BOEM DEEPWATER GULF OF MEXICO HISTORY PROJECT

OFFSHORE ENERGY CENTER HALL OF FAME

Interviewee: Dr. George Vance

Date: September 25, 2010

Place: Houston, Texas

Interviewer: Tyler Priest

Ethnographic preface: George Vance grew up in Brooklyn, and from high school shipped off immediately to the U.S. Coast Guard Academy. Vance would end up spending twenty years in the Coast Guard, the first half as a shipboard engineer—primarily on an icebreaker—and the second as a professor back at the Academy. Vance earned his doctorate while at the Academy, from the University of Rhode Island, focusing on modeling vessel behavior in ice. For three years, Vance was able to test scale models of icebreaker designs in a custom-built ice tank built by the Army Corps of Engineers. Vance soon retired from the Guard and took on with Mobil, in their Ice Engineering section, where he helped design the landmark Hibernia platform. Vance also served as Mobil's designated representative in the DeepStar industry consortium. When Exxon and Mobil merged in 2000, Vance retired, having spent twenty years in the Guard and twenty at Mobil.

File 1

TP: This is an interview with Dr. George Vance for the 2010 OEC Hall of Fame. The interviewer is Tyler Priest. We're in Houston, Texas.

Let's just start off with a little background. Where are you from and where did you grow up?

GV: I was born in Brooklyn, New York, and went to Brooklyn Tech High School. Then from high school I went directly to the Coast Guard Academy.

TP: What drew you to the Coast Guard Academy?

GV: Well, it was a free education, first of all, and, second, it was a small school that I could fit in with easily. We only had about, oh, less than a thousand students, compared to about four or five thousand for the other military academies. And I enjoyed New England, so I stayed at the Academy.

TP: Were you a sailor, interested in boats to begin with?

GV: Well, not really. I just wanted to be an engineer of some sort. After coming out of the Academy, I liked boats and naval architecture. My first assignment was three years on a cutter that went offshore, off Newfoundland, and monitored the flights from the U.K. to the U.S. and the U.S. to the U.K. With the onset of jets, that stopped and we did other things.

So I spent the twenty years in the Coast Guard, and that was divided into two parts. One part was in the field, where I was a shipboard engineer, particularly on an icebreaker, and then I went to Michigan, got a degree in naval architect, marine engineering and nuclear engineering. Coast Guard thought it was going to have a nuclear icebreaker.

TP: Oh, really?

GV: Yes. But Admiral Rickover put a stop to that, and he encouraged us to go with a conventionally designed breaker, and we did. We changed the shape from the old Wind class to the new Polar Star class.

TP: Were you working up in Alaska at this point?

GV: Well, not at that time. At that time I was mostly on the East Coast, working up in Greenland with the icebreakers. We stopped at St. Johns, Newfoundland during the summer, and I thought, boy, I wouldn't want to be living here. It was cold and windy. As it was, I ended up my career at St. Johns. [laughter]

But after ten years in the field, they asked me to come and teach at the Academy, and I spent the last ten years of my Coast Guard career at the Academy. I got my Ph.D. while I was at the Academy, from the University of Rhode Island, and my Ph.D. was modeling vessels in ice.

In addition to that, the Coast Guard said, "Well, would you design a tank that we know we could use to test our icebreakers?" So I did. The Coast Guard looked at the tank and felt it was too expensive to build, so the Army Corps of Engineers built it up in Hanover, New Hampshire, where Dartmouth is. Afterwards, a colleague of mine who I had met in the many icebreaking trips we made, was working for the Corps of Engineers, and he says, "Why don't you come up and run the tank that you designed." So that was an opportunity of a lifetime, and I went up there and for three years I worked with [unclear], testing Coast Guard icebreakers in the army tank. It was quite interesting, because by that time some of the students I had were now in charge of the Coast Guard design of the icebreaker. They were coming back and testing it in the tank that I ran.

TP: And these were model—

GV: Models, yes.

TP: How big were the models?

GV: The models were about twelve to fifteen feet in length, and the tank had to be specifically designed for ice because of the modeling of the ice. You just can't freeze water and say this is the model ice. It had to be weakened. Just as the model of the vessel was smaller, the ice had to be weaker.

