Naval Surface Warfare Center, Dahlgren Division
Interview with Sheila Young
Conducted on June 5, 2003, by Jamie Rife

JR: This is Jamie Rife, and I'm interviewing Sheila Young, the head of Strategic and Strike Systems Department. It's June 5, 2003. My first question, Sheila, is, can you give me a little bit of your background, your career, your education, how you came to Dahlgren?

SY: Okay. I came to college at Mary Washington in Fredericksburg. At that time it was the Woman's College of University of Virginia. UVA didn't admit women undergraduates. So I came to college there and I was looking for a summer job, and found out about something called---I was going to be a math major, and they had something called summer interns in mathematics. So I applied to the government and got two offers, one from Dahlgren and one from Suitland, Maryland, Naval Oceanographic Institute. I didn't know where Dahlgren was. When I found out it was just down the road from Fredericksburg, I said, "Well, this'll be a whole lot better."

So I came here the first summer after my freshman year, did not like it at all, could not stand it. I was copying numbers from one sheet of paper to another sheet of paper, and then having to sit down with somebody like you and read the numbers to make sure I copied them right. So I tried hard to get a job the second summer someplace else, and wasn't successful. But then I came back here that second summer and was really doing some more interesting work, had a different boss, and so I came back here after graduation. That was in '66 when I graduated, so I've been here since '66.

So I worked here from then, and gradually meandered up the management chain to a division head, which is like Rob is now, at a hundred-and-something people, and then I applied for a job in Washington at the program office in the SES corps. Got that job in 1990, worked there until 1999, and then they were moving out of Crystal City, which was a good place to commute to, over to Nebraska Avenue in the city, which was not a good place to commute to. And this job came open, so I transferred back here in 1999.

JR: 1999. Fairly recent, then.

SY: That's right.

JR: What is the mission of Strategic and Strike Systems Department, just in your own general words? What's its role?

SY: Well, we started when the Navy decided to put ballistic missiles on submarines in the 1950s. There were people here at Dahlgren who were working in ballistics of Navy guns. We had computers. We had the first computers that the Navy ever had were right here. So they came to us to do the computations in the submarines' fire-control computers, and we started doing that in the late fifties, and are still doing that today. So that is about half of the department. That's the strategic part. So all the software equations, data that are used in the launch of Trident missiles is done here.

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Growing out of that work in the 1970s, we took on the same role for Tomahawk, so we basically do software development for those two systems. Those are our big programs. The fact that you do software development means you have to understand the system, so we do lots of modeling and simulation and systems engineering kinds of things, and general technical expertise to the program office in Washington, on those two big programs.

JR: What kind of mathematics and computers are involved?

SY: It is mostly mathematics associated with modeling physical systems, right trajectory models, and then because in history the computers that could be on submarines were not very large, then what we would do is take those results of trajectory models and simplify them so we could put them into the submarine computer, so that the parameters could be computed at the time of launch. And what we did at first was take lots and lots of data. We would run grids, latitude and longitude all the way around the world, going in all the different directions, get the answers for the parameters that need to be sent into the missile, and then we would do functions, curve fit through all that data. Then, of course, as computers got more and more capable, you could actually put the trajectory models themselves in the submarine computer.

So it is mostly "force equal mass times acceleration" and all the details that go with that. You end up modeling the system in a lot of detail—the guidance computer, the

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aerodynamics of the reentry bodies, the performance of the rocket motors. You model the missile in a fairly detailed way, and then you have to model all the environments—the gravity field of the Earth, the reentry atmosphere, winds and densities in reentry. There's a star-sighting on Trident, so you have to figure out where stars are going to be.

JR: Especially since the submarine is moving.

SY: That's right. It's a challenging mathematical problem.

JR: The reason I ask goes all the way back to one of the fundamental missions that Dahlgren started out with in the 1920s, the Nordon bomb sight.

SY: Right.

JR: And in a lot of ways the problem is the same, because you have a bomb, you have a plane at 10,000 feet dropping the bomb. Where's the bomb going?

SY: Right.

JR: And the more motion, the more factors that's involved, the more complicated the equations are. It gets to points beyond human capability.

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SY: And one of the women I worked with early in my career here, she had been a Navy WAVE here, making computations on a calculator, mechanical calculator, that was used by the Navy to do the offsets. When you point a Navy gun and it's going to have a range of twenty or thirty miles, then the air density and the wind direction are important in the accuracy. So we computed what were called ballistic offsets, so that when you knew whether it was a dry day in October or whether you were in the South Pacific and it was monsoon season, you had to aim the guns differently. That's the basis of how we got into then doing the same thing for missiles.

