. But then there was a lab manager, Ken Brown, who never came to the lab. He was a civilian, but he spent all of his time with the enlisted guys.

Then there was Graeme Johnson, who in my mind is probably the MVP of the early American Antarctic Research program. He was a Kiwi. He'd wintered over in IGY at Scott Base, and he was a mechanic and retired kiwi air force, and he could do anything. He was as solid as a rock. I still think of him as one of the most important players I've encountered.

The food was really awful. We were eating dehydrated stuff from the Korean War. The dried eggs, for example, were like plastic, you could wad them up and bounce them. The food was really bad in the winter.

Other memories of a different era I offer as an idealistic left-wing liberal of a sort. It really hit me hard when Kennedy was assassinated. All the communication at McMurdo was on teletype. There were these little terse teletypes that he'd been shot, and then he was in the hospital, and then he was dead. Johnson, who I never really particularly thought much about, was now president. So this to me was sort of a staggering event.

I can't remember the dates of when the Bay of Pigs or the Cuban missile crisis happened, but they were just before my visit to the ice and set the stage for an acute sensitivity about such political things that went on that made me very nervous that year. You are down there, you are stuck, and there's not much you can do about it. When JFK was shot, I still remember that really vividly.

Then during our winter over, it was Johnson's run for president against Goldwater. I knew Goldwater well because he was from Arizona. Goldwater was very much into war and being tough, and Johnson was just basically a really slick politician that I didn't know much about him.

The politicking had a lot to do with preemptive strikes on Russia and things like that. At least that was the type of thing that dribbled in on the teletype machine. What I actually came to learn was that it was Johnson scaring the people, Goldwater wasn't actually proposing to do that, but this is what we were getting on the ice. So I'm down in Antarctica thinking Jesus, am I going to come home to a nuclear winter? You know, this is scary stuff and here I am stuck there. So these were things that were big for me then.

The Kiwis at Scott Base -- Scott Base was much the same as now. The Kiwis were very independent and they were very friendly. Any time we would go over there they would break out something to eat and drink.

PETER: Were you allowed over there only on certain evenings?

PAUL: No, whenever we wanted... nobody paid any attention to us. I was busy and did not go often, but it was always warm and inviting.

PETER: So it is different than now, now it is much more controlled.

PAUL: It was very different. Well, there was nobody to visit them except for maybe 150 people at McMurdo and seven of us civilians. The military people didn't go over very much, hardly at all. The Kiwis had dogs I liked to visit and enjoyed loving the huskies. We had two dogs, also, now that I think about it.

PETER: Sled dogs?

PAUL: Yes, and a couple puppies got loose and came to McMurdo where they became pets. We had a dog in the Bio Lab much of that year. It was a really nice husky.

PETER: They didn't want him back for a sled dog?

PAUL: No, they knew where he was, and they had had puppies, they knew he was there. They never used the dogs, the dogs were for PR. They killed 50 to 55 seals a year to feed the dogs who were just there for when a camera crew came out, some Kiwis would come out and drive around in a dogsled.

PETER: So they weren't actually working dogs?

PAUL: Yes and no, they were trained sled dogs and taken out and run, but they weren't really needed for anything. It was tradition, and there were a lot of seals going down. At the time it didn't bother me that much because we used seal bait for fishing, and it was a different era, I had grown up in hunting traditions. I killed a seal and I feel badly about it now, obviously, but at the time I came from a tradition of hunting and it did not have the moral impact that it would now. Anyway, the Kiwis were fun. At the time there were no bowling alleys in New Zealand, I don't think. Some of Kiwis just loved bowling; McMurdo had a bowling alley that they put up in the winter. So we had a bowling alley, and those Kiwi guys were the main people to use it. It was maybe four of them, but they just loved it. They went home after they wintered over at Scott base and set up a bowling alley in Auckland and got rich. I don't know if that's true or not, but that was the mythology, and I want to believe it.

PETER: Were there any scientists at the Kiwi base?

PAUL: Not in the winter that I remember. The scientists were mostly geologists, so it was still the era of exploration. In the summer they had really good scientific programs with penguins and seals and wonderful dry valley projects. They had excellent penguin and skua programs from the beginning and early on they had a wonderful shipboard marine biology program with effective drop cameras and grabs.

PETER: Did you interact with the biologists?

PAUL: Oh, yeah. We knew each other.

PETER: Just socially, not with research?

PAUL: In that article I mentioned ["Antarctic Memories of an Old American" in US Antarctic Research Program Oral Histories. Scripps Institution of Oceanography Archives collection 2012-14], that I wrote for the Kiwis, any time there was a trip to the dry valleys, I went along. There was one Kiwi trip I tagged along on to Taylor Valley right at the head of Lake Bonnie where there was a glacier with this red splotch, the blood glacier we called it then [now called Blood Falls on the Taylor



Glacier, with its red coloring due to iron oxides]. The glacier has now melted way the hell back, but the glacier was much closer then, but the iron was still bleeding out just like it is now. So that was something that we were interested in.

John Pearse was talking about the discovery of the dry valley lakes being warm at the bottom. That was by an American, Ken Armitage, that discovered that, and he thought it was geothermal. We knew that the lakes were warm, and we actually knew that they had a biological layer in there, so that was known from Armitage's early pioneering work - but the mechanisms were not understood.

I got dropped off with a kiwi graduate student who was working with a geophysicist named Alex Wilson. They had a nice little hut that was up at the head of the lake about maybe a mile or two or so, it was a walk but not a bad walk from where we got dropped off. We were going to get dropped off and we would have many hours, and there was going to be a pickup of me at the hut. So the Kiwi guy and I got the samples of the iron from the blood glacier to take back to Alex Wilson who understood exactly where it was coming from, as it turned out.

We were walking back and we discovered to our delight an old (remember in 1963 old meant 3-5 years or so) IGY cache. During the early IGY years the transportation was not very reliable and they prepared to spend extra time in an emergency. So all over the dry valleys they were caches of food, big boxes of Bolton rations and fuel. And, as it turned out when we got into it, there was a bottle of whiskey and a box of Cadburys. So the student and I knew what to do with those, we left the other stuff behind, but we freed the whiskey and Cadburys.

So we were drinking and eating on the way back, and when we got there we shared our largess with Alex Wilson and his small group of people. I got talking to Alex Wilson, and he was really one of the brighter scientists I've ever met. He knew just intuitively what the red was in the glacier, but he also had figured out how the water was heated. Not from the geothermal, which he said was nonsense, which had to be nonsense if you thought about it, but he figured out how the salinity stratification would trap the heat, and that there would be a warm spot in the middle. He had it figured out, and he was there testing it and putting down his thermistors and things. He was making the thermistors in the field, and he was making his oxygen sensors in the field.

I was doing Winkler titrations at the time, measuring oxygen the old-fashioned way. Alex was sitting there with his little pieces of rubber and latex and fabricating oxygen sensors. And it was just in that hour or three when we drank whiskey and ate the Cadburys he explained to me things that took years for people to figure out on the lakes. He explained how the glaciers would surge because they were melted at the bottom, and that there were probably lakes under the glaciers, which took us decades to find. He understood glacier surging. The guy was sort of a universal

genius. You asked me about the Kiwis and the Kiwi scientists, and that's one of my good memories.

The Kiwi's had really good bird and seal people. Ian Sterling became a really good friend; he was working on the seals. There was a seal guy there when we wintered over. Murray Smith was branding them with blowtorches. His brands festered in those seals for years and years, they were just a terrible thing to do. When Ian came down in 1967 or 1968, he knew how to handle seals. He had been working on grizzly bears, and now he was down there. He is still working on polar bears in Alaska, in the Canadian Arctic. He is another one of these universal geniuses I so admire. Ian knew how to work with these animals, you just put their heads in a bag and then you can tag them or do anything you want with them. They stop thrashing around when their heads are thrust into a black bag.

Gordy and I have really strong memories of when we met Ian. I think we talked about the awful BBC crew that deliberately left the door open in a very cold hut to start with and we almost froze when we came up. Well, a few days after that we met Ian. We vividly remember coming out of the water and sitting there by the Preway. We had just dressed in the cold before we got the tubs and the door crashed open and we both immediately started to lose our temper thinking it was the BBC assholes coming back, but no, hark, there stood a complete stranger with hoar frost all over his clothes and ice around his face standing there with a tiny 4 wheeled "Bug" going putt putt putt behind him in the wind and cold. Gordy got it together faster than I did and yelled politely to get his damned ass inside and shut the door. I fear it may have even been a bit stronger than that. Ian did, and immediately wanted to know what we were doing, listened respectfully, understood everything (the first time anybody had appreciated the project) and asked good questions. He told us about his seal project, and Ian Stirling has been one of my great heroes and best friends ever since! I had blamed him for Murray Smiths brutal tags but Ian disillusioned me of that immediately and explained his tagging operation. Clearly he was the best in the business, even as a graduate student. He would drop in on us fairly often and talk, and we would share a lot. The relationships were good.

Back to the kiwi science relationships, I don't know how they are now. When I was there in 2010, I didn't run into many Kiwis but they seemed as friendly and competent as always and I have some really good friends at NIWA in NZ who do excellent Antarctic research, so I have nothing but huge respect for their science.

Anyway, let me go on back -- there are some things that I thought of that we didn't talk about with Gordy Robilliard. One was the scuba regulators. I'm pretty sure they had bought a bunch of regulators in maybe 1962 for Carlton Ray's program and Gerald Kooyman's program. In the early 1960s, most of the regulators on the market were two hose regulators. That was sort of what we used. When we got there in 1967, I knew the regulators were there from helping Jerry et al. They had a couple of shelves of

regulators, there were probably maybe six or seven regulators, maybe more. All two hose regulators, and they all worked really well. But they didn't have a compressor that worked very well, and so that was a problem.

I think James Stewart got involved at McMurdo in 1968, but after we had left. In 1967 Gordy and I had to go to Key West and have our diving checked out by the Navy. In 1968 we brought Chuck Galt down to dive with us, and I think he was the first Antarctic diver to be checked out by Jimmy. So in the summer of 1968, Chuck Galt was here at Scripps getting checked out by Jim Stewart. We went down, and the compressor was just shot. They hadn't done any of the things we told them to do, but instead put a bunch of filters on the old worn out one that blew out the system immediately. So we had compressor nightmares.

At this point McMurdo Station was shifting over to civilian contractors. They had hired two mechanics, and a guy who was in charge of maybe the food locker and the dive locker. The food locker was basically where you went and got pots and pans and tents and sleeping bags for your field trips. It was just open shelves, you go get what you wanted. It wasn't a big deal. So the new guy lorded over the diving locker and was obnoxious about it being his not ours, and we used it only with his permission. I think Jim went down maybe after we left McMurdo, and I think it may have been 1969. So we left at Christmas in 1968, and I think he came down immediately thereafter or shortly after. I didn't know him personally; I met him later, when I first came to Scripps.

PETER: Did you know there was a diving officer coming or something at the time?

PAUL: No, basically we were on our own. He came down to fix the compressor because we had made so much noise about it. The NSF had decided, or the Navy had decided, not to send civilians to Key West! I suspect that Gordy and I did not make friends for the NSF with the Navy at Key West. So the NSF had to have somebody check out the divers. And who else but Stewart?

PETER: So you were the last USN-checked out divers in the US Antarctic Program, because then Jimmy Stewart started certifying them?

PAUL: Well, he checked out Galt. He was very reasonable. Jim is one of my real all time heroes. There was none of this macho stuff. Are you comfortable in the water? Are you strong, strong enough to get to the surface? Take care of your buddy? Okay.

PETER: Did Galt have to report on his dives to Jimmy, a dive log or anything? Was it only an initial checkout?

PAUL: No, there was just a checkout. There was no more control at that time.

PETER: Again, very different from today.