We did that for a few years, and then I got a call from a headhunter and he told me that his client wanted somebody that knew vessels and structures in ice, and would I come down and interview. I did, and that's when I got the job at Mobil, and I was with Mobil for twenty years. My life there was kind of in two sections. I took the job in the Ice Engineering Section of Mobil.

TP: And where were you based, in New York?

GV: We were based in Dallas. They had their offshore engineering in Dallas. We were based in Dallas, but we worked all over the world.

The reason that they were interested in somebody in ice, they were searching for oil in the Grand Banks, and they were worried about icebergs. They wanted to know how much of an impact an iceberg would have on an offshore structure. Mobil and Exxon had done a lot of work in concrete structures over in Norway, but they were big round structures that they dropped in and had legs. We knew that we couldn't have that kind of structure in the Grand Banks because the icebergs would break the legs. So we came up with a structure that had the concrete structure come up through the water line, but it was star-shaped. It wasn't round. It was star-shaped because our research indicated that as the iceberg hit, if you had a large area, it would have a large impact force. If you had a smaller area, it would gradually enter into the structure. So we had a star-shaped structure. It cost about five billion dollars to put in, and it was the first offshore structure in the Grand Banks.

TP: That's the Hibernia.

GV: That's the Hibernia, yes. It was very, very successful, pumping about 300,000 barrels a day. Then they came back to me and they said, "Look it. We can't afford another five billion dollars. Could we do something less expensive, something in a ship? Could we do a ship?" So we did some research and came up with the idea, yes, we could do a ship. If you're worried about the iceberg, we could make it disconnectable if an iceberg came. Just press a button and all the flow lines drop in, there's a buoy that holds them up, and if you're worried about the iceberg scouring the wells on the sea floor, we could drop them below the mud line. If we dropped them below the mud line, we knew that no iceberg could get below the mud line because it would stop. So we designed the Terra Nova Project, and we had a lot of success with that.

TP: This was a floating production, storage and offloading vessel.

GV: It was a floating production and offloading structure.

TP: For the Grand Banks?

GV: For the Grand Banks. And it came out about two billion dollars, but it only produced about 150,000 barrels per day because of the limited topside load that we had. But that was successful.

TP: Were there major icebergs that impacted the Hibernia or the Terra Nova?

GV: Well, in retrospect, Terra Nova was never threatened by an iceberg. The subsea wells were never threatened by a scouring iceberg. If you want to take the risk, you could decrease what would be the strength of the design, more or less, if you wanted to take the risk. What we found in testing the tank is that as the ship stood there and the iceberg came down, there was a current that was on both sides, and instead of hitting the ship, the iceberg would follow that current. So it really never impacted the ship. But the government wanted to be safe, so we made it disconnectable. Just the turret alone was $250 million, just the turret, the designer turret. It was designed by a Houston firm.

We had contractors from all over the world. The ship was designed and was built in Korea. Brown & Root Kellogg was the primary contractor. We designed it over in London, and then the Canadian government said, "You must now have all your managers up at St. Johns." And that's how I ended up in St. Johns, after saying I never wanted to live there. I ended up in St. Johns for two years. So after twenty years with Mobil—

TP: What time period was this that you moved up to St. Johns? What year was that?

GV: It was about the early nineties, '95 or something like that, '93 to '95.

Then I was up there and we were just at the finishing stages of the design when Exxon and Mobil merged. That was about 2000. They made an offer I couldn't refuse, and I retired at that time, after twenty years. So I had twenty years in the Coast Guard, twenty years with Mobil, and now I hope to have twenty years in retirement, at least.

TP: And you're not living in St. Johns.

GV: No, I'm not living in St. Johns. I'm living in Venice, Florida.

TP: So you got involved in DeepStar from Mobil or with Mobil?

GV: Yes. After I joined Mobil, I was manager of the Ice Engineering Section, and that's when we did some work with Terra Nova and Hibernia. They asked me to go up to St. Johns, and I said I really didn't want to go up to St. Johns. So they said, "How about Toronto? You could look after, as a technical adviser to the project manager, look after the projects that were going on in Nova Scotia and the projects that were going on in Labrador, Newfoundland." So I did. I was up there for two years.