JR: Really major technical developments. How would you characterize the evolution of technology in, say, 1980 through 2003? How's it improved?

SY: Well, of course, computers are much faster. That's the big thing. They have more storage and they're much faster, so that you can more faithfully represent whatever physical system you're modeling. whether it's a ballistic missile or a cruise missile, you can more faithfully model that in the shipboard environment. The other thing that has happened is that we know so much more about the environment now. With the satellites' coverage, we know the shape of the Earth and the details, fine details of the Earth's gravity field, so that we can do computations more accurately, because missile guidance systems sense what is known as gravity-free acceleration, and if you just keep integrating the acceleration that the rocket motor is giving you, you completely miss what the Earth's gravity field is doing to you, so you have to model that.

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JR: So you don't overshoot or undershoot.

SY: And it's significant, too. Without any kind of correction, you'd be miles off. We want to get accuracy a whole lot better than that.

JR: Relationship with the military. How well does the department coordinate with the military? Because that's a running theme in Dahlgren's history. There's always been a sort of tension between the scientists as well as the military officers. Getting them on the same sheet of paper can be difficult, or has been in the past, at least.

SY: Well, here in this department we have been extremely lucky. If you go back in history, the Strategic Systems Program Office was a special programs office. That was the one that [Hyman G.] Rickover wrote the check and said they could take anybody they wanted to from anyplace in the government and form this program office. They got extremely talented engineers. The military, Admiral Smith—I would look this up—but between being the technical director and being the director of the Strategic Systems Program Office, he spent about twenty years at the flag level. So the military were so tightly integrated into the program, they weren't the kind of military who would be in the job for two years and then go away. A young lieutenant would come in, and he would learn the business, and he would advance in management within that program office in very much the same way the civilian would.

JR: Would he be an EDO?

SY: Yes. So we haven't really had tension with the military. The program is first, and we are all on the same team. I mean, it's a really unique environment. I was thinking about it the other day. It is a family. We know each other. When I was working in Washington, every day that the admiral was there, he invited the senior staff for lunch, and we talked about everything—families, work, interests, golf. They had this macho thing going about how hot the peppers could be, eating habaneras. [Laughs] I said, "This has got to be a guy thing." But it was a very close-knit group of military and civilians working together. So, really haven't had that much tension. Every now and then here, you know, whoever is the captain of the base or whatever, they have . . .

JR: Their idiosyncrasies.

SY: They have their ideo—that's a good way to put it. You're such a tactful young man. [Laughs]

JR: Hey, I try to be. You learn, dealing with people of all kinds. But it's interesting, because the reason I ask that is because at one point in Dahlgren's history, in the thirties and twenties when Dr. Thompson was here, he was chief physicist and really the only civilian scientist on base. He had a couple of assistants, but he was enough of a diplomat, he could do what he wanted until World War II came, and the demands of the war caused a

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huge influx of both civilian and military personnel, particularly [inaudible] gunnery officers.

In 1940 and 1941 to '42, the tensions really caused an interruption, to the point Thompson left, most of the scientists he had brought in for his new armor and projective lab left in a huff, and according to some of the research I have found, the armor and projectile lab was really only saved by personal intervention by FDR. It was a freak stroke of luck, is what saved the research here during World War II, because Captain Hedrick was such a no-nonsense, guns-only, proof station, "leave research to private industry." He almost killed it. But the fact that FDR intervened when he did and saved armor and projectile, saved the nucleus of scientific research here at Dahlgren.

Of course, the irony is that in 1945 the scientists were emerging as the preeminent force here in terms that they could pretty much set their research agenda. That led, in turn, to Akin's computers, as well in [inaudible], the IBM Stretch Series, and on up to the Crays that are used today.

SY: Crays are gone.

JR: Crays are gone? What do they use now?

SY: We use servers, Sun Microsystems servers.

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JR: That's interesting. I thought the Crays were still standard.

SY: I don't think so. I think they're gone.

JR: Probably are. I just had an interesting conversation with Rob yesterday, in that off-the-shelf personal computers have gained such power, microprocessors operating in the gigahertz now, and you don't really need the big mainframes anymore. You can just go down to Radio Shack or Wal-Mart and buy one.

SY: That's exactly right.

JR: For hardware setup.

SY: That's right.

JR: That's interesting. 1990s, early 1990s, BRAC, downsizing, hiring freeze. A couple of interviews we had done with a couple of the former commanders, we addressed this issue, and one of them noted that this had caused not only a technological, but a management—not a gap, but a chasm. How did that affect your department, and how did you deal with it?

SY: Of course, I wasn't here in the early nineties, but it didn't really affect us in that the sponsors that we have, as a working capital fund, it's all a matter of the money, and the two big programs that were in this department, the SLBM and Tomahawk, were both preeminent programs within the Navy, and their funding was not in jeopardy, and the funds continued to come here. We had about the same size organization It didn't really go down. It wasn't growing the way it had been in the eighties, but it didn't really go down till the late nineties.

JR: I had a discussion yesterday with Rob, and he was on corporate staff, so he got the full force of it.

SY: That's right.

JR: In a lot of ways he was caught squarely in the middle. We were talking with the new public relations officer, and even though he was a new guy, he picked up right on the fact that there was heavy in senior-level management and heavy in the lower-level engineers, but there's a gap right in the middle management, and that Dahlgren perhaps has not necessarily recovered fully from some of the things that happened in the early nineties.

SY: That's true in the fact that there's a much less robust hiring program during that time. Even in this department we were basically hiring to fill attrition, but we were hiring. I

mean, except for short time when there would actually be a hiring freeze, we did continue to hire through that period.

JR: It's interesting, because I've been asking this question in some of the other departments, and some of the departments were luckier than others. Some took a real beating during that period. So it's interesting. What outside influences have you had to deal with, as being the head of a department?

SY: See, this is all not for attribution, right?

JR: Sure.

SY: Organizations have cultures, and cultures are different in different places. This department is very different, in my mind, from some of the other departments. People say, "I gotta do this, gotta do that." I say the fate of the free world does not depend on what the head of K Department does. The quality of the products, the importance of the products, the tutoring of the people is all done by the big divisions and organizations within the department, and that's the way it should be.

In my view, my job is to do a couple of things—one, pick the right people for the right jobs and then let them go do it. Bob is a good example. He was on corporate staff and doing all this sort of stuff. I put him in a division and he is blossoming. He is really, really

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taking that organization in a whole new direction. I don't have to do anything. All I had to do is put him in there. Of course, depending on where you are, I mean, earlier in my career when I was a branch head or division head, then it was my job to really nurture the individuals as they started from their career and going up. But now I feel as though my job is mostly to keep the things that are happening at the corporate level from affecting the department any more than it has to. So the outside influences that I feel are the things that the Navy does to itself. I mean, like right now, NMCI, a disaster.

JR: What exactly is that?

SY: Called the Navy Marine Corps Internet. The Navy decided, in its wisdom, that it was going to buy its networking capability, just like if I was this telephone. It was going to purchase it from private industry. So they let this contract and competed it. EDS won it. Ten-billion-dollar contract. And it is to supply the computers on everybody's desks, and you pay a certain amount per seat, etc., etc., etc. Well, that's wonderful in a shipyard or on a Navy ship or someplace that isn't an R&D facility. Here my mail service—not for me, because I don't do technical work, but for the software developer, we provide them with a computer and hookups to the mainframes and the servers in a classified environment so they can do their work. And the mail service and the office kinds of things are just a little teeny bit of that.

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But now we have to buy that kind of stuff from a separate contractor, and they are going to give us a machine that doesn't meet the needs of a developer, because that's not what the Navy was doing. They were trying to buy network services like they buy telephone services. So when that clash comes to a place like Dahlgren, where we have great equipment and great capability computer-wise, and we're going backwards with NMCI, well, needless to say, people are not happy.

So it's those kinds of things that are affecting us the most now, and the Navy is trying very hard. Of course, the Clinton years, the budgets went down. But now the Navy is trying very hard to recapitalize. It hasn't built as many ships. The size of the fleet is going down, and they want to put more money into hardware. So they're trying very hard to cut down on their people costs so that they can put the money into hardware. So that's another influence on us right now. We're feeling the pressures to not spend so much money on people. Of course, my view is, we aren't people; we're product. I mean, if you don't pay us to do that work, you're going to have to pay somebody else.

JR: And then you get what you pay for.

SY: That's right. You can say, "Okay, Dahlgren, you should downsize and that'll save money on Navy personnel costs," but it's going to mean that you have to turn around to somebody like Raytheon or Lockheed or something to get the products you're getting

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from us. But if they pay for them on a contract to Lockheed, they think of it as product. If they pay it in civilian salaries, they think of it as people. So it's interesting.

JR: They have a word game going on there.

SY: That's right.

JR: Or the old shuffle.

SY: That's right.

JR: If they maybe do it too much, it becomes a complicated mess. It's interesting, because I was talking to Barry Dillon yesterday, and he talked about this same problem—staffing. It's not necessarily he hasn't got the technology or he hasn't got the funding; it's just needing the people to do it. That's interesting. Not necessarily an outside influence, but really just the Navy shooting itself in the foot, so to speak.

SY: Yes, in a lot of ways. That's the way it appears to me. And then, of course, the fact that under this administration, or at least under Rumsfeld, they want in some ways for the services to go away. They want everything to be DOD.

JR: Sort of a super unified—

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SY: That's right. The interoperability and ability to go into a theater and do what you want to do, they think that the services sort of get in the way of that, because the Navy has a way of doing things, the Army has a way of doing things, the Air Force has a way, and in the first Gulf War they couldn't communicate. The systems—you know, the guy on the ground couldn't call for air fire. And you've seen in the last war we've solved a lot of those problems, but Rumsfeld thinks that if we—he made a quote the other day, something about "The services don't have requirements. Only DOD has requirements." The joint warfare kinds of things. So it's going to be an interesting . . .

JR: Next couple of years.

SY: Right. And I think the next BRAC is going that way, too.

JR: When is the next BRAC? 2005?

SY: Yes, but that's when it's implemented. The end of this year, 2003, there's going to be a pre-look at what the criteria are going to be for evaluating places, and then by the end of '04, all the assessment's going to be done, and then it'll be implemented in '05. So it's starting now. It's starting pretty hot and heavy now.

JR: It's interesting. As many commitments that DOD is making across the world, they're still thinking in terms of BRAC and consolidating, downsizing.

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SY: They want to reduce the infrastructure so that they can put more into fielded equipment and personnel, and in a lot of ways they're right. I mean, the Navy has planes, the Air Force has planes, the Marine Corps has planes. I guess the Army has planes, too; they just call them helicopters. [Laughs]

JR: There are scout planes, too.

SY: That's probably true, yes. So there is a lot of overlap, and it is true that the services in the past haven't cooperated as well as they should about taking advantage of each other's strengths and doing one weapon development instead of three. In the next BRAC I think what they're going to be doing is consolidating, and they're not going to be saying, "This is a Navy base, but can we put Air Force things here? Can we put Army things here? And what are the bases that we need, rather than what are the Army bases and the Navy bases we need?"

JR: The cycle is repeating itself, because Dahlgren has found itself in this very position before two or three times in the past. It's always a cycle, and Dahlgren survives by adapting and innovating, but yet it always invariably turns out the Navy always seems to be glad that it saved Dahlgren, in that whenever the next war comes around or the next unforeseen incident, that Dahlgren's there to provide the solutions.

SY: Right. And Dahlgren isn't anything but the people. Any of these buildings, I mean, these buildings could be anywhere. But what would really terrify me about doing something like closing Dahlgren and incorporating it with something else would be if it's very far away, the people won't go. And if the people don't go, then the organization is kaput.

JR: Yes. It seems to me that's a dangerous way of thinking, that you can have the fleet without necessarily having a shore establishment backing it.

SY: Right.

JR: If you eliminate the shore establishment, the consequence is going to trickle out into the fleet.

SY: Right. Because the industry is wonderful at doing the technology, even. I mean technology and manufacturing and all that sort of stuff. But when the lean times come, they walk away. Like reentry bodies. Nobody has developed a new reentry body in this country for the last fifteen years, and the people who did it for the Navy and the Air Force—I mean, those companies, they don't still have those people on the payrolls. So the technical expertise resides here at NSWC because we do. We will be able, if something happens and we need a new reentry body, we will be able to resurrect enough of the manufacturing processes and the technical expertise so that industry can start back up

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again and manufacture some things. I mean, but industry won't ride you over those periods where you don't need that expertise anymore. That's just not their—

JR: The same thing happened in the 1930s—armor and projectile development. Dr. Thompson saw what had happened, and that's one of the reasons he and Commander Parsons had pushed for armor and projectile lab, because in between World War I and World War II, industry lost the capability of developing, testing, and improving armor. But they, of course, being good private contractors, they were loathe to admit it. But Thompson recognized this and pushed for it, and in the end it saved the