PAUL: Very, very different. You remember how Gordy and I discovered repetitive dive tables. We didn't even know about them. To this day I haven't had a formal diving course, so it was a different world. The two hose regulators worked pretty well, and I am actually quite proud of the diving program that Gordy and I put together. We got a lot done. And while we worked deep, we were very careful and I think very safe once we figured out the tables!

But in 1968 we were starting to have problems already with the civilian contractors. And we had problems with the diving locker. My personal log [in Paul Dayton Papers, Scripps Institution of Oceanography Archives collection 2011-83] is my rendition of what happened every day in 1968. For some reason I kept good records that year, normally I'm a very bad note taker, but 1968 was well recorded. I was just looking at October 2, 1968, I just stumbled on it yesterday. And there is a discussion of how the two mechanics and the dive locker guy went bad overnight. They had been quite friendly to Gordy and me, and then I was in the garage working on the Homelite saw, and things were okay, fairly cool. And then the next day I came in to finish as we needed the saw, and they all looked at me and they started whispering. They were aggressively hostile. It was an overnight shift that had to come from above, of people putting down the scientists. So there was overt, nasty hostility to the scientists from the contractors and it happened on that date for these guys.

At that point, the good NSF saints in the early 1960s, had left and been replaced by people more interested in developing a dependent relationship with contractors. I wasn't very much aware of what was going on when I wintered over because I was doing my own thing getting my work pretty much unfettered by anybody. The NSF had three I think really remarkable people, Phil Smith, William T. Austin and John R. Twiss. They were young, they were probably in their early to mid-twenties at the oldest, and very very capable. They were in charge of taking the research program away from the Admiral. Admirals aren't used to having young civilians tell them what to do. Those guys in hindsight -- and I got to know Twiss very well over the years, I know for sure that they had a lot of trouble forcing the Navy to do what they asked instead of letting the Navy boss us around. So those guys were quite heroic. I think in 1967, the NSF was starting to bring in civilian contractors because they were having so much trouble with the Navy guys. I remember being in the chalet, the NSF office where there was a civilian who I remembered being passed over by the Navy as a C-130 pilot, now a civilian working for a contractor. I remembered him from before as hostile and cold. He was lining up with a private contractor to take over the Navy's job. This is when the contractors were starting to come in. He was standing in there with his wardroom posture and alpha behavior. I remember it really well, with the shoulders back as though to say: I'm really a super stud and I know everything, telling at that point some NSF guys how to deal with scientists. "These guys, you have to get control of these guys, they are out of control. They have to be closely supervised because they are

incompetent and they are going to get you in trouble. It is just a matter of time" It was really gross.

PETER: Did he know you were standing there?

PAUL: I was standing there.

PETER: He was saying that, knowing there were scientists there?

PAUL: He didn't care, he just didn't care. I was still a student, this was 1967 or '68, and I was pretty young myself. So he was saying that, and the next year we ran into this buzz saw that just happened overnight. And I'm pretty sure that Holmes and Narver Services, or whoever the first civilian contractor was that took it over, basically got their guys together and said anti-scientist hostile things on October 2-- I imagine this passed over turkey or somebody just like him was in charge, and he probably give them that same story. Those guys changed overnight, they were really okay, I was in there doing some different things with them, and they were fine, and the dive guy wasn't a problem. Then when I came in the next day it was totally different; they glared at me and whispered and walked away from me. Then the dive guy became a problem. He was spiteful and hateful, and the mechanics were just awful.

The day before I had set aside a small Homelite generator we had used for Doug DeMaster, that when you take something out of the shop to go into the field, you check it out to make sure it works. I had been using it and taking it back. I was just using it when I needed a generator.

Doug DeMaster, who was going out to work on seals, had needed a generator. So I set it aside for Doug and told him it worked fine. The next day when they became hateful, there was Doug's generator sitting there when it should have been out with him, and they were all numbered so I knew what it was. The chief mechanic was telling the other mechanic -- both of them were sort of bozos -- that this was the only generator in the shop that worked, and we can't let a scientist have it. So they had switched it out.

And while I was there, Doug came back all angry because his whole thing had been ruined, with a generator that wouldn't start, and the guy just sort of smirked.

Meanwhile, they were working on one of those big generators, and it was a great big thing on skids. They had it undone, and the chief mechanic kept telling the other mechanic that all tune-ups start with the spark plugs. "Gotta find the spark plugs and check them out. Where the hell are the spark plugs." The whole time I was in there working on my saw, he was looking for his spark plugs when he wasn't abusing us or fighting with Doug. The generator was a diesel.

PETER: With no spark plugs...

PAUL: No spark plugs, and I knew that. He had been such an asshole that I wasn't telling him. It just got worse. Much worse. In the mid-1970s there was a guy in charge of the diving locker named Steve LaSorsa or something like that. He had an awful attitude problem. I don't think he knew anything about diving himself, all he knew was that all the equipment in the dive locker was his and his main job was to control us from using his equipment. He had messed up our regulators so that they free flowed a lot but with the two hose regulators it was behind your head and you did not know (we did not have sea view gauges then) and suddenly you would find yourself completely out of air. You can buddy breath with a two hose regulator but it is a chore and since this free flowing happened so often, we made up pony bottles that we always carried with a strap on an arm (obviously this did not help us do our work). We took care of our Pony bottles - they too had two hose regulators and you had to turn them on underwater, but we got really good at turning on the pony and aborting our work. Mostly we used them to decompress after the air leaked out of the primary tanks.

And it was not always just a leak. One time my first stage went out on the bottom on a deep dive and it just exploded air around my head taking my mask off with it! I caught my mask and got it back on and cleared and saw Oliver and Jim Barry rushing to help but I got the pony going and we all went up. But LaSorsa would not let us work on our regulators, they were HIS regulators and he was the only one to work on them! He locked up all the tools in the locker and even locked up everything else including the weights and he was never around to help but made our work really difficult if not dangerous. Oliver and I took pictures of the locker with everything locked up and they are in the library archives if you want a good giggle.

By the 1980s there was a new dive locker that was wonderful. It even had a shower and the locker folks filled our tanks for us and always did everything they could to help, so early-on the dive locker situation recovered from people like LaSorsa to the best dive support operation I have ever heard of. I can't remember the names of the early dive locker guys in the 1980s, one was an experienced cave diver, but they really knew their stuff and were wonderful. Eventually Rob Robbins and Jim Maestro were there and were just superb. Rob is still in that job and Jim wrote an introduction to Norb Wu's book that is the best natural history summary of Antarctic marine biology I have ever seen. It is simply hard to really believe how wonderful Rob and Steve are!

PETER: but in general the contractors were not very helpful to the scientists then?

PAUL: Well, the civilian contractor got more and more hostile to the scientists, and there wasn't any thought of service. You were still on your own, but if we needed equipment, it was a nightmare of groveling.

That's when I first heard the term "beaker" used as an insult. Beaker is now just sort of laughingly a scientist, they work with beakers very well

now, but at that time it was an insult to make sure that all the contractors realized that beakers were hapless heads-in-the-clouds academics utterly incompetent to take care of themselves. Jim Barry was there in 1970 or so and he thinks that the terms started with the Navy, and he is probably right.

PETER: When you were there in 2010 were they still using the term beaker for scientist?

PAUL: Oh, yeah, it's still used. It was there for you too, I'm sure.

PETER: I heard it in 1997 and 1999.

PAUL: It started in the late 1960s, and it was an insult. It was a put down ... you stupid beakers, you don't know anything. I don't think it is an insult now because the contractors who work with the beakers are really great and helpful.

PETER: The term beaker for a scientist got started when the civilian contractor started running McMurdo, not the Navy?

PAUL: I thought so, but Jim thinks it was the Navy, when people like the passed-over Herc pilot exerted those ideas on how to control scientists, and of course how to have cost-plus contracting and get more and more people down there paid by the government contract to take care of the poor stupid beakers before they kill themselves. To be fair, there were hapless scientists who did need to be babied.

But my memories of the 1970s and 1980s, are full of these tensions with the contractors. The NSF people in those years often (not always) seemed in cahoots with the contractors. Sometimes they would see me in Washington DC later when I was on the Polar Research Board or something, and they'd be my good old buddies, but often they weren't helping us in the field.

There was one exception. My memories of David Bresnahan are universally respectful. Dave did a professional job. He helped us whenever he could, and we were hard to help because my scientific appetite is bigger than what can be supported, so I am always pushing the limits of what I can actually do in the field. I needed logistic support, and I was a difficult scientist. I was probably obnoxious to the contractors because I was self-sufficient and demanding, so they would probably offer the same memory of me. One example when we were working at Salmon Bay. Blasting through 25 feet of very rotten ice was really difficult and needed some much powder that we would drag it over on snow machines and sleds and even then cleaning the holes was awful. I had the insane idea of driving the drill rig over to our site and letting it winter over with the idea that we would use it to drill our holes on a winfly and get it back to McMurdo in the early spring when the ice was smoother and easier to drive across. For many reasons the idea was insane and I realized all the problems with it when we were working over there and returned to find Dave actually trying to make it work even though he saw all the problems. In principle

it could work but clearly it was a stupid idea yet he was really trying. I have never forgotten that event of people truly trying to support science.

If I could get a problem to Dave Bresnahan, and if he was on the ice [meaning resident at McMurdo Station], he would be helpful and do what he could and if he could not, he looked me in the eye and said so and I understood. Bresnahan was diving in Antarctica before we were diving there, about 1966 with Jacques Zanefeld. That picture of the Nodwell going through the sea ice crack, Bresnahan was in it in 1967 I think, when the Nodwell went into a crack, and Jacques Zanefeld leapt out and broke his leg. So Dave goes back quite a long ways with me, and I respect him. But otherwise, the relationship and respect for the scientists -- I don't know about the 1990s -- but in the 1970s and the 1980s, became pretty bad.

Let me just run through my memories a little bit of the NSF hierarchy as I probably misunderstand it. The first person that set up the Antarctic program was a guy named Tom Jones. He had a scientific advisor named Bert Crary, who the Crary Lab is named after. These were really good guys, real leaders. George Llano was the biological program manager, and he was a real visionary. He was one of the all-time heroes in my life, because he saw the future really well in terms of science. He always encouraged me to push the envelope. A good biologist doesn't stick to a plan, they grow as they see better things to do. I did not know Jones, but Crary especially had a huge amount of field experience and very much understood field science. Llano also had field experience, but his own field was with lichens I believe, but he was a dream science manager because he knew what was involved and went out of his way to help the scientists he was supporting. He also went out of his way to find and encourage and importantly, to mentor, young scientists.

PETER: He was encouraging you to write proposals?

PAUL: Write proposals, he helped me to write my first proposal. You know, when I wanted to set up a program at New Harbor -- nobody ever thought one could dive over there -- he was fine, he encouraged me.

PETER: Because before that, people worked in a certain radius from McMurdo Station?

PAUL: People always went into the field, but our diving program in the 1960s was near Ross Island. The farthest west we got was an abortive dive at the Daily Islands. But we did get to Cape Bird and all along the Ross Island. But it never occurred to me to completely cross the Sound.

PETER: Right, and then you went across the McMurdo Sound. You were the first to go diving over there across the Sound, and that's because you wanted to compare the ecology over there because of the water currents?

PAUL: That's right, that was in '74. John Oliver, who was my student at the time, had been talking to his roommate. There was a deep-sea dry



valley drilling project at New Harbor, and the pipe is still there in the sand. John and I were rooming with the scientists involved with the drilling, and they were telling us about the ice being eight feet thick. I didn't see why you couldn't dive there -- because I was blasting holes all over the place of the 1960s, ... eight feet, 10 feet, 20 feet. Just enough dynamite, I'll get there. Anyway, as soon as John came in, he said we ought to go look at that, so we did. It was his idea but it took me about a second to jump at it!