Then they had some difficulty negotiating with the government of Newfoundland, so they almost shut down the Hibernia project. They said, "Okay. Why don't you come back to Dallas and be manager of the subsea," and that's when I got into Deep Star. We had an excellent staff. Curtis Burton invited us to join. The idea was to break the paradigm of everything has to be secret to every oil company. There were some technologies that could be developed on a joint basis and shared, and then applied by the companies in the most cost-effective way. So we did, and I thought it was a good idea and I joined wholeheartedly, convinced the people at Mobil that it was a good idea.

TP: Was it difficult to convince upper management in Mobil to go in on this?

GV: They would always ask, "Are we giving away a trade secret? Are we giving away something that leads to our bottom line?"

And the answer was, "If we were, I wouldn't do it. But I think that Texaco—at that time it was Texaco—is working on the same problem we're working on, and we're just paying contractors twice to do the same work." So it was difficult at first, but then when they saw the benefits of what was coming out of DeepStar, they gave us a free hand.

TP: So you were Mobil's representative.

GV: I was Mobil's representative. The way we worked it, each company had a representative that went to most of the meetings. Then we would come back and if there was something on flow lines, I would get my flow-line man involved and he would go to the sub-meetings on flow lines and then come back and report to me. Then I would bring that to the general meeting, and we'd decide whether we were going to do A or B or which way we were going to go. But it was really bringing the technology back to my company, to the individual that had the expertise in that area, because I had people that were experts in flow lines, expert in subsea structures, subsea wells, things of that nature. So that's the way we went.

I give a lot of credit to Curtis because he kept it going. He kept pushing and got contractors to eventually join too. So we had contractors and oil companies working in Deep Star. I didn't think we were pioneers, but I guess we were.

TP: You must have been one of the first companies that they brought in. Was Mobil one of the first companies they brought in?

GV: I think so. I think so. I saw the benefit of doing the—because we had a few of these what we call joint industry studies, where we would get together with, say, Chevron and Shell, and the three of us would do something. What Curtis did is he broadened that and he said, "Why not bring everybody in, and if a contractor wants to join, fine." We all put in some money and then we also put in a lot of time.

TP: So how did it work? So the operators would identify their needs, is that right? And you would go to the contractors and say, "This is what kind of things we're looking at. What kind of technologies can you design?"

GV: That's right. The operators jointly would say, "Look it. We've got a problem in, say, mooring systems in deep water. How do you moor in deep water?"

So they would say, "Okay. We've got two companies that know moorings. Let's get one that is interested in looking at the alternatives for deep water mooring." Whether we use steel or whether you use some kind of

polypropylene or some kind of mooring systems that would work in—at that time, deep water was 3,000 feet. Now it's—

TP: So you would give them some seed money to do applied research on those questions?

GV: That's right. And then they would be doing it, so I would get my mooring guy and he would bring whatever non-confidential information we had to the party, and say, "Look it. We know this works, so maybe you should look at this in one of your alternatives." That's how we would contribute our technology on a non-proprietary basis to whatever contractor was working on that particular problem.

TP: Was there ever a problem that some operators were willing to contribute more than others at the beginning. Was there any tension because of that?

GV: Well, I think some operators had the capability to contribute more than others. For instance, Shell and Mobil and Exxon and Texaco were the primary contributors, and maybe Chevron. When you get—I don't want to mention any other ones—that said, "Okay, we'll join, but we don't know anything about that problem, and we're not into 3,000 feet of water yet, but we should look ahead," and they would join to look ahead. It worked out very well.

I had to leave it in '95 because I was assigned to Terra Nova Project. What happened at that time, I was a subsea manager and things were going along as normal, and then my boss said, "Look it. Petro Canada is the operator and they want to design a ship to stay in the ice, stay where the icebergs are. They don't have anybody with that expertise." He said, "I know you don't want to go to St. Johns, but this starts in Calgary. Will you go to Calgary?" So I went to Calgary and we worked in Calgary. It was the preliminary efforts to get a contractor on board, and the contractor that made the best presentation was Brown & Root Kellogg, and they were based in the U.K.

So then I moved to the U.K. and I was the technical coordinator for Terra Nova, which incorporated the French for the flow lines, the Koreans for the ship, the U.S. for the turret, and we were all over the map. Did a lot of flying around, and it was successful.

Then when we were ready to construct, that's when the Newfoundland government said, "All the managers have to come to St. Johns." I think that was

about ’98, about ’98, and we moved to St. Johns and moved ahead with the project and everything went well. And then 2000, the merger occurred. They asked me to stay, but I was sixty-five at that point anyway, so I said, “No, I better start my twenty years of retirement now.”

TP: Do you have any interesting stories or anecdotes that you can share about any of your work that you did? Is there anything that sort of gives particular insight into challenges?

GV: I think the challenge was to convince the people, particularly the government people, that we could safely put an FPSO there and protect the wells. They were very concerned that if the wellheads were right at the mud line, an iceberg that almost touched the mud would come and wipe them out. And we did a lot of statistical work there with local contractors and U.S. contractors, and found that if we put them down, say that the top of the well was five meters below the mud line, no iceberg could get to it.

After I had done all this work, I’d compiled all this work and then I retired, I had this library. I said, “What am I going to do with this?” So I went to Memorial University in Newfoundland, in St. Johns, and said, “Would you want this?”

And they said, “Certainly we do.” So I gave my whole library, non-proprietary library, to the university and they use it for both students and for research work that they do. So that was an interesting aspect of [unclear].

TP: Were there other projects or are there other projects slated that are similar to the Terra Nova?

GV: Yes. There was a company, a Canadian company, that was the operator of White Rose. I think it was named Wolff [phonetic]. I think that’s the name of the company. After I retired, they asked me to come up to St. Johns and consult with them about what they should do, how they could cut their cost down. I says, “Well, first of all, I don’t think you have to be disconnectable. That will save you some of that 250 million. Second, I really don’t think you have to go five meters below the mud line,” because every meter you went, somebody had to come in and dig that out. So they went ahead and brought my suggestions to the government and incorporated whatever they could to cut the price down, and I

think they got their price. I'm not sure of this because I wasn't involved in the final, but below the 2 billion that we had.

So every time you do it, you can lower the price when you know maybe you overdesigned this or overdesigned that. But I think Petro Canada is very happy with Terra Nova. It was based on 100,000 barrels per day at $20 a barrel. Now it's producing 150,000 barrels per day at $70 a barrel. So it's worked out very well for them. They never had any ice incidents. The hull could take the sea ice, and the icebergs never got close enough to warrant a disconnect. The only disconnects were for testing and for an overhaul after several years on the station. Everything worked as planned, as far as I know, from talking to my colleagues that were still working on the project. So that was the last five years or so of my career, was on that project and moving from Calgary to London, to St. Johns.

TP: There's a growing interest in Arctic regions for exploration and development. Do you think that this kind of concept is applicable to other certain Arctic areas?

GV: Yes, it certainly is. It certainly is, particularly areas that are subjected to sea ice only. But I think once you get off Alaska and you get into the Bering Sea, you don't use a ship up there; you use a structure.

TP: Icebreaker structure.

GV: Similar to Hibernia, but maybe refine the design a little bit to shed the ice. You wouldn't use a ship up there. Maybe off the west coast of Alaska, if they find anything there, they might do that or over on the west coast of Russia. We did a lot of work there, and there that might be—

TP: Sakhalin Island area?

GV: Sakhalin Island, exactly.

TP: You were involved over there?

GV: Oh yes. We had people go over there, and we had joint programs with other companies that needed ice information, and we would send our people over, yes.

TP: Just going back to Deep Star for a minute, one question I'm interested in is how Deep Star interfaced with the regulatory program. I know that was an emphasis early on. Were you involved in any of that?

GV: We had a group that liaised with MMS at that time, so that if we were studying something we could take the results and say, "Look it. This is safe to do this particular thing in deep water, and these are the results of our studies." We had a group that liaised with MMS, and I didn't get too involved in that. I was more in the technology development side.

TP: Is there anything else you want to share with us, anything memorable, looking back at your whole career?

GV: You know, you go through your career in steps and you don't realize what you're doing at that time. I mean, I never thought somebody would ask me to come here and be in the Hall of Fame, because I was just doing what I thought was best for Mobil at that time and deployed my resources accordingly. And then I look at it and I say, "Well, look it, this is how my career went. I was ten years in the field for the Coast Guard and designing icebreakers for them, and then ten years teaching the cadets at the Academy, and then ten years doing some ice work for Mobil, and ten years doing subsea work."

So it kind of went into steps and I didn't think I was doing much, but when I look back and I look at Terra Nova and I look at Hibernia, I think I had a significant impact in their design. Then I look back on the subsea work, when we were working with joint industry, the little bit of work we did here and the little bit of work we did here, at that time didn't seem to be significant. Now it's being applied and it's very significant.

TP: You were working on the frontier.

GV: Yes.

TP: The frontiers of the environment, Arctic, deep water, and the frontiers of technology.

GV: One of the things that I thought was outstanding, when we were talking about the impact of icebergs, we didn't know how strong icebergs were. So we flew up to an iceberg and dug a tunnel in the iceberg, and then tested the ice from the outside of the tunnel to the inside of the tunnel, figuring, well, is the outside stronger than the inside, and if it starts melting, do we get to stronger ice and everything? All that data was collected to lead us to the conclusion that we could design a ship to withstand the biggest iceberg that could get into the Grand Banks, not the iceberg that was capped, because that was too deep and it would be stopped.

If you look at the Grand Banks, there's a channel close to shore and then there's the Flemish Cap that's out further. So the big icebergs would come down and either go through the channel next to the shore or go through the channel and the Flemish Cap. The ones that came in were limited in size. So that was a big point with—it is a limited size. You don't get a multi-million-ton iceberg, you know. Maybe a 100,000-ton iceberg, that's a big iceberg, would come down.

TP: There was quite a lot of oceanographic data study.

GV: Oh yes. So we took that into consideration, that we wouldn't have to design for the worst-case scenario. We convinced ourselves and the regulatory authorities that the worst case could never get on the Grand Banks because it was too shallow. The Grand Banks was too shallow.

So now I think you'll see a couple of FPSOs up on the Grand Banks. I don't think you'll see anymore Hibernia projects. Hibernia will be the central point perhaps, but I don't think anybody is going to put another $5 billion into another Hibernia. Now, you might need something up in Alaska Arctic that's equivalent to that but not in the Grand Banks. I think they can do it with FPSOs.

Now FPSOs are going to be working in the Gulf of Mexico, and they won't have to be designed for ice but they will—well, when I left, my opinion, after looking at the aggregate of information that I had, was that I was more concerned about the biggest hurricane coming through up there than I was the iceberg, because we tried to design the mooring system for the hundred-year storm, and that's what we think we designed it for. But I was more concerned about perhaps we had not designed it strong enough for the worst hurricane that

we would see going up there. And every time I see these hurricanes skirting the East Coast and going off—

TP: Like the one two, three weeks ago.

GV: That's right. They go right through the Grand Banks, and I just hope that Terra Nova can withstand them. But when I left, my concern wasn't ice, maybe because I was so familiar with ice and I felt that we could take care of that. But you never know what a hurricane does to a platform, and I was more worried about the hurricane and the seas that it generated than I was about ice damaging the structures.

TP: Is there anything else you'd like to share? Anything you want to pass on to your grandchildren about your career?

GV: Well, I just say do your best and the Lord will take care of everything else, you know. I just enjoyed my career, I enjoyed my twenty years with the Coast Guard, and I enjoyed my twenty years with Mobil. I just think it was an extraordinary career and this caps it all up. I mean, I was overwhelmed when I got a call from Viann [Bonoan] and said she was looking for me.

TP: Congratulations. You're in exclusive company.

GV: Thank you.

TP: All right. Well, let's stop here.

[End of interview]