Interviewee: Elmer "Bud" Danenberger
Interview: October 10, 2009

OFFSHORE ENERGY CENTER HALL OF FAME
BOEM DEEPWATER GULF OF MEXICO HISTORY PROJECT

Interviewee:	Elmer "Bud" Danenberger
Date:	October 10, 2009
Place:	Houston, Texas
Interviewer:	Tyler Priest
Ethnographic preface:	Elmer "Bud" Danenberger III has a long and distinguished career as an offshore oil and gas expert in the U.S. Department of the Interior. Trained as an engineer at the Pennsylvania State University, Danenberger took a job in 1971 with the now-defunct Conservation Division of the United States Geological Service. Danenberger played a key role during a busy period in which the Outer Continental Shelf program was opening frontier areas for leasing for the first time. Work included writing new regulatory orders; reviewing exploration and production plans; and performing inspections. At the time of his retirement in January 2010, Danenberger was the chief of offshore regulatory programs for the MMS. After the *Deepwater Horizon* incident in April 2010, Danenberger served as an expert and senior advisor to several of the resultant investigations into the oil spill, including the White House-chartered National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling.

File 1

TP: This is an interview with Elmer "Bud" Danenberger for the OEC Hall of Fame induction 2009. Interviewer is Tyler Priest. We're in Houston, Texas. The date is October 10, 2009.

Let's start off and tell us a little about yourself, where you were born, where you grew up, where you went to school.

ED: I'm from Bucks County, just north of Philadelphia, went to school all the way through there and went to Pennsylvania State. Started in general engineering for two years, didn't really know what branch I wanted to go into. Being from Philadelphia, I wasn't familiar with oil and gas. So I just went through the catalog, and petroleum and natural gas engineering looked interesting to me. I talked to the department head and that's where I went. It was a lot of fun, I enjoyed that very much.

After I graduated I spent a short time with the Federal Power Commission down in Washington, D.C. and that didn't appeal to me very much. At the time they were interviewing for the Conservation Division at the USGS down in New Orleans, and they offered me a job there. I went on down there towards the end of 1971.

TP: That's an interesting time to start, because you had had all the blowouts, Santa Barbara '69, and there were three blowouts in the Gulf, I think in '70, '71. Is that right?

ED: Well, there were the three big incidents, the Santa Barbara, the Main Pass fire, and the Bay Marchand fire, and that kind of put a lot of the program on hold. But I had the privilege of working for Rod Pearcy, my first supervisor down there, and that guy is just tremendous.

TP: How do you spell his last name?

ED: Pearcy, P-e-a-r-c-y. He was one of the greatest people I think we've ever had in this business. He was in charge of the reservoir side of the program. That's more where I worked, but I also got to do inspections and go offshore quite a bit, just to get familiar with everything that was going on. The good thing in working with the USGS is that you got to see everybody's projects, not just one company's, but all of them. Different styles and how different companies go about their business. So I thought that was great.

After a couple years down there, I went to graduate school for a year in environmental pollution control. I was always interested in energy and the environment and what the real issues were and how we could do things better. That was a great year. Then went back with the organization in headquarters in Reston, Virginia, where I worked for [Richard] Dick Krahl, who's also being inducted here tonight.

TP: Mr. OCS.

ED: Right, Mr. OCS. Back then the whole program at the headquarters level was four people: Dick, myself, Price McDonald, and our administrative officer, Sandy Streets [phonetic], who's really terrific. We got to do and see everything. It seems like we got as much done with four people as they do with ten times that now, but it was just a different style. Dick gave you a lot of responsibility, just let you run with it.

TP: What kind of stuff were you mainly working on? Inspections?

ED: Well, we were doing all the regulations.

TP: I guess they had in a whole new set of OCS orders?

ED: Well, actually, it was orders at that time, and we were developing them for the Atlantic and for Alaska, which were coming up. It was an amazing time in the program because frontier areas were all opening up gradually. So we had all those issues to consider, plus, of course, the bulk of the activity in the Gulf. And then we were also working with the other agencies in developing lease stipulations and frameworks for some of the frontier operations. But the excitement to me was always the frontier activity, which peaked in the seventies and early eighties.

TP: It peaked at Georges Bank and Baltimore Canyon and Atlantic, and then all those—

ED: Yes. I'll talk a lot about Georges Bank. It's very personal there. Yeah, those were all getting started. The first Atlantic district to open was, I think, the Mid Atlantic District about '75. An old college friend of mine, Bruce Walmsley [phonetic], was the district supervisor. Then they opened up the South Atlantic District Office in Saint Simons Island, Georgia, and had a Lease Sale 42 for the North Atlantic in the late seventies. That was kind of wild. They were throwing dead fish at the L.M., [lease] moderator for the lease sale, and oil baggies and stuff like that.

TP: The fisherman's groups were really—

ED: There was just as much opposition back then as there is today, maybe even more.

TP: So they still got the sales through.

ED: They got the sale through, and the governor of Massachusetts at the time was actually a proponent of OCS. The embargo to the gas lines twice in the seventies, the embargo, made a big difference in terms of public opinion for some of the politicians. So we opened up an office in Hyannis, right at the Barnstable Municipal Airport, in like January of 1980. We were just kind of working out of the hangar at the airport to start with, then we got a little fancier with the other half of a maintenance garage. [laughs]

TP: So you were developing new orders.

ED: Well, we were doing everything for the North Atlantic. The way it was run back then, which I think is the ideal way to run a regulatory-type office, is that districts which were out there where operations were being conducted did all the review of the plans, all the exploration plans, the environmental assessment of those plans, all the approvals of the permits, and all the inspections. We were small, but for a while we had a Fisheries biologist, an environmental scientist, geologists and geophysicists, two inspectors, another engineer and myself. That was it. We did pretty much everything. We went offshore to do inspections. The helicopter just taxied right behind our building from the airport. [laughs] Long flights. Operations were 90 to 154 miles southwest of Nantucket. Add another twenty, twenty-fight miles from Cape Cod. So, long flights, uncomfortable. It'd be foggy when you got out there.

TP: That's a long way to go in a helicopter.

ED: Sometimes you'd get all the way out there and couldn't land, or you'd get out there and couldn't get back, which was worse. [laughs] So, yeah, it was pretty exciting.

The first rig to get there in July of '81 was the *Zapata Saratoga*, which has quite a history, actually. Actually broke loose in several hurricanes in the Gulf and we had some mooring issues with it up there. But anyhow, that was the first rig there.

TP: Was it a semi-submersible?

ED: Yeah, for Shell. And when they got there, there were some Zodiacs, Greenpeace protestors, and this is 150 miles southwest of Nantucket, 180 miles from shore. And these protestors had come out with the *Rainbow Warrior*, which you may recall, was later destroyed down at a harbor in New Zealand when Greenpeace was down there protesting some French nuclear tests. One night, some French commandos, that was it for the old *Rainbow Warrior*. [laughs] They were there with banners unfurled, "Oil and Water Don't Mix." So we still think that's the record for a protest farthest from shore.

TP: That's a long way to go in a Zodiac. Or I guess they went out in the *Rainbow Warrior* first.

ED: Yeah, they were in the ship.

Shortly after that, the *Alaskan Star* came to drill for Exxon. Later the *Aleutian Key* come in to drill. Only eight wells drilled. They were all pretty deep. We thought one was actually going to be a discovery, real good gas shows, but it was just tight. They got good gas in the mud logs, but didn't test anything.

The reporters were so active, it was unbelievable. Almost every day there was a story in the *Cape Cod Times* about the operations. Cape Cod is really just tourism and fishing, so there was much attention when something like this was going, it was unbelievable. The *Boston Globe* was out there too.

TP: Did the guys who were dealing with the Cape Wind issue ask you what it was like?

ED: Yeah. Some of the same reporters actually did follow-up stories linking the two. I can get back to that. There was one reporter that followed us closely, Bill Mills. He used to go into the bars when the crews were coming in from offshore.

TP He was with the *Cape Cod Times*?

ED: One day the *Cape Cod Times* had a front page, banner headline, "Natural Gas Discovery on Georges Bank." He had been talking to them about the mud lines, and there were good shows in the mud lines, but it didn't turn out to be anything producible. But I still have that headline. And then the first day, when they actually started drilling, it was "D-day on George's Bank." Kind of a play on words, Drilling Day.

But it was a lot of fun. We were treated very fairly. Congressman Studds, who was a strong opponent of offshore development, was, nonetheless, very good to our office. The first day we opened up, he invited me over, and he was there with a couple of leaders from the fishing community. He said, "Look, I've been against offshore drilling in Georges Bank since it was proposed and I'm still against it, but you're just here to do your job, and anything I can do to help you, you call on me." I thought that was pretty terrific. The state people we worked with were fabulous, still some of my better friends; Pat Hughes, Rich Delaney, Bernice McIntyre [phonetic], a whole list of people that we worked very closely with.

We were totally transparent on anything that was public. If somebody lost an anchor, we told them all about it right away. Everything that went into the drilling system, the mud components, everything fully documented. Any little thing that was dropped over, any spill of any size, we tried to be totally open. I think we had a great working relationship because of that, one of the best monitoring programs of drilling operations ever with all those scientists at Woods Hole.

The Department of the Interior funded a major study and pretty much the material balance on everything that went into the mud, especially on the Bay Right [phonetic], which is enough of it that you can trace it. I think it's probably the most comprehensive study of exploration ever. It didn't really show much impact from a few exploratory wells in a high-energy environment, zero impact for exploratory drilling.

TP: Did that convince a lot of skeptical scientists, do you know?

ED: I think real scientists have never been the issue; it's people who take advantage of the issue for their own agenda. If you could keep the debate on the science, I think it's pretty solid.

TP: You look at the Gulf of Mexico, too, not for exploratory programs, but just a long history of production, and the pollution is minimal.

ED: They just finished that sperm whale study that showed there's pretty much not any impact to the sperm whale. That's a good thing. Millions of miles of seismic have been run; 30,000-plus wells. The whole key is to focus on the problems. If there are problems, identify them, then figure out how to deal with them. How can it be done in a way that doesn't affect the environment.

TP: That's the mission of the MMS, right? Tell us a little bit about the Technology Assessment and Research Program. You mentioned that in your write-up.

ED: That was actually formed when I was in headquarters working for Dick Krahl. It was organized by John Gregory, who's being inducted here tonight. He did a terrific job. It's always been a very modest program. Back then it was never more than $100,000 dollars a year in research, but we leveraged our money working with industry partners and working with other government agencies such that we had tremendous leveraging. We had different technical committees throughout the organization that would pinpoint areas that we thought needed investigation from a safety standpoint primarily. We're not interested in developing technology. We need to understand it and make sure that everybody knows the risks and how to mitigate those. We actually set up a well-control center that's still going today at LSU. There we did most the research on well control, including deepwater.

TP: Is this is a joint government-industry-funded research center at LSU?

ED: It was. Now, we're not involved anymore because it's running great on its own, it has been for the last few years.

TP: But you access the results from it.

ED: Yeah, and we kicked it off and that was a tremendous partnership. Started our own oil-spill response research program, which I think is the best in the industry.

TP: Is this OHMSETT?

ED: That came later. I think we just had minimal money, but we got involved in all the projects and started participating in OHMSETT. I was actually the first MMS project officer at OHMSETT back in the late seventies. Then after the *Valdez* spill, we'd already been talking to a naval weapons station in New Jersey and New York City.

TP: This is the National Oil Spill Research Test Facility.

ED: Yeah. I think the EPA closed it down in the eighties; I'm not sure exactly when. It sort of had been just sitting there along with its tremendous resource for testing response equipment full-scale. So we had started talking to the Defense Department just before the *Valdez* spill, and we weren't getting a whole lot of cooperation. Then there was the *Exxon*

Valdez spill, which, of course, we took a lot of heat for even though it had nothing to do with offshore production whatsoever.

So that brought attention back to oil-spill response and, boom, we not only got the cooperation of the Defense Department, but we got quite a bit of funding to operate that facility. It's been tremendous. We just finished our fifteenth anniversary as manager of that facility. Ninety-plus percent of all the data on booms and skimmer performance is gathered there, we started the testing on burning oil slicks, in situ burning, and test dispersants. The Coast Guard strike teams train their personnel there now because you can actually deploy full-scale equipment. It's a big 200-meter tank. We just had Alaska Clean Seas there, training their people.

Our newest thing is to test some of the renewable energy concepts. Just a few weeks ago, there was this auger that turns in current to produce electric power. It's a good place to start and gather some initial data and see if it works. The TAR program now, we have really good cooperation internationally too. There's a website you can go to find any kind of research on offshore oil and gas safety from the U.K., Norway, Brazil, Australia, and most the countries that are working in this area. Or you can just do a search at that site and get all the work from any of the agencies.

TP: Do they have a database at this test facility?

ED: This is at the website we set up.

TP: I've been looking for historical statistics on accidents, deaths, and safety over time.

ED: The MMS site is good for that. Industry-wide you have a hard time getting that.

TP: Oh, I know. Not everything is reported, so it's hard to get an accurate idea. The MMS basically compiles data on what's reported, right?

ED: Yeah. The real problem in gathering this data internationally is that the companies do it on a voluntary basis. There are different groups like the oil and gas producers in London that gather international statistics, but it's all voluntary. If you have a bad year, then I'm not going to say what they did. Then there are so many differences in the definitions that the companies use. Some of them report contractor injuries and some don't. So what we've done, eight countries, U.S., U.K., Norway, the Netherlands, Australia, New Zealand, Brazil, is that we've created

consistent definitions of what's a major injury. Things like these are difficult to decide.

TP: This is the International Regulators Forum?

ED: Yeah, through the International Regulators Forum. Major gas releases, what those are, accidents, what categories, what falls where. Which accidents do you count? If a helicopter crashes, is it—

TP: In the Gulf it has to be a lost workdays, is that right? I remember there were some questions over the definition.

ED: Well, there was seventy-two hours lost. So we've got all that consistent such that we have comparable dates and we also have kind of a peer review of the statistics.

TP: Is that published anywhere?

ED: It is published. We just did our first year and we're about to do the second year. We did a couple years' trial before. It's at the IRF website. So yes, I can provide you with a link. But now the hope is to bring in some other countries. They'd have to qualify in. You have to show you have a good framework for collecting these accident data, but once you have that, this will be a unique resource for comparing performance worldwide.

TP: How far back does the International Regulators Forum go?

ED: Just had our sixteenth meeting. Started here in Houston one year at OTC. I think Bartholomew, who was my boss at the time, myself, and Jeff Weiss [phonetic], we've got all these different countries doing the same thing we are, learn from each other, share information, coordinate, and save ourselves a lot of money.

TP: What are some of the better regulatory programs out there? What countries would you say are ones that you've learned a lot from?

ED: I have a lot of respect for Norway's program. I know some parts of it have been difficult for industry, I think more on the side of having Norwegian companies involved. I think on the regulatory side they learned a lot post-*Alexander Kielland*, some problems they had early on offshore Norway. They're pretty advanced thinkers, in my opinion. Their whole philosophy is to put the responsibility on the operating companies. Don't do their job for them; make sure they're doing it. Don't necessarily tell them how to do it, and don't take responsibility for safety; that's their

job. They've been very successful at it. Five years without a single fatality in harsh conditions. Not as many facilities, certainly, as we have in the U.S., but a lot of people involved. So I have a lot of respect for them.

Everybody tries to do the right thing if you give good people the opportunity and the room to work. The problem is that political systems divide everything up so much. I mean, look at the situation in Australia, Timor Sea blowout, which you probably saw. You had the state, in this case the northern territories out at Darwin, Australia, regulating the subsurface stuff, the well integrity, the well plan, and the federal agency doing their safety case and review on everything else, on the production stuff. It's all interconnected, interactive production systems. If you don't know what's going on with the wells, if you don't have the same level of oversight on the wells that you do on the other operations. It's just amazing what happened on this sophisticated regulatory system that you would think Australia has and doesn't. When the reports come out on this one, it's going to be unbelievable.

TP: How does the MMS work with other government agencies? What kind of working relations? I'm thinking of like OSHA, EPA, Coast Guard. There's a lot of divided responsibility in the U.S.

ED: Good question. Our closest regulatory partner is the U.S. Coast Guard, whether we wanted it to be or not. They're a good organization, but it's kind of a forced marriage, and the OCS Lands Act gave them a lot of responsibility for safety and us also. So we have been working with them my entire career. It's sometimes a challenge because they change personnel so often, given the military system, but it's a very good, pragmatic organization. It wants to do the right thing, different than us in that our whole world is offshore oil and gas operations. It's all we think about, facilities. Their security mission was huge. It still is huge.

TP: Bigger now with Homeland Security questions.

ED: So search and rescue is not always their most important—

TP: Top priority.

ED: But we meet at the admiral level in Washington quarterly. That kind of keeps things going, because the people know that their admiral's going to be meeting with our senior management. They know they need to get their problems fixed and they know, or they're going to be at that level soon. [laughs]

When we were in Hyannis, the Coast Guard was right across the street. This is the ideal way to work. We flew offshore together. We did the first ever offshore oil-spill response drills, unannounced. We went out and said, "This is happening. Go ahead and exercise your response." We did all that together.

TP: To operators? You go out and tell the operators, "This is a drill. You show us what you can do"?

ED: We would say, "Here's the scenario. This well's flowing from here. So much oil, go ahead and activate your response plan."

TP: Did you say it was the first unannounced one?

ED: The first one unannounced I think anywhere in the world.

TP: When was that?

ED: 1982, at Georges Bank. We did it with Coast Guard partnership. It involved two companies; Exxon was one and I believe Tenneco was the other. Since then, MMS has had an unannounced spill drill program. It's a really good way to test.

I got in a little trouble out in California in my district there, because the weather picked up after we told them the spill scenario, and it was pretty rough out there. North of Point Conception, it's like the North Sea sometimes. People don't realize when they think of California. But after the drill, we got some complaints from the Clean Seas Response Co-op. "What are you making us do this for? Bad seas, you want to get people hurt and ruin equipment?"

"Well, it's your job to say 'Hey, if the conditions and winds are such now that it's unsafe, we don't want to continue.' Whether it's a real spill or whether it's a drill, we don't want to be dictating those circumstances."

It's a great program, and I think probably oil spill response capabilities are as good for the offshore industry as for any type of activity going. There are some things you can do and some things you can't. Preparedness is there.

TP: Let me see how your responsibility has evolved.

[switching tapes]

TP: So you were out in California in the eighties, is that right?

ED: Yeah, from '84 to '89. I haven't talked about that. That was a good job. Good stuff there, then back since that to headquarters.

TP: If you want to talk a little about California or if you just want to move on and follow up with your subsequent work in headquarters.

ED: At the time, since there weren't any discoveries up at Georges Bank, that was pretty much going to be it for that office. There were about eight or nine rigs operating in the Pacific then, in addition to the production facilities, and they were making all kinds of discoveries north of Point Conception. There's a huge amount of oil in place off of California just waiting to be produced if the opportunity ever comes.

So they decided to set up a district in Santa Maria on the central coast, 75 miles north of Santa Barbara, and they moved a bunch of us from Hyannis out there to oversee those activities. That led to the first facilities north of Point Conception, which was first Platform Irene, Unocal, now operated by Plains Exploration. It's been in the news a lot lately, still producing, but that's the facility that Governor Schwarzenegger approved. He wanted to approve some drilling in the state waters to produce some state oil. Actually, it was very controversial. It got quite a bit of support even from the environmental community. Not totally for good reason, but they had some support there, and it was in the governor's budget but hasn't been approved by the legislature. So that's still up in the air.

Then the Point Arguello Field, which was thought to be the biggest discovery since Prudhoe Bay in U.S. waters. A major discovery, but it's Monterey, which is a silly shale, low-permeability in the matrix of least formation. The real question was, with these well tests, how much is coming from the fractures, which flows right into the well bore? It's very high permeability, and then how fast is the matrix porosity from the tighter rock feeding into these fractures? How well is that mechanism all working? So it didn't end up being as good. It's still a good field, but didn't turn out to be as good as they expected. They're still in production out there with three platforms.

TP: Who were the operators there?

ED: Well, that was originally Chevron and Texaco, and now it's Point Arguello Partners. Chevron's still on the hook for the decommissioning part of that.

TP: That's how that all works, yeah. [laughs]

ED: That's part of the deal that was worked out there. That was a tremendously interesting project. We had some crazy experiences out there in California too. We had to work closely with Vandenberg Air Force Base. When there was a launch scheduled, we sometimes had to evacuate people from the platforms because they couldn't launch if there was a certain risk of people being impacted.

So one day I'm out on Texaco's Platform Harvest after we evacuated prior to a launch, and this is a top-secret Air Force launch. Nobody even knew it in the community at all. It was shortly after the *Challenger* disaster. They blew up a Titan missile during the launch booster. There was a huge mushroom cloud over Lompoc, California, the whole central coast, that actually drifted offshore and people that were on Harvest, which didn't have to evacuate, they were getting impacted a little bit. Just watery eyes. But the local people were totally upset. That led to a change in some of the procedures there.

There were sometimes reports of seepage or spillage, and you'd have to go test it and find out if it's a natural seep. A blue whale beached there on the Guadalupe. I remember Thanksgiving, going out looking at that and making sure it had nothing to do with offshore activity. It was a beautiful place to go offshore.

TP: You're the first suspects, usually.

ED: Yeah. That was a great place to go offshore. But it was a lot colder than people think when you come from the Gulf or from Europe. Even in the summer it's still pretty cold out there. Actually, it's colder in the summer.

TP: When did you come back to head office?

ED: In '89. Back then we had two divisions and I headed one at headquarters. Mine had more to do with the rule-making side and with coordinating some of the activities.

TP: What was the other division?

ED: The other was the Research for Inspection and Enforcement.

TP: I guess this was after the Conservation Division became MMS. That was in '83.

ED: In Hyannis. I mean, are we allowed to be honest on this? [laughter]

TP: As honest as you want to be.

ED: Some things changed when that happened. We were in Hyannis, so we functioned as a district. But it was a merger of the BLM lease management function and the Conservation Division, which was more of an engineering, geology group.

TP: Completely different cultures.

ED: Very different cultures, and they never really merged, in some cases still haven't totally.

TP: Just two separate organizations within one agency.

ED: Yeah, and the way it was organized didn't lead to a good plan. I mean, that's kind of gotten over that now, but the leadership tended to be at the top from the BLM side.

TP: John Rankin was the first, right? The first head?

ED: Down in the Gulf. Maurie Adams, a very colorful figure from the past, he called it a takeover, not a merger. One of the disappointing things from my standpoint was, again, in Hyannis we took care of everything, environmental side, safety side, and once the MMS was formed, the leadership at that time in the Atlantic Region said, "Well, all the environmental work is done in Virginia. The place is closing." So they came up, and that was it for our environmental specialists, which is strange since the environment we were concerned about was where we were going offshore every day, not back in Washington or Virginia. But it's going really well now.

TP: You were talking about the division that you headed up when you came back from California.

ED: Yeah. A few years later, they consolidated us together into branches under Frank Bartholomew, and I was a chief engineer under him. So we didn't have two divisions; we had really one. After they did the subsequent reorganization, it was one division and I was the head. So then I had inspection, coordination with the other agencies, all the rule-making, all the research, accident investigation. About four years ago, that was upgraded into an office statement and I was appointed into the Senior

Executive Service. That's the way it is today, and I'm retiring at the end of the year.

TP: Oh, you are?

ED: Yes. So we'll see what changes are made then. But it's been a great job.

TP: Do you have an idea of who might come behind you?

ED: No, they haven't decided that yet. Who knows, there could be some reorganization.

TP: One interesting thing you mentioned is the hurricane response issues. That must have sort of taken over from a lot of your other responsibilities in 2005 and last year. What can you say about that?

ED: Oh, I can say a lot, actually. [laughter] I told you about *Saratoga* on Georges Bank. The only real serious problems we had, and it didn't amount to anything that caused any safety or environmental harm, was mooring failures during some of the big storms you get up there, nor'easters. The *Saratoga* had a number of them. We worked closely with Shell on those, and also the *Rowan Midland*. But the problem of MODU [mobile offshore drilling units] mooring systems that's kind of firmly implanted in my mind and it's been kind of a crusade of mine ever since Hurricane Andrew, there were a couple failures. That was '92. Then there was a long gap and we had started talking again some more with industry and the joint contractors about those problems. Then there was a long gap till Lily, the next real serious hurricane. Then there was Ivan, which was 2004.

TP: That ripped up a bunch of pipelines, right?

ED: Lots of mooring failures and damage. And we said, "This is it." As a matter of fact, there was a conference post-Ivan, but pre-the next hurricane season, and MMS said, "This mooring situation is going to be fixed."

TP: It was the anchors that ripped up the pipelines, right?

ED: It was anchors ripping up pipelines, rigs drifting up to 100, 120 miles, and you can't have that. There's evidence all the way back to 1965 —I think it was Betsy— of a platform, which was then one of the deepest water platforms, 300-plus feet, destroyed by a MODU adrift, all the way back to '65. Some guy sent it to me after I started work on this issue. And there were still people in denial.

TP: I know, that was Shell's *Bluewater* Rig No. 1.

ED: Was that the one that hit—

TP: Well, I'll tell you the story about that, but I don't want to use up the tape. But you're right.

ED: So it was not a matter of any improvement; it was a matter of whether or not there were hurricanes. There'd be at least 50 percent mooring system failures where rigs were adrift at least for some distance. Any more semisubmersible was going to have a 50 percent chance it was going to be gone if it was in the path, and if it was dead in the path, it was a higher percentage than that. So there were still people in denial at that hurricane conference, which was disappointing to me.

TP: Ivan.

ED: After Ivan.

TP: That there was that high a percentage of failure?

ED: After Ivan, even when we showed them the statistics and talked about the history, there were still people in denial. So then, what happens? Katrina and Rita. We had, I think, about 70 percent of the moored semis MODUs exposed to hurricane-force winds, and some of the jack-ups. That's still a problem. Well, that was the big problem as I see it, lots of platforms destroyed and things we can do to improve design standards. But this MODU question had been going on for years and nothing had been done.

I briefed Secretary Gale Norton, who was Secretary of the Interior at the time. I also briefed Johnnie Burton, who was our director. Anybody can imagine what a politician thinks about all these big rigs just ripped and loose, 4,000 platforms out there. There are pictures of them grounding near Dolphin Island. So this really resonates with people in Washington. This is something they can easily visualize. She brought in top executives from all the companies. She brought in leaders and joint contractors and said, "You ain't going to be drilling out there anymore until we get assurances that there are improvements here." And there was no denial at that point on any party in industry. We got very good cooperation. There's only so much you can do to an existing semi. You can increase the mooring lines. You can change the material.

TP: So are there new regulations, new orders for mooring systems?

ED: Well, there's a new standard that was developed with API, and there are new regulations that we've put out.

TP: New recommended practice standards?

ED: Yeah, RP 95, F for the floors and J. A lot of that is now being put in permanent standards which we have codified in the regulations. Still ongoing work, and before any operation during a hurricane season, everybody has to do a risk assessment that takes into account the design and return period for that rig, proximity to pipelines and facilities that could be impacted, and that type of considerations. It worked very well. During Ike there were only two of ten moored semis that had failures. They drifted a couple miles, as predicted in analysis, and there were no real problems.

TP: So it was a real-world test of what progress you'd made on the moorings.

ED: Then there's a lot of work been done on the design standards for the platforms themselves, tremendous, in terms of deck heights.

TP: Did Lily and the 2005 hurricanes really alter the understanding of the industry?

ED: Oh yeah.

TP: Because I know the mid-1960s hurricanes, Hilda, Betsy, and then Camille, changed the whole design concept for a lot of things.

ED: Yeah, absolutely.

TP: Do you think it was it the same kind of impact?

ED: One of the problems in previous design had been that we have about fifty years of good offshore data. Before that, they were taking into account onshore information on hurricanes, which is much different. We saw what Katrina and Rita and Ivan were like offshore versus on. They were strong Category 5s offshore.

TP: And then 2s by the time they got on the ground.

ED: Yeah, much less. So the oceanographic data was very much understating the real conditions during a worst-case storm. There are still some issues that I'm not comfortable with, this consequence-based design, whereas if

you have minimal or no oil production and it's an unmanned facility, you can design to a lower standard. Well, the lower standard that was being used essentially guarantees failure in case of a significant hurricane. There are a lot of other consequences from structural failure than the worst ones, which are people and pollution. They can still be safety issues because you've got this platform on the sea floor. Maybe the wells haven't all been PNA'd, so you've got the challenge of doing that after the platform's been toppled, and the great expense, which has changed a lot of people's thinking.

Then you have the potential impacts to shipping. Not a platform, but a jackup was what the tanker hit after Ike and a million barrels of oil on the water. It caused a huge gash in the tanker. If you saw the pictures, you'd say, how did this thing ever survive? It was a double-hull, very well-designed tanker, but we could have had huge oil spills. Then this was a jackup that had toppled and we still had some issues there. The hull of the jackup had grounded 100 miles away and was hit near a fairway by this tanker with a million barrels of oil. There are still a lot of issues. This was a good year obviously, a lot of catching-up work.

TP: I can think of a lot of other things, but maybe we'll conclude. If you don't mind, I could follow up with you.

ED: Sure.

TP: Maybe sometime when I'm in D.C.

ED: Sure.

TP: Or maybe at one of the scientific committee meetings.

ED: I'm going at the end of the year.

TP: You might have more time then. Thank you.

[End of interview]