PETER: And Llano supported it?

PAUL: Oh, yeah, Llano supported it. You couldn't do that now. Now it's turned into the NSF routine that you really sort of have to have done the research to be able to get the grant and you have to have absolutely precise plans before you go down and it is hard to make changes in the field because the system resists it. The system does not understand how critically important the exploration phase of science can be to really understanding an ecosystem.

PETER: To just go someplace and set up a field camp to do diving research, that would be a huge undertaking now.

PAUL: Yes, but at that time they would fly us in, and they would leave us for 10 hours, 12, 15 hours. We would set up the Scott tents. Gordy and I were doing this in 1960s, we were doing day trips all over the place. We went to Cape Byrd, we went to the Dailey Islands, we went all over the place in the 1960s. I just hadn't gotten to the other side of the Sound.

PETER: So when did they build the building at New Harbor?

PAUL: That was actually Ted E. DeLaca who built that, I think in the late 1970s. We were just working out of our Scott tents on the ice. And then in the late 1970s, Ted DeLaca, was a foraminifera guy, and the foraminiferans are really interesting. Ted also was politically well-connected, and I think Oliver actually took him by hand and showed him arborescent foraminiferans, which are deep-sea foraminiferans, and Oliver recognized that. In any case, DeLaca saw the opportunity and was excited as hell. He's a good scientist, he was very excited, and he built the building.

PETER: Now it's a permanent field station.

PAUL: Well, once they put the Jamesway in, they never took them down. But it was just one Jamesway, it sort of grew. It grew with DeLaca's program, and DeLaca's program has continued through Sam Bowser, who has been running it for 20 or 30 years or something, but that was DeLaca's original program. I think Ted was a post doc from UC Davis in Hessler's lab at Scripps when he started that program.

PETER: Right, then he went on to Alaska?

PAUL: Yes. We were friends, and we helped each other. He was a good guy.

PETER: So you guys told him about the foraminiferans there, and that got his whole research interest going.

PAUL: Yes, at least I think it was from Oliver, not me, but that was after Llano encouraged us to push the envelope, and Oliver suggesting it to me. That opened up New Harbor -- I think it is still one of the most interesting areas in the world for benthic ecology.

PETER: Because of being able to work on both sides of the McMurdo Sound?

PAUL: Because it's so different, it's so very different. And it's like my first dive that summer in 1974, I had been arguing with Howard Sanders at Woods Hole on deep-sea diversity. I really wanted to go into a submersible and see the deep-sea diversity that I had just seen from pictures. It was a big thing on my mind in 1974. I made that dive, it was darker than hell. I went down, and as my eyes focused it was one of the most exciting moments in my career. It was deep, we didn't know how deep it was, and we put the hole in, and it was 150, 160 feet. But it was just ophiuroids in mud as though I had swum out of a 4,000 Alvin dive.

PETER: Not much hard substrate?

PAUL: No, it was all mud at that site, and it was one of those big moments in your life where you just sort of stop and your heart is thumping as you really get a grasp of what you are actually looking at. It was really, really exciting for me. I was shivering but this time not from being cold! So that is how we got over there, but it was Llano that made it possible by encouraging me to push the envelope. He really deserves praise, and he doesn't get very much because he was just helping his biologists, not pushing his own career, and he was a very decent and wonderful program manager. Again, I point out that Dave Bresnehan was also always very helpful with our logistics working on the other side of the sound and was very supportive with what was a logistical nightmare from his perspective. I don't think we would have been successful over there if Dave had not been involved.

But back to the early NSF, at the top, Tom Jones and Bert Crary, were real legends, even by probably 1961 or 1960, there was a Jones mountain range.

PETER: They were in charge of the whole scientific program?

PAUL: Yes, the Antarctic in the early days was mostly geology, and it was field mapping geology. It had really good field geologists. Those were geologists of the 1960s, 1962, 1963, that had been there since IGY, they were really good. They were all older, they were probably in their late fifties when I met them in the 1960s. They had grown up in Alaska and Greenland. They were good, very good, and very self-capable and competent field people.

One of them in particular, after Jones retired, was Bob Rudford. I think he may have moved into the division director, Jones' position at the very top. He was also in my mind, one of these sort of heroic figures because he was so competent and decent. I think he had lettered in a couple of sports for several years at the University of Minnesota. I think he was a football player. Tall, athletic, strong guy. Really good field man when I met him in 1963. He'd already been working on the Jones range, named after Tom Jones, I think. And in 1963 and 1964 he had his own program; he was a young guy then running a big program.

I have these memories of him in that the old field Butler building, that shop where we all did everything. He was in there building boxes for his collections, so he had all these flats of plywood, and that's what he went down with. Flats of plywood and nails and tacks, and he went down expecting to go in there and build his boxes. I'm in there trying to fix my equipment, and he's over there bang-bang-bang, running this plywood through the saw and making boxes and smoking a pipe. I have this mental picture of it, just a tremendous, self-assured, competent and very nice and decent man.

Eventually, I think maybe from 1972 or something to -- I'm not sure when he became director of polar programs, but he was director until maybe 1977. I don't know why he left. I think he went off to become a university president in Texas. So I think it was a promotion for him but I sure wish he had stayed with Polar Programs.

That was really the beginning of the end. That would have been in 1977, and he was replaced by a guy named Ed Todd. From my perspective Ed Todd was a disaster. It was a lateral promotion getting him out of some NOAA job I think. I remember we all worried about it when it happened in the late 1970s.

PETER: You wanted to continue with your research endeavors and interests, and so director turnover is a huge concern.

PAUL: Well, Llano was my biology program manager in the early 1970s. There was a guy named Andrews and maybe another. Then we had Dick Williams who was a very nice and decent man, so my program was okay and the biology managers were fair and very nice. But Ed Todd was at the top. This guy's attitude inspires the contractor. So he's the very top, he's the big honcho, and when that was Rudford, it was really good. Then it became Todd, and seemed unhappy in his job, and he would stand around at the orientation meetings where he had to meet us and talk to us, and give us little bits of dry bureaucratism about who was in charge here. Todd was genuinely uncomfortable and often embarrassed around scientists.

We used to be USARP, US Antarctic Research Program. I think he's the one that got so tired of the scientists that he took the research out and made it USAP, it was just a program, we are only here to maintain a presence for a possible land claim. He acted as though the science is irrelevant

to the mission, "my mission is to have a big base. And the less that scientists interfere with my mission of running a big base and having a U.S. presence in the Antarctic, the better."

Then Todd retired, and the job was taken over by somebody remarkably even worse, a guy named Peter Wilkniss. He was a grotesque leader. He really didn't like anybody, and I think he caused a lot of tensions in SCAR, I think tensions that might still be around, although I think we have far outgrown the Wilkniss era.

PETER: SCAR, meaning?

PAUL: The Scientific Committee on Antarctic Research. It's an international part of the treaty, and it's very important, it still is very important, and it is scientific. The Brits have always had a really good program, and Wilkniss really didn't like them. This came across in the polar research board meetings and his memos. We were maintaining a presence, these guys were competitors for our presence in the Antarctic, and that's all Wilkniss cared about too.

So while this was going on, of course contractors were taking advantage of it, and marginalizing the scientists very effectively with all sorts of control things. So if I wanted to get some more food or silverware or something, I had to write memos and attempt to justify trivial requests all the time.

The radio control thing got going too, where field parties had to report in every morning. That's a very reasonable ideal and it's intelligent, except that the radios didn't work. So I was constantly in trouble because I went to areas that didn't have good radio reception. We'd sit there, "Mac Central, Mac Central, this is A001," and silence. Buzz, buzz, buzz. It was just the way of life. Then they wouldn't hear from us, and they would come over in a helicopter and rescue us. The helo crews were Navy through the 1980s, and now the pilots had no interest in the science or even the Antarctic. They had passed-over pilots, who with few exceptions, were hostile. There were some exceptions, but maybe one or two. Overall they were always hostile. They had discovered that there are all these commercial rules for flying hazardous material which could even be a specimen.

PETER: A scuba tank, for example?

PAUL: It seemed as though it were almost everything including specimens preserved in alcohol So in the 1960s and 1970s that wasn't much of a problem although it was getting to be difficult in the late 1970s. In the 1980s it became a huge problem because they made us adhere to every single little rule that we would have in San Diego flying on a commercial flight. So if I wanted to take a cigarette lighter to light my stove, I had to have it professionally packed by a professional hazmat packer who packed my cigarette lighter in a good-sized box full of Styrofoam and of course paperwork taped on and for the dumbest little items, even our pocket

knives if we declared them, had to be professionally wrapped by a hazmat packer. So of course there was a lot of cardboard and Styrofoam, which would then sometimes blow around because it was hard to keep track of it in the wind when you had to open so many boxes and packing just to get the gear you needed. So we were generating all of this packing, simply to haul routine gear around. We used to photograph the arrival of big boxes and all the packing to get to a box of matches.

The pilots then were all over it and most were really hostile and aggressive. In the 1980s there were sort of two levels of pilots. There were these older hostile, aggressive, passed-over pilots, and then there were these young guys immediately out of school. The young guys were ok, but very much influenced by the bad attitudes of the hostile superior officers. And they did not like to fly and were afraid. We had to spend a lot of time in the hangers waiting for them, and we could see how many hours they had flown because their hours were all there on the little clipboards, and we were always waiting because they didn't want to fly. These were pilots that were flying with 200, 240 hours. I almost had that many hours as a passenger on their planes, so they were very inexperienced. It is sort of scary to think that people like this did not succeed in the military and are now flying us around on commercial planes.

Instead of trying to get the flight skins -- the money for flying which the Navy pays you -- and flight experience and going out and seeing this gorgeous country like pilots did earlier, these guys didn't want to fly. They were afraid to fly. If you hit a little bit of wind and the plane jiggled some, the radio would be, "What's that, what's that? Everything okay?" The crewmen, who was usually a more professional, experienced guy, would say "Everything is fine, Sir." The landing was just an adventure. They go down inch by inch. "How are we?" "Yes, Sir. Still got five feet, sir." You know, that kind of radio chatter with these inexperienced guys. They were not comfortable in the air.

So if a pilot doesn't want to fly, he can find all sorts of reasons to ground the flight. This really hurt us as we would have blocked part of the time, the day had been sent aside, the weather was good, I could have been doing something at McMurdo but we were finally going to get out, and these guys would find something missing on the plane, and they would ground the flight. It happened over and over again.

That contrasts then with these old bitter guys. The bitter guys were causing a lot of trouble because they didn't like us either, so they would come back and just tell lies to the NSF about "dangerous conditions in their field camp, those guys don't know what they're doing."

As an example, once we had compressor problems at New Harbor and when we finally got a good compressor, one of my guys was on the plane and the pilot just dropped it. "Do you feel that thing swinging? Looks dangerous, doesn't it?" Pulled the plug on the whole compressor, he released it in the air and it was smashed and we were out the compressor for the season. I had the guy on the radio in the plane, it wasn't a

problem, he was bringing us the compressor, and it was hung under the plane in a sling which is the way you do it. He dropped it and laughed about it.

So we have this sort of problem. They dusted our camp, and by this time I was pretty experienced with helos, and Eric Vetter had been a medic in 101 Airborne, and he knew all about helos and dusting things.

PETER: What is dusting?

PAUL: Dusting is where you take a helicopter as a big fan and blow stuff around on the ground. So they would come over and --

PETER: So it's an aggressive behavior to screw something up?

PAUL: Oh, it's very aggressive. They never came by our field station without trying to blow our tents over. In fact, if we were expecting some planes or we heard one coming, we would take the tents down and put stuff on them because the tents don't have that good pegs anyway, so they always did manage to blow some around. So this was just routine, dusting us.

One time at New Harbor when we were doing microbial ecology with Judi Hansen and they had brought up a centrifuge and a refrigerator, we had to have really good temperature control on the bacterial stuff. So all of this expensive gear came, and he put it down and now it is sitting out there by the Jamesway. He lifts off, and it's just like a hair blower -- he just blows this expensive equipment down the hill. You know, a refrigerator is supposed to stay right side up, so it's doing cartwheels, and you could just see the two pilots in there just having a great time.

There were some pilots that were particularly bad and I still remember their name tags, Sherman Bronsig, Bryce Graham and Kehoe and Stihl. Their badges on their little uniforms are emblazoned in my mind. Given how exciting our research was and how wonderful it is to be privileged to work in the Antarctic, it is too bad that these memories are still with me.

PETER: So, they are actively screwing up the scientific work -- that has to be triple underlined here, and they knew it.

PAUL: Absolutely. For example, once John Pearse had come out to New Harbor, and he is really sort of the grand old man, and everybody, including me, was respectful and very anxious to help. He had a Coleman stove that didn't have its fuel container, it was just a stove, but it hadn't been wrapped by the certified hazmat authority. Bryce Graham saw it, leapt out of the helicopter, came running over and chewed me out, really chewed me out in a personal and profane way. I'm actually just there trying to help them unload because I was already there, it's not my flight or anything. Finally he got to his real villain, poor old Pearse. Pearse didn't even know that it was there, he didn't know what was going on, and I think to this day he doesn't know why he was getting chewed out so nastily and so aggressively. They didn't even look to see that they'd

actually taken the fuel canister out of the stove and it was actually wrapped in the damn hazmat box.

So this is the scene in the late 1980s, and the radio calling in was just a nightmare for me. It was almost impossible to get through from Salmon Bay which is where I had my worst problems.

New Harbor was a problem also until I learned I could get better reception from the ridge south of the Explorer's Cove site. Up on the ridge is a big rock, conspicuous from the camp. It is a pretty good walk up to get to it. I had to go and huddle by the rock trying to get out of the wind every single morning at seven o'clock. There is always a very cold wind up there as I tried to call in. I sat there huddling by the rock and the box with the battery and equipment, with that radio phone trying my best to get through the old squeaky contacts. Eventually I ran a phone wire up to that rock and had a little box with a battery that I carried up, it was a car battery, and I hauled that thing up there myself. I spent some time running the line up there and established the receiver by that rock on the hill at New Harbor so that we could check in from the building. It was a lot easier with the phone.

I would make my request for things that were sort of routine resupplies. I would make them with whomever I was talking to, and at that point most of the things we needed were from the Bio Lab, so you'd just phone the Bio Lab. The manager always was our friend and they were really helpful. One of the best of several really helpful guys was Steve Kottzmeier.

So I would give him the list of things I needed, but it didn't go through all the paper work demanded by Ann Peebles, the very nasty contractor who insisted on piles of paperwork and groveling and things to get stuff like food. I would get these really nasty letters from her and the NSF rep about going through channels, and not to use Steve. Some of her notes are in the field notebooks I will give the library eventually. This is what it had deteriorated to in the 1980s.

PETER: Well, you reach a tipping point where the hassle and the overhead of working there and all of that was no longer worth the scientific endeavor.

PAUL: In my mind, you have to have some pretty good scientific reason to go through with it. Let's just stay on this thread and maybe move it up 20 years from when I got kicked out in 1989 to 2010 when they let me return. So I'll read off the lists of things that you have to do now.

PETER: Well, it's amazing to me how you stuck with it so long. I guess it creeps up on you.

PAUL: It does, it creeps up on you, and the frustrations. I didn't realize how angry I was in the 1970s and 1980s until I went back 20 years later in 2010, an old man, deaf and everything and being taken care of like I was some sort of important person and absolutely having the time of

my life. Every time I heard a helo down there in 2010, I got angry, because those guys were just so ugly in my memory. So here I am almost 70 years old having the time of my life -- and the helo pilots in 2010, they are professional, they are really really good, and they are nice guys, they're very good and helpful. There's no reason for me to get my blood pressure shooting off the scales every time a plane goes by. And I knew that, I couldn't talk myself out of spiking blood pressure no matter how stupid it was and how wonderful the pilots are now. It is embarrassing to admit my problem, but it gives an idea of the intensity of the frustrations in the 1980s

PETER: You had other scientific interests that weren't just Antarctica, so you didn't have your eggs all in that one basket. That was fortunate, I'd say.

PAUL: Fortunate for me. Actually, it was fortunate for me that I got kicked out of the program. I became a much better parent and a much better graduate advisor and a much better person for the things I did instead of fighting these silly battles. The science was worth it. The only sort of lingering anger I have about being thrown out was that Judith A. Hansen and I were on the verge of making a breakthrough which will never be made and is extremely important. And it related to the bacterial activity in the deeper benthos, the diving deep at 140 feet depth. It's orders of magnitude slower than anyplace in the world, any place even in the deep sea. It took her two seasons to realize that they weren't artifacts. I learned this in 1968. One of Chuck Galt's programs in 1968 was to actually plate out bacteria, because I knew bacteria were important, we knew that even in the 1960s, so I really wanted to look at bacteria.

We plated things out and did everything we were supposed to, and put them in a +1 degree fridge, the coldest fridge we could find. Nothing happened for weeks and weeks. Finally we were at the end of the season and I went to clean out the fridge, which would have been two and a half or three months since we plated them, and all of those plates were slowly growing bacteria of different colors, and it looked just like classical bacteria samples that normally happen overnight or in three days or something.

So I knew that there was something going on, and Judi finally agreed to come with the state of the art techniques she had developed in Australia. At that point she was probably one of the better microbial ecologists around. She was well-trained at University of Georgia Marine Institute at Sapelo Island, and Western Australia and Australian Institute of Marine Science. She was very good, she worked with the best, and we never got to go back after we did all of these preliminary things and saw that these slow rates were real. We never got to go back and finish it.

I'm resentful, because it won't get done now. At the time we were using labeled stuff. It was tritiated leucine I think. We were using labels, we were doing state-of-the-art research that Judi had done and sort of pioneered in Australia in the barrier reef at 30 feet where you could stay



for a couple hours. We were doing it shivering and colder than hell at 140 feet, lying there motionless, injecting leucine into tubes.

PETER: So you can't even conduct work at that depth now because of the diving rules.

PAUL: Right, and the Kiwi program went down and tried to do it, but the Kiwis can't go anywhere near that deep because of their really restrictive rules, and they have to stay near shore to get to the bottom. So the Kiwis repeated my stuff, and they did it at New Harbor where we were working, but they were doing it at 80 feet or something, and it's very different. There's a lot of productivity at 80 feet. But if they had gone out to the middle of New Harbor at 140 feet, they'd have seen what Judi and I saw, but they can't do it either. Nobody will do it, it will never be done.

But now the changes are amazing. Instead of of bribing and fighting with people to do their job, these guys that are actually on the surface interacting with the scientists are some of the most wonderful human beings I have ever seen. They were terrific. Did you work with Rob Robbins?

PETER: Yes. You went down with Stacy Kim's project in 2010?

PAUL: Right, we were with Stacy, and Stacy knows the hoops.

PETER: She knows all the paperwork?

PAUL: Yeah, she did all of that, she organized us and made sure that we did all of that and so on. So it's the only way I was ever going to get back. But I think Rob Robbins and Steve Rupp, the diving people, those guys are like Jim Stewart at his prime. They are very very good. They obey the rules and they do everything they can to help - they go way beyond any reasonable expectation. With Stewart they are the best DSOs I've ever seen in that sort of situation. It used to be that it was all about controlling and interfering and being powerful and nasty. They are the complete opposite: what do you need, how I can I help and here is a better approach and if we can get free we will come and help. Hell, they often went out and collected things for me on their own! They are absolutely wonderful people. I wish they were here in the off season as they would be my best friends. They really are good at what they do, and it's safe. They obey the rules, but they don't bludgeon you with them, and they help you.

In fact, Rob Robbins found a place -- did you dive the Cape Evans wall?

PETER: No, I did not.

PAUL: It's the most impressive dive that I've never done.

PETER: I got there after my friends went diving there. Evans Wall has the soft coral *Gersemia antarctica*, on that side of the Sound.

PAUL: It's got everything, it's an amazing place. Rob just found it because it looked interesting and these guys are out there helping, going out of their way to help. Unbelievable.

The same thing for the guy that runs the drill rig. When the drill arrived and we had easy access to the water, there was always booze and begging and groveling because they didn't want to go out in the cold and run a drill rig for some beaker. Often it seemed easier to dynamite than to use the drill rig.

Now there's a guy called LT. His name is Tom Holford, but he goes by LT. He's the same way. I couldn't believe my tired eyes. We go out there to put in a house, I think it's going to be a day and a half of shoveling the snow off, screwing with the house and things and then finally getting some guy to reluctantly come down and drill the hole with a drill rig. I go down there, and here is this guy with the drill rig warmed up and ready to go. He has a cat and he scrapes the snow off for you, makes a nice clearing, you could stay in your car for the whole operation if you have some warm vehicle. We would always stand around trying to help, but we weren't doing anything because LT did it all. So he scrapes the snow, then he puts the rig just where we want the hole, and in maybe 20 minutes, 15 or 20 minutes, he puts a hole through and it was 20 feet of ice that year. And it's just minutes to go through. Under normal conditions when you are looking at six or eight or 10 feet, it would a few minutes to drill a hole with LT.

But then we used to have to get the Nodwell and take several passes with the house to get it over that hole to because it was hard to get a house and the hole lined up and everything. This guy, he's in his Cat. We would go over and unbolt drill rig sled. He would then drive around, jump out of his vehicle, hitch up the house for us, drag it over, put it on the hole inevitably perfectly. We get it in and check, yup, the hole is right below, perfect, and LT is in his cab sitting up there smiling away, happy to be helping.

Then instead of just driving home for Miller time, he will back up his cat and doze all of the snow and slush and things around the house to seal the house from the wind. That was something else, we used to sit there with our shovels and do it in the wind. And he just does it, and actually when he sees you up on base, he says "You want any more holes?" He's dying to help.

PETER: This is blowing your mind based on your history...

PETER: My God, and the helo pilots, the same way. They are professionals. They can take a barrel of fuel and they will put it on the spot within maybe eight inches. They take pride in what they are doing. They know what needs to be done and they do it happily. They see you --

"How was that?" Unbelievable! The guys that interfaced with us were just unbelievable, just wonderful. Even without asking, they will bring things from Marble Point that they know we need, they help us move stuff around the broken ice, just unbelievable. God the scientists don't know how good they have it!

Another example -- we were out with a Tucker snowcat, and here is the old Tucker chugging along, and it's cold. We had been in a warm hut, and it was just a run into base, and if we broke down I could make it back, but I wasn't really dressed for the cold. Then the Tucker threw its track.

So I know how to deal with that and so especially did Bob Zook and others on our team. You unbolt the track, you jack it up. I know Stacy's team could have fixed it, and for sure they knew how to do it, but all we did was call in on the radio that works now, and somebody from our group comes out and gets us back for dinner. They come out, and we leave the Tucker out in the cold with the track off it. The next morning, there's the damned Tucker right there by the dive locker where we park it. Those guys had gone out in the cold, got the Tucker, fixed the track, brought it back, lubed it, gassed it up, and brought it over for us by breakfast. I don't even know their names, they were invisible to me, and I am still utterly in awe!

PETER: You were talking earlier about the difference, the juxtaposition.

PAUL: My God, think about it. When you think back to going down to the junkyard and recovering some tracks to prepare for future problems, or blow torching your gas line, my God, things are changed at that level. But at the top level, it is very controlled beyond any reason. It's just a control thing of contractors, you are beakers and they are in control of the big scene, and it's just cost-plus out of control.

PETER: Before you move on, let's say you are the young Paul Dayton an assistant professor, there's this great support in Antarctica and you've got ideas. There's a lot of academic pressure now to publish and it is a huge investment of time and energy to do scientific work in the Antarctic and plan and all this stuff, whereas you can go somewhere else and get results to publish on something for a lot less time and energy, right? So it's problematic, isn't it? It's better support than in your past, but the world has changed, where should someone be funneling their effort, because they've got to advance their career and get funding and all of these things. You had less pressure, perhaps?

PAUL: I don't know. I've always felt the pressure to try to do my work, and I think that's maybe the same. It's the quality of the questions and the types of ecological, coastal ecological questions that you can ask at McMurdo, it's still the best natural laboratory in the world in my mind. The various habitats one can access from McMurdo have to be the most diverse and fascinating places I have ever heard of. But it is just really hard to work there without somebody like Stacy to help you navigate the rules.

One rule that could be changed a little might be to set the diving limit at 140 instead of 130, it is not much but is important as the little extra depth allows you more interesting habitat, at least at New Harbor. It doesn't make that much difference to the physiology and the diving safety.

PETER: It's just a number?

PAUL: It's just a number, and Rob knows that. We obeyed it, Stacy obeys every rule, and following them is how she managed to keep programs going down there. If you don't have Stacy personally working for you, you will never get through those hurdles.

There were other good biologists there, and they are really excellent scientists. There is an acidification program for example, with some really good people, and they were frustrated by the rules. They get things done, but they are not diving, they're not doing our type of thing and they had Rob and Steve helping. I think that there are just extremely interesting problems and questions that one could ask, especially at New Harbor and in Salmon Bay.

PETER: New Harbor, with the 130 foot diving limits?

PAUL: 130 feet is deep enough for most stuff and it is a reasonable limit sort of based on steps in the old Navy tables. But with the extra 10 feet, we would have gotten to a bunch of my past experiments at New Harbor for which we had to use the ROV to get 10 feet deeper and it was nowhere as good as a diver. Any diver would agree that 10 feet does not make much difference in safety. But because the bottom is flat the extra 10 feet depth gets you to a much more interesting habitat. At any rate, I think the scientific questions are wonderful and still very exciting. And I think that there's a lot of benthic ecology questions that I would love to have been able to do. I'm glad I was here and not wasting my time fighting with those guys over my career, but had it been a really good support program all along and had I stayed there, I would've had a different career. I would not have been such a good parent and advisor to my students, but the science was, and it still is, really good. I think New Harbor and Salmon Bay are just ecological gold mines just waiting to be picked and I would love to have been able to work there over my career.

PETER: Where is Salmon Bay?

PAUL: It's an area south of New Harbor that is even more oligotrophic. Fascinating place. Judi Hansen had projects there too, we had bacterial stuff going on there too. Hard to work because we didn't have the building, but we were okay. We had the tents that the helos blew over, and we had a little Apple shaped portable building that we did our research in. We were okay logistically, but the science was really good.

I made a list of stuff we have to do now and the control freaks that are orchestrating it. Apart from this, if it were just relatively easy to work down there, it's worth it.

PETER: But a young assistant professor Paul Dayton would be adaptable, and like Stacy, you deal with stuff, right? When we get older, we don't want to do with certain stuff?

PAUL: I don't know, I think the people that are down there doing good work, and they are happy to be there. It might be hard for an assistant professor but great for a post doc or a tenured professor. The biologists that are there are excellent scientists. They're mostly working in the lakes, but they are very all really excellent scientists.

No, I still think that the Antarctic as a research place is really good. One of the most interesting places in the whole continent was Winter Quarters Bay before the Navy dumped a ship load of diesel fuel on it. It was soft mud, but it was on the eutrophic side of the Sound so there was productivity and food for the critters there that does not exist on the west side. It wasn't like New Harbor and Salmon Bay which has some soft mud, but it was soft mud with plankton energy advected in from the north unlike the other side of the Sound.

So we had Bulla, the snail that we have here at Mission Bay. And naticid predators. It was sort of like a Mission Bay in the Antarctic. It was a very interesting place. And yeah, there was a truck or barrel or other trash here and there, but the mud was clean, it was whitish, and a really interesting habitat.

Then -- and I want to nail this down better as it is all hearsay, because Oliver got the information, and either he's forgotten or he's clammed up, but he told me the story that he got from somebody, or I don't know if it was Navy or a contractor. I'm thinking it may have been in the late 1970s or early 1980s. They had a ship of fuel, and somebody left the hose in the water and they didn't realize that the pump was running, and so they pumped diesel under the ice all night. I don't think anybody really knows or they weren't telling how much diesel is in there. That place will never recover. It's poisonous. I just can't believe how awful it is. I really sort of think that there's a cover-up going on even now, because they have a contractor that has been doing environmental monitoring for a long time.

PETER: In that bay?

PAUL: Yeah, and around McMurdo Station as well. It is really good to have a monitoring program, but in this case I think it is a pretty shoddy program. Somebody in the NSF must really look after the program because they have been doing it for 25 years or something, and but the science is poor. They've done a good job keeping track of the roads and things and disturbances around the base. They have a good historical record of what is going on in McMurdo over the years and it is very interesting because

the NSF has made a huge effort to clean up the base. The base is dramatically cleaned up from the earlier days, there has been a huge and successful effort. They should be complimented for this successful effort. But contractor's use of random samples is really silly because when you are looking for change through time, you want to have site-specific places so that as things improve, you see it. You lose all that if you randomize the sampling sites each time as the incremental changes are lost in the large-scale patchiness. And the marine sampling is equally sophomoric because the depth strata are wrong for the ecology and the sampling is wrong for the animal distributions. They should look at the contaminated and equivalent uncontaminated areas so that as things improve you see it. With their random sampling, they are not seeing the improvement that I think is obvious around McMurdo, they have really cleaned the place up, and I think it looks a lot healthier. These guys really can't show it because of the poor sampling approach.

Finally, they don't do the diving because Rob does it. Rob has to do Winter Quarters Bay because he's a commercial diver, he has to get into his hazmat equipment and go down in and get that oily sludge and bring it up. But when the scientists does not do their own sampling they miss the natural history associated with changes.

So they gave a talk, and I asked about the diesel spill. Here they are working with god awful oily samples that I have seen, their hands are all slippery, and the guy says, "There's no diesel." He just denied it. In front of the whole room, and what am I going to do? I thought the guy was just lying through his teeth. I don't know if it's diesel, it's broken down, it was fuel oil when it went in. So I went up to him later and I said what do you mean? He says well, here is the chemical definition of diesel and it is not diesel. Maybe it is a semantic problem, but considering the horrific reality of their samples, to brush them away like that seems very suspicious to me.

PETER: Yeah, right.

PAUL: So I think they're covering it up, and that's too bad.

But let me get back and finish out. I think that in terms of cost-plus, the modern contractors would do Halliburton proud. For example, the chainsaws. The need for chainsaws is rare, maybe to cut some wood for construction purposes but mostly sea ice and with the drill rig, that need is rare now.

PETER: Are you talking about back in the day, or are you talking about now?

PAUL: No, right now. But even back in the day, the chainsaws were for us to cut ice with. That's the only thing that I ever saw them used for, but I grew up in logging camps, and I'm good at chainsaws. We just had these old saws, they were Homelites, they are probably like the Sears ones now.

You could fix them, they were just sort of rugged and repairable and slow and not very powerful, but they were perfectly adequate for the job.

Now they have a rack of Stihl saws. I think of them as the standard for the professional loggers. They are very powerful, fragile, and they need to be tuned all the time. I think they're actually sort of dangerous because they are so powerful. Instead of buying cheap saws, sort of like a Chevy pickup, they buy a Ferrari to haul things. It's not a bad analogy, but the Ferrari is hard to drive and so are Stihls.

One of our courses that we had to take, it was an hour training us to use the saws. So before we had to go to the chainsaw school, we had to watch a 45 minute Stihl video, which is a commercial on how to use a Stihl in the woods, but we had to look at that. Then we had to have this poor mechanic, who is a nice guy and really exceptionally good at his job tell us how to drive the Stihl. He really was an expert and so damned nice that if we ever wanted a saw he'd have probably come out and done the job for us. So they've got these Ferraris lined up to do a Chevy pickup job with Ferrari mechanics. And in the same sense, the old vehicles, the old Power Wagons and the wheeled vehicles that we used to use, we had both tracked and wheeled, but now they are gone to be replaced by have something called a Piston Bully. You can't believe what a complicated miserable thing that is. I think it's made in Switzerland and it's made for ski runs, it's for rich people to climb into this upholstered back with felt and things. It's a nightmare to run. To start it you have to follow a long list of procedures such as turning on or off the fuel lines, you have to do go through a long checklist. It's like an airplane. The thing is fragile, it breaks all the time. They are extraordinarily expensive and they work ok on smooth ice or snow, but not on dirt after the melt. And they are so complicated to maintain that I am sure they have to have another herd of mechanics to keep the damn things running. But that hour or so of being trained to drive that thing was necessary as it is really difficult. So the training was important.

There was one or maybe two remaining Tucker snowcats left, a reliable diesel, a 1984. In the early days the big Tucker Snocats were the best thing we could use when we could get it from the poobahs, because the Tuckers are powerful diesel engines on tracks. They could pull fish houses anywhere and never got stuck and were very reliable. They are really remarkable machines made in Medford, Oregon. I went up and visited the factory last fall to see if they had closed and that was why we were stuck with Piston Bullies. But the Tucker factory is still there, they're still making them, they're still diesels, and they'll make anything because it's a small little factory. They'll make whatever the Antarctic people want, they'll make it, and you could probably buy four Tuckers probably or maybe five for one piston bully, and the Tucker works and is easily maintained. I can't understand why we need a fleet of piston bullies that, like the Stihl chain saws, are too fragile for that system.

The Tucker is so reliable. You put the heating plug in, you don't need a glow plug anymore for the most part, the diesels just start most of the

time without the glow plug. It's bombproof, and it's relatively cheap. But they don't use the Tucker snowcat, they use these piston bullies because of the cost-plus I think.

So these are examples. But the thing that really boggled my mind was the control of scientists and everybody. Everybody there is treated like a moron, like you don't have a brain and you have to go through these courses before you can do anything. So before we could go out on the ice - - I'm going to run through a list of courses we had to do. It took us 11 days. There were eight or ten of us there, and I don't know how much, somebody said several thousand dollars a day per person when you add it all up. Waiting -- we had to line up, sign up, take these courses, get certified before we could go out and do our research. The courses were good, sometimes not necessary, but good courses taught by competent and nice people.

For me with a Macintosh instead of a PC, there was a considerable hassle getting my computer certified to be virus-free, so I could plug the thing into the system and do my e-mail or just have it there at McMurdo. Certainly that is reasonable, but still a fair amount of time.

Then there's something called Happy Camp, which in the early days was a really good idea for the field parties. They go out on the ice and they learned survival skills in the early days from the Kiwis. So it's a good idea for the people that need it. But the survival school now is a really good school if you're going to climb Everest or work someplace where there is snow.

We went out, and it was really cold, it was early October. You go out by the windward area by Scott Base, out beyond Scott Base where it's really cold and windy and there is a lot of snow, and you camp overnight. They show you how to make snow caves, how to dig holes in the snow, which we never worked around. You don't get snow out on the ice, you just get ice. So it is important to learn how to set up tents and things that they teach you, and then we have to camp in the tent or the snow cave. People are all frostbitten, your face has got the white patches on them. You all survive it and Happy Camp is a tradition that everybody that leaves the base has to go through happy camp, I think they call it.

The teachers are really good. Again, it's this whole thing -- you don't blame the messengers. Those guys are wonderful. They were Alaskans, they are outdoors people, they are basically professional outdoors people, they are very very good, and they are very nice. They make you go spend two days out there freezing to teach us things we don't need. We work on the hard ice, and I think people should know how to set up their tents on the hard ice, but you don't have to go through all of that to do it.

Before you get into the lab and get your lab badge so that you could get through the door to come to work in the morning -- you have to have an electronic badge. And to get the badge, you have to have an hour-long tour of the Crary labs. And again, they're nice people, they're helpful,



they're showing you where things are. It's a great service. I don't mind doing it and I always appreciated their great and friendly help, but I could do that while I'm doing my research if I needed something.

The driving school... you go to a big lecture in the mess hall with a PowerPoint for an hour of the traffic rules at McMurdo Station. There are five stop signs or seven or something, and he has pictures of them. You have to stop. And if you don't stop, if you run a sign, somebody turns you in and you get called up and chewed out. Everybody is coming to a complete stop and pausing and looking around to see whether Big Brother is looking before they go through any of the stop signs. This is an hour just to drive a vehicle in town.

There's the sea ice school, which was a full day, and it's taught by the same guy that does the survival school. He is a great guy. He's trying his best to do what he is supposed to do. For that day it was cold again, and you go way out by Cape Evans where you learn to drill holes in the ice, to gauge the thickness of the ice, you learn to recognize a tide crack, that you don't drive into it. You learn to make the holes, and something useful if you are camping on the ice. For example, they have these really nice ice screws made out of MIG jets. We never had gear like that and it is great to have it and learn how to twist it into the ice; They just go right into the ice really lickety-split, they are really great.

So I learned how to put in ice screws in case I did want to set up a tent, which I definitely did want to do. So that's great, but you don't need to spend a whole day on it.

And the irony to me is I used to this in my own safety course.

PETER: For your scientific group.

PAUL: Yeah, I did it here, and I spent a fair amount of time on the sea ice. But it is the transition zone (where the ice meets the shore) that will break your leg because you can't tell where you're going to fall through. The transition zone can be genuinely dangerous. We never touched that in training in 2010, so that was maybe the only flaw I saw. The transition zone is a nightmare because the ice is all broken up and the holes and cracks are covered with hard windblown snow that you fall through not knowing what is beneath you. Rather than a day out near Evans, an hour around Hut Point in the transition zone would have been very helpful to people who have not done it before, but not everybody every year.

There's another school and a course for driving track vehicles. It was about an hour and a half, and we got to drive all of the track vehicles, and it was fun. I like to drive, so it was okay, but it took time.

There is another course for wheeled vehicles and trucks. The main thing is that you really do need to check the oil before you drive away, and

it's very important to unplug the heater plug. That is the main take-home message from another hour there. That was done by one of the only person with a real chip on her shoulder that interfaced with us. It was a lady I called Sally Blue (Sally Lyon I think), because she wore baby blue clothes all of the time. She harked back to the hostile age. All the other people that I interacted with were just human jewels, just wonderful, but she was seemed unnecessarily hostile.

So there was a tour for an hour or so of the food locker, which for somebody like me who was always interested, and she didn't mind if I filled my pockets with Cadburys and things, which I did. I had died and gone to heaven.

There was two hours with Mac Ops to learn how to phone in and how it's important to phone in because if you don't phone you are going to be in trouble. It was all about control, but with very nice people.

Two cold hours on snow machines, for which you always have to take this really heavy survival bag to carry with you. So we learned to drive snow machines, which again are like the chainsaws. They are really good, temperamental, but high-performance snow machines and the training was essential for me as they are totally different from other ones I have used.

PETER: By snow machines you mean snowmobiles?

PAUL: Yes, snow machines is what I always called them. In Alaska it is the term, anyway. In the 1960s we just called them Polaris, and everybody knew what you were talking about. One of my old Polaris I used to drive now is in the Christchurch Museum. That made me very happy to see this old Polaris that I drove around.

There is a small engine school, which again was important because there are lots of little small engines that you use. They are complicated, they have different rules, so you want to know this material and the guy was exceptionally competent and helpful. Indeed, that whole team was world-class working on temperamental and difficult machines like the new snow melter.

There's a two-hour lecture on protecting the environment, which involves peeing in little bottles, you can't pee outdoors anywhere, even on the ice where it can't be much of an environmental impact. But the class had a lot more and covered some important stuff, especially for people new to the Antarctic.

Basically the programs were all good - wonderfully friendly competent people doing their jobs very well. It's just the fact that you have to go through these things before we could go out and do our job.

PETER: So that changed since the 1980s.

PAUL: Oh, my goodness, yes.

There was a diving locker check out, which for us was useful obviously, and then the divers got checked out very competently by those guys.

There's a lecture on helo ops, which again, you've got to know the rules around helicopters. I'm not objecting to the material.

Then there's a waste recycling lecture about you have to separate your paper, and there's a whole hour learning how to put things into recycling containers.

Again, I'm okay with that, but it took us eleven days to get to be allowed to go out on the ice in 2010. That's a significant fraction of your field season, and the strong controlling attitude about rules seemed insulting. I don't mind learning things, but we could have been learning the things that we need to learn on the run, as it were, rather than wasting 11 days of a tight schedule to complete all of them.

PETER: Doesn't that harken back to what I asked you? That's a huge amount of a scientist's time that if you were working in an easier and accessible marine environment, you could have been gathering data and doing all sorts of things. It's a huge time investment to go there to do scientific work.

PAUL: And the other thing is that there is a massive bureaucratic nightmare getting all the forms done.

PETER: Upfront, the paperwork?

PAUL: The paperwork upfront, because if you don't think of everything you need, it becomes a real issue. It's a major and very important time sink.

PETER: Well then I'll re-ask my question. If you're an assistant professor and you really got to get your career going and get work out, Antarctica, that's a huge investment of time, reducing your scientific productivity for that amount of time, I would argue you could be much more productive if you could figure out interesting problems locally, right?

PAUL: Right. But I still defend the value of the questions that can be addressed at McMurdo.

PETER: And for publication, you've just got to come up with something interesting and great to have a career. Your academic review doesn't care if your work is off La Jolla or in McMurdo, you've got to get published. I think that's what I was trying to get at earlier.

PAUL: I agree with you, but I didn't want to denigrate the value of the Antarctic habitat.

PETER: I'm not, I'm just saying there is extreme pressure for academics to get work out and get published.

PAUL: For somebody like me, an old fart. I'm so glad that Stacy took me down and I got that in 2010, it's changing the Antarctic history of understanding the sponge community because of what we learned. The Germans just yesterday sent me a really neat paper, which is pretty much predicated on the stuff I told them a couple of years ago.

PETER: And that's all based on your data going back to the 1960s? Long-term data.

PAUL: Yeah, so Stacy's ability to get me down there ended up making an important contribution to the Antarctic benthic community. I say that without any humility because I had misled the science with my earlier work.

PETER: Right, long-term data are rare and important --

PAUL: But I couldn't, I wouldn't know how to fill out the paperwork that she fills out even before going down and being forced to do these required courses before going to work. I wouldn't know how to fill it out, and get it done right so that I could have my project.

So I think that the Antarctic as an ecological science for somebody new is practically a lost cause. For the lake people and the acidification people, I mean that's their only world, that's all they have. They go through this, but they get off base right away. For the most part those are field programs that are out in the field away from all of this.

Then they can enjoy that wonderful helicopter support. Now they take tractor trains to get gear to Marble Point. They took all our stuff over to New Harbor, it was all hauled over in a tractor, the big stuff, on a sled, and then huge amounts of stuff are taken to Marble Point. So the logistics are just spectacular.

I mean, I think of the early people that I worked with, if they could see what I saw in 2010 they would just be stunned. [LAUGHING] I was. I still am. And yet you still have this bureaucracy, which I think kills the assistant professors that you were worrying about.

Would I send a student down there going out in the scientific world? No, you're right.

PETER: No, because they've got to get their dissertation out?

PAUL: You're right, you've got to have a fast and effective academic life. You've got to have Stacy. If you don't have a Stacy, you are SOL for a program like mine. In contrast our program in the 1960s was in addition to our theses for Gordy and me.

PETER: And Stacy Kim's qualities would be, one must be very organized and systematic about this with of all of these requirements and paperwork and all of this stuff, right?

PAUL: And she's friendly. The people down there know her, and she obeys the rules. Oh, my God, some of the rules I didn't even get into. For example, in the lab, they treat everything like a hazmat, a hazardous situation. We can't have coffee, we can't have cookies in the lab, and twice a week some lab cop comes down to see if your lab is being maintained cleanly. Can you imagine somebody coming in and checking out my office?

PETER: Lots of coffee and food around Scripps labs.

PAUL: Yeah, so Stacy obeys all of those rules. Ethanol is treated as a hazmat and simply preserving samples needs a lot of environmental control to be sure that nothing ever touches anything.

PETER: So the research environment there is going to select for certain individuals who will be successful.

PAUL: Yeah, let me tell you one other little horror story that just talks about the intractable nature of this whole system. The wall, my favorite underwater wall --

PETER: Dayton's Wall off Cape Armitage?

PAUL: Yeah, I have so much stuff there. It's critical to our program.

PETER: Stuff meaning structure on the bottom that you put down there?

PAUL: That's right, all of my experiments and things. It was one of the focal points of the research from the very beginning. You've been there, you know where it is. I measured it once. It's 1,000 feet actually from shoreline from below the helo pad to that hole because I could see -- in those days you could see the shore from there on the other side of the jetty so I had the visibility measurement. So it's a little under 1,000 feet to where that house is, maybe 700 feet from the jetty. It's an easy walk.

The fuel line goes across the ice between my research area and the base, the fuel line to the airstrip. Now it's just inconceivable that a scientist could be trusted to step over a fuel line, so you can't walk out on the ice straight to my house. You can walk on the ice, and people even walk in from the strip on the road. The road goes off about maybe half a mile where they have a bridge over the fuel line. So you go out several hundred meters, cross over the fuel line on a bridge, and then you come all the way back in to the house that you could practically hit with a baseball from camp. Well, maybe several throws for me; it's 300 yards, but it's an easy walk.

So that means then that I have to have a snow machine to go help the ROV team find the sites and work on them. That means I have to have two people, because you're on a snow machine and you can't be trusted on a snow machine by yourself. That means you have to have a survival bag which weighs 80 pounds or something and takes up all the space on the snow machine, and you can't leave it out by the snow machines because people might steal it. So that means I have to carry this thing that I can barely carry. It's not really 80 pounds, but it's probably 40 or 50. It's a heavy mother for an old fart. Our strong women could carry it, but I was having trouble. Old age.

But you have to take it out to the snow machine parking lot on the ice where they are all lined up out there. First you have to grovel to Sally Blue to get the machine which she says are all busy even though you look out and see them lined up, but once you have permission to take one, you have to find somebody to go with you, drag the survival bag out, and go through all of the rigmarole of getting the snow machine going, which is about 10 - 20 minutes even if it starts when it's supposed to. It's still a good 10 minutes just to get it there, and it's another 20 minutes to carry that crap out.

Meanwhile, I'm trying to get to that hole over there where they are running the ROV and they need me because I know where everything is underwater. They are having so much trouble with the ROV and I am doing stuff in the lab, and I have so much to do, I have to go back and forth.

Well, I can't go back and forth because I can't normally get a buddy to drive the snow machine out with me and help me carry the survival bag, to drive over that bridge and back to the house, and nobody wants to go out and waste time while I work with the ROV drivers and things. So it really did truncate my research to do something that, for God's sake, I could have walked over less than 10 minutes, and I think I might be trusted not to cut the hose.

PETER: To be able to step over it instead of step on it?

PAUL: To be able to step over a hose. Right. This is the type of thing that is simply insulting, and there was just no negotiating that. Stacy tried, I tried. Rules are rules. That's their attitude; 'we are in control here.'

So these are the types of things that sort of weigh on you. But I think I am way too negative about one of the most wonderful parts of my life. Can I have a few minutes more to switch over and try to recover the magic that the place has always had for me?

PETER: Yes, please go ahead.

PAUL: I was fixated on my memories of the support stuff rather than on the magic of the Antarctic that is so vital to almost everybody who has worked there. Obviously it is unique in the world, and it is also one of the

most wonderful places in the world and it has a special magic that just keeps on growing in your soul. I think most people would agree.

PETER: I agree.

PAUL: Because of its history and remoteness it was always mystical to me, and when I climbed out of the old Connie in 1963 I remember standing there looking at the odd vehicles on the ice such as weasels and Nodwells, the Kiwi's had their dog team, and I knew it was everything I had dreamed of and so much more. Over that year it turned out to be so much more than I ever might have imagined, all those trips to such spectacular and beautiful places, the animals that I had expected were better than I dreamed, the history with the huts and really with the trips to the dry valleys and Crozier that I had read about truly came to life. Each of those places had histories from the heroic age and we even found signs of the old heroes. God it was a life change experience for me. To be sure I had my ups and downs, but I simply cannot imagine anybody growing up so much in one year as I did that year. I was a totally different person when I left. To be sure, I moaned in my journal and was angry now and then, but the people I met, such as George Llano, John Twiss, Bill Austin, Phil Smith, Bob Rutford, Tom Berg and on and on have been truly the most inspirational people in my life. Nothing matches the wisdom I have acquired from John Twiss over the years and the scientific friends from the Antarctic are still some of my very best friends. And some of the best scientists I have ever known.

The magic is striking, overwhelming at times and subtle at other times. The perpetual whiteness is so very uplifting. I remember thinking even in the dark of the winter how wrong Dante was to describe his lowest hell the way he did when really it was so uplifting and wonderful. The sounds are embedded in your mind, from the windless silence when you are out on the ice and it is deeply cold, and then you hear the ice cracking, the seals through all that ice trilling, and your slow breathing with the tinkling as the vapor as your breath freezes. At the same time you always remember the howling and screaming gales with the low moaning of the wind in the power lines outside your building, struggling to walk against it in the dark feeling variations of the wind on your face as you move within a wind-shadow created by a building and then move out of the shadow, the twilight pinks of spring and fall with the nacreous and noctilucent clouds I had read about. But no photograph ever taken can even hint at those brilliantly bright nacreous clouds or the mysterious blue of the so very high noctilucent clouds. Or the magic of the first sighting of the sun after the long winter and thinking how it was for the explorers - Kelly Rennell and I drove up to Evans and Royds so I could experience what they had experienced and the memories still make me shiver.

The research even then somehow seemed impossible and maybe not real. The blood glacier, warm lakes under meters of ice, Bob Black's and Tom Berg's patterned ground, the distilled water Tony Gow extracted from the middle of the sea ice in early spring or the deep frozen springtails, tardigrads and rotifers or the deep diving seals and penguins. Somehow it still does

not seem possible and will always be magic to me. Do I have time to mention my research?

PETER: Please do.

PAUL: I don't know why I talked so long about the support system when my whole life revolved around the research I was trying to accomplish. I have talked enough about the 1960s, but I think of the 1970s as the John Oliver decade and the 1980s as the Jim Barry decade.

When I returned in the 1970s I knew I wanted to study recruitment biology and quantify the benthic productivity gradient that I realized was important to my system and I desperately wanted to take advantage of the calm conditions of that system that allowed us to establish experiments to evaluate the larval recruitment biology. At that time except for John Pearse's early work on one starfish that was reputed to have demersal larval, very little was known about larval biology in the entire Antarctic and I knew that Pearse was wrong about *Odontaster's* larvae as they had settled in structures off the bottom. And I was very anxious to try to work on soft bottoms. John Oliver was the perfect colleague to collaborate with and between us we learned a lot about larval settling biology. In fact, the first thing that the team led by Gordy Robilliard did early in 1974 was set up settling plates at various levels above the bottom and supported by floats off the bottom. This was done explicitly to measure the water column distribution of larvae that John had written were demersal. Finally in 2010 those ancient experiments demonstrated settling biology nobody had ever dreamed of.

But it was John Oliver that stimulated our work on the other side of the Sound and a paper that came from that changed our understanding of coastal ecology in the Antarctic and it was a terrific lesson to me about appreciating the importance of oceanography to marine ecology. With the help of Dan Watson and others we did get a rough measure of the large differences in benthic chlorophyll and we saw amazing recruitment biology we could never have anticipated simply with the reduction of anchor ice, we experimentally outplanted a species of acorn barnacle that had survived the ice ages on Pennell Bank.

One interesting development that was extremely useful to John Oliver's thesis was the aquarium with flowing sea water. For years Art DeVries had asked to have one built always being told it was not possible, it would all freeze and it was a big waste of money. So Art built his own! He put up a Jamesway near the water intake system and ran a line off that into his tanks in the heated Jamesway and as simple as that there was running sea water that Oliver was able to use, especially the year he wintered over.

Thinking through the things we did those years I realize that in addition to the interesting science, there were many important social breakthroughs for McMurdo Station. I remember arguing with Navy officers about having women at McMurdo and there had been a couple of tentative efforts with



teams of mature women who had flown in and gone into the field, but John's wife Donna was the first woman to winter over at McMurdo and as many of us had predicted, the men shaped up in her gentle presence and everybody behaved better than they had ever behaved in the winters before. Mary Alice McWinnie and companions had spend part of a winter the year before Donna but I think Donna was the first person to spend a complete year there.

For me the 1980s was characterized by my efforts to push other scientific boundaries with recruitment questions and especially with bacteriology while Jim Barry defined the oceanography in the Sound. We had wanted to better define the larger scale currents that drive all of the benthic ecology in the sound and Jim was and is an excellent scientist who simply could do anything including all sorts of oceanography. Jim's two papers rewrote the book that Jack Littlepage had started as a young graduate student in 1961. To be sure, Jack's paper is still the most remarkable and creative single coastal oceanography thesis I have ever heard of, but using crude equipment that we scrounged and begged and jury-rigged, Jim did a spectacular job of synthesizing the oceanographic processes for the entire region. I did mention the bacterial work that Judi Hansen and I were not allowed to complete by vindictive program managers, but over-all we accomplished an amazing amount of very high quality science in the 1980s. And the science truly was exciting, especially as we explored and studied the unique benthic community at Salmon Bay. But always I was utterly dependent upon Jim Barry who could do anything.

And in sincere appreciation for the support that we received, I regret focusing on the problems. The logistics that went into our programs boggle the mind. And our day-to-day operations really could not have been done without the various Biolab managers of the era and especially without the spectacular turn-around of the diving support. Some of this would be easier now with the huge number of really enthusiastic surface support But while I have been complaining, we relied on a great deal of helicopter support that one way or another made the difficult field work possible. In addition, we always received wonderful support from many of the support personnel we actually interacted with such that we became good friends with many of them. As I mentioned, I think much of this is thanks to Dave Bresnehan who really pushed the envelope to help us do the fieldwork that we did.

Finally I have to mention a couple little vignettes in defense of Wilkniss and the NSF. I'm not sure when it started, it might've started in the 1970s -- there were two I think extraordinarily dishonest NGOs that really soured me on the environmental movement. Now I know with much more experience how dishonest a lot of NGO environmentalists are considering my experiences with NRDC. The two really bad ones at that time in the Antarctic were the Environmental Defense Fund in the beginning, and Greenpeace.

The Environmental Defense Fund saw an environmental report somebody did for the NSF which had some bottom grab samples that somebody had taken

from Winter Quarters Bay before the oil spill. One of the samples, I think probably hit an old battery or something, something bad down there, so there was one sample of many that had high PCBs, and this was when the Bay was pretty clean.

So even though there were several other samples and the adjacent second grab was clean -- Bruce S. Manheim made a lot of money for the EDF. I've got his report and put it in the library, but as I recall they took that sample and blew it up to claim the entire bottom was like that and got thousands of dollars in donations to clean up the Antarctic because McMurdo Station was dirtier than anything in the United States. They took the single sample, extrapolated to the Sound and claimed we were dirtier than Boston Harbor that was in the press then for its polluted benthos. Sort of made our area look like a super fund site. And it sort of made me sick.

And then one of the NGOs claimed that our air pollution had killed off all the lichens in the area around the station and somebody had found bits of sponges on land and claimed that it was from our pollution. Of course sponges come up through the ice and do blow around naturally. At McMurdo Station, there aren't many lichens. And in fact, the lichens grow on really older rocks that aren't tumbling around like the volcanic gravel of Hut Point, the ground around Hut Point Peninsula is fairly fresh volcanic ash and gravel and stuff, so it's not a lichen habitat. But there are lichens over at Cape Evans and Cape Byrd and Cape Royds. So they claimed our air pollution killed off all of the lichens on Hut Point Peninsula. This is the sort of thing that was going on.

Greenpeace was also making probably millions of dollars in donations to clean up the Antarctic, and they actually set up their own base to police the NSF because cardboard and things were blowing around, which they really were. I don't think it was doing any environmental damage, but stuff was blowing around, especially after we had to treat everything as hasmat and box all of that unnecessary packing to take it on the helicopters. So there was plastic and things blowing around, which shouldn't have been blowing around, but it wasn't a disaster, it was just a nuisance type of environmental impact.

So they set up their own base at Camp Evans right beside Scott's sacred hut for a year while some of these kids wintered over, policing the NSF. They had their snow machine, and they would come in and drive around taking samples of the snow, and they would go up onto the fueling area at McMurdo where you fuel up the vehicles, where there are some spills that they recorded. They take samples of that, and then that gets exaggerated through the press.

PETER: And it's not private property, so they can go freely where they wanted to?

PAUL: Oh, of course, they can go anywhere they want, and so they were all around the base doing those things when I was there. These exaggerations

contributed to this overkill in the environmental stuff where now they even weigh your poo and your pee when you are coming back in to make sure that you brought it all back in because they have a calculation of how much each of us should do. This isn't just the NSF. I think all the countries are supposed to do that. It's because of these two flamingly dishonest NGOs making money by talking about how the NSF is ruining the Antarctic.

Then, bloody hell, somebody went and dumped all that fluid in Winter Quarters Bay, and did ruin the best habitat. So, what the heck. During those years -- and I was fairly visible because I was working in the Antarctic and was around, I went to meetings fighting this stuff. I remember one in the New England Aquarium where I ranted about their dishonesty and defending the NSF at these meetings. They couldn't argue with me but they were very good at the political pivot in which they change the subject. They were interesting meetings.

I think that to be fair, Peter Wilkniss and Ed Todd had their hands tied. They had to deal with these NGOs and the press they created. I'm pretty depressed about the integrity of the environmental movement when it gets into big business like that. So that's something I wanted to get on to the record. I think a historian could get an interesting book from mining those old documents and the government responses.

PETER: Because you saw it there first-hand up close.

PAUL: Yeah, and you have a file of Manehim's doggerel and other stuff into one of those boxes you have.

PETER: Into the Paul Dayton papers in the Scripps Institution of Oceanography archives.

PAUL: The other issue I want to bring up that is a personally important has to do with my student that died. He was Jeff Rudd. He was there in 1975, he went to the ice before I did that season. They were out coring a road to Cape Evans, doing everything right. There were four of them in a Trackmaster vehicle. They were stopping every so often and coring the ice. It was six, eight feet. It was sort of normal.

PETER: So there wasn't a flag road put up on the sea ice?

PAUL: No, we didn't have flag roads. We made our own roads, and we didn't use flags because it was a lot of work to drill holes for the bamboo. We knew the way, and as you go with a track vehicle, the tracks compress the snow and it stays a long time, so you follow your own roads. When you get to tide cracks, you find the best place to go over the tide crack that is safe, and there we would put flags. So we would go over the tide cracks carefully.

But in this case it was the first trip out, and they were coring the road and they were out by the Erebus Glacier Tongue. They'd pulled up in the

Trackmaster just to stop to core. The guys didn't have their coats on because the Trackmaster had heat, it was a calm day. They would jump out, the core was out the back, you open the back door and put this core on out and vroom, then you get back in and you drive on another 300 or 400 yards and do it again.

Jeff was driving and he stopped on what we now know at the time was a snow bridge that he couldn't see. There was a tide crack that was just inches longer than the Trackmaster was long, and there had been a big storm and the snow had blown in and frozen. So this is a fairly common polar phenomenon of blowing snow freezing and being pretty hard.

PETER: And the crack was that wide?

PAUL: The crack was wider than the snow track, the Trackmaster, just a little bit. So they came up to a stop, it settled, and crack, it went through. The guy in the front right seat and the two guys in the back, got out while it was in the water -- one guy I think was dry, he jumped out so quickly that he scrambled up, and the other two were in the water.

And one of them got caught on the right-hand door as the Trackmaster went down. His feet were caught. The other two guys at this point, one was in the water holding him as best he could, the guy on shore was holding him, and so he didn't go down with his feet, but it pulled his boots off.

Jeff meanwhile had a brand-new camera that he had bought, and the last they saw of Jeff was he was turned to the right from driving this thing to grab his camera which was in the backseat. And he never got turned around and got back out, and he went down with the vehicle.

So the two guys that were in the water were trying to dive down and see if he was under the ice, and this was out by the Erebus Glacier Tongue.

PETER: It's deep there.

PAUL: He was at 1,500 feet before he knew it. These guys were out there without coats, maybe one of them had a coat. One of them didn't have shoes. Two of them were from Minnesota, so they were outdoors people to start with. The other one had been through my little course, so they sort of knew how to take care of themselves. And they did, they got back. They walked all the way back from the Erebus Glacier Tongue to the base without a frostbite or anything.

But Jeff was dead.

I was in Christchurch. Poor Margaret Lanyon, the lady that ran the Christchurch office, had to come find me. It was a really ugly, sad scene for me. It was just awful. Somebody had to tell Jeff's mother, and I knew that Jeff's father had just died of cancer. So Jeff's mother was dealing with that, and now somebody had to tell her about Jeff, her only son.

Rudford was involved. He was director at the time. He was very supportive, and I'm down there at Christchurch on the phone bawling and carrying on. Who is going to go tell the mother? So, poor Gordy Robilliard. The mother lived in the Bay Area where Gordy was, and old Gordy went out and told her. What an awful thing to ask of a friend and he did a terrific job. So this was a big thing that really shook me up very profoundly. I still don't know what I would have done without Gordy - man that guy earned a lifetime of my worship for sucking it up and doing that. I can't imagine how awful it was for him. Meanwhile everybody at Scripps was doing all sorts of things to be helpful, as was my wife of course. Sometimes you really don't know how many wonderful friends you have until something like that happens. And Rutford and Llano in the NSF were just extraordinarily helpful.

So the next year I set about getting a monument to put up for Jeff. I went to Ed O'Connor who had been down there. I think he may have been the guy who replaced Jeff. And Ed made up a really nice little monument, a rough hewn pole that is about maybe four feet tall. He had made it of brass but then he chromed it so it was all silvery, and the idea was that the silver would blow off in the wind and the gravel, and then the brass would streak green and it would be pretty.

So we had this monument that we were taking down with us, I think it was in 1977. We had it there, I managed to get a 100 lb bag of cement and another heavy bag of clean sand, and I had a plaque made up. Everything was ready to go, but we never really got it done for one reason or another during the season. We found the place to put it, and we had been down there with a pick and a chisel and cut a little hole into the permafrost so we could put the cement in. So anyway, on my last day it had to be done. It was very blustery cold weather, but it was my last day. So I got some people, it was Jerry Kooyman, Jim Barry, and I think John Oliver or maybe John Boland involved with putting this thing in. We got a couple 5 gallon containers of hot water because we knew the cement was going to be hard to mix in that cold. All of this was in the back of the Trackmaster, and a banana sled, and that big 100 pound bags of cement and a couple buckets of the clean sand. We planned to use buckets to mix the cement in, and took the monument and the marker and headed to the site at about midnight of my last night that season.

When we got there it was just god-awful weather. We had to drive along the shore in a lot of blowing snow. We really had very bad visibility. We left about midnight and went out. We had to go to the place because we'd dug the hole in the frozen ground, and we had to put it there because it was the only place we were going to get a hole dug. The hole isn't very deep, but it was maybe 200 meters up this hill, and the hill might be few hundred feet high. You know, it's not that big a deal. But the snowpack was awful and hip deep and very hard to walk in-- we fell through, and it was often at least waist deep. So we are pulling this banana sled, and we took turns breaking trail with the buckets, but mostly it was Jim Barry who was the strongest, and these two buckets that had the sand. We took

turns with the buckets breaking the way by swinging the buckets up and sort of throwing them into the snow where they buried themselves ahead of you, and then you would plow up and get them, lift them up and swing them up. We took turns as this was the hardest, but Jim did most of the work. The rest of us were trying to maneuver the banana sled with the 100 lbs of cement, the water and monument and plaque and stuff. To make it worse, there was a really strong wind right in our face freezing our skin and making it really hard to see through the driving sand-like snow particles blowing in our face.

It was the only time ever that I've actually used a balaclava to get my face covered. My glasses froze over from my breath coming out of the balaclava, so I had to put them in my pocket. So I have this balaclava and I can't see because I don't have my glasses and the snow was blowing into and freezing my face, and I was so damned frustrated because I knew that hot water was going to freeze solid before we could get there. I was bawling like a baby with frustration because I really wanted to get that in there, and we just weren't making much headway. I was really frustrated, an emotional wreck to start with because of Jeff and now this act of God preventing me from leaving something to remember him.

Finally we struggled up there, and everybody worked really fast, there was a horrible black cloud around us with the blasting wind screaming over you, and you hardly see anything. One person enlarged the hole with the chisel and then hammered the chisel deep into the permafrost as we mixed up the cement with the buckets and the hot water now cool at best so we had two buckets of the cement powder mixed now with the gravel that we carried up there in those buckets, and we were mixing as fast as we could with a little shovel we had.

So we got the monument in over the chisel and positioned it with the plaque, and got the monument sticking up there, and then we poured the cement around it. I thought it was going to freeze before it set, but it didn't. It went in and settled down, and the monument was standing up in the wind and it seemed that the base was solid.

Finally we just sort of paused because and took a deep breath and we stood there panting. And after all of this the tears were frozen on my cheek from the frustration and my balaclava was still all over my face, and I got my glasses back on and looked around to see that the black cloud was moving north where it was now hanging over the frozen Sound, and little bursts of bright sun beamed through it and one hit us and the shiny monument. I heard the others going ooo and aaahh experiencing something of a spiritual moment as this beam of light with the black cloud around us was reflecting off the monument on our faces.

I am sorry, I still get chocked up thinking about this. It was a very bad time for me and I was in a dark place in my life, and then this happened and it obviously affects me even now. But nature was not finished as we quietly experienced the wind dying and the black cloud moving north there were other beams of light shining through the cloud and there were little

flicks of white moving through the sun beams off in the distance with the black background and I thought at first it was ice on my glasses. But the flicks of white were actually circling us and eventually really did circle us up close in our sunbeam with the monument. They were a flock of snow petrels obviously circling right around us. I'd never seen them before. Jerry Kooyman had never seen them, but he and Jim knew what they were, and at that time Jerry said that they had never been seen south of Cape Hallett. I think they do show up at McMurdo now with global warming, but they weren't there then. It was so spiritual and unreal and you can see I still cry just thinking about them circling us in the beam of light with the black background and the sun now reflecting off the monument and these pure white birds circling us.

PETER: Wow. Magnificent.

PAUL: It was really neat. When I flew out the next day in the afternoon, I could see the glint of the monument from the Herc as we left McMurdo and flew up. Ed O'Connor himself then died a few years later leaving a little baby. Well, I don't know how old the baby was when he died. I think the baby was two or something when Ed died. The baby's name was Kevin, and Kevin O'Connor was with us in 2010. So Oliver and Stacy got Kevin down there and got us to the monument his father had made and I cried all over again, but I have a picture of the two of us there in 2010. I will put a picture of me after we put it in and the more recent one into the archives.

PETER: Oh, really? I recognize the name now from reading Stacy's blog. Yeah, that's wild.

PAUL: Yeah. So I just sort of wanted to end with something nice.

PETER: A nice memorial for your student.

PAUL: Yeah, I wanted that.

You know, it's just to my own sense from coming back sort of 50 years later, going to McMurdo, and it would be true for you too. The magic is still there. You watch the last sunset in October as it goes over Mount Discovery and then doesn't quite set the next day, and you are watching it at midnight every night. You are outside, your cheeks are hurting, and it's cold. You can look down and see Discovery Hut; it is still there. The ghosts are still there. It's magical - spiritual. It's still really neat.

PETER: To be able to build on your earlier work is special, you shared with me the PLOS paper on long-term sponge growth [Dayton PK, Kim S, Jarrell SC, Oliver JS, Hammerstrom K, et al. (2013) Recruitment, Growth and Mortality of an Antarctic Hexactinellid Sponge, *Anoxycalyx joubini*. PLoS ONE 8(2): e56939. doi:10.1371/journal.pone.0056939]. You wrote how things changed over 50 years, or didn't. I think that's really cool that

not only did you go back and see these things and all of this, but you had this great scientific work you got to do too.

PAUL: Thank you, and that is a good point to end it with. Because that return that Stacy engineered, -- for which I am extremely grateful -- it's really enhanced science. The entire Antarctic benthic ecology literature is based on our work from the 1960s, that things don't grow, and now we see that they episodically grow like mad. They did it from 2000 to 2010. All sorts of stuff happened. That's changed people's perception of that whole system.

PETER: I was surprised reading that article about how nothing seemed to much happen, and then boom, it took off, and then you tied it into the big iceberg grounding -- or you speculated rather.

PAUL: That's right. I knew it was so important that when we came back, the first thing I did was set up a trip on my own dime. I went over to Bremerhaven and my friends there organized a gathering for the people in Barcelona and Bremerhaven that work on the Antarctic, they were really the only benthic Antarctic ecologists working in that habitat in the world. So it is not a very big community, a small room full of people.

So I told them everything. So they knew, but they really needed it published so they could cite it, because now they are rewriting their own papers. Thank God we did get that out finally.

I was just thinking about Jeff and the fact that the magic is still around. I went up to Observation Hill where the old explorers sat looking south for their companions, I'm sure they sat there - there is a cross there now, but there wasn't a cross there then. They were watching for companions to come back over many years, people were struggling back more dead than alive and staying in that Discovery hut for months waiting for the Sound to freeze. Year after year there were different parties, because they would always have two parties leaving out caches and things. So people were always struggling back barely alive, and there were people up there waiting for them.

I can sit up there and transform my little mind into their minds and be thinking how much they missed their families, and how they were worried about World War I. I can imagine just like my crying about Jeff, they were people -- Sir Charles Wright certainly was -- they were just people like us sitting on that same rock a little out of the wind, and you can sort of lean back and let the magic happen and experience the ghosts. I'm sure they were sitting there where I sat and I can see them and put myself into their minds and know I am feeling exactly the same emotions. In so many ways we are all one. The magic is always there. If you get back, you will see what I mean.

PETER: Okay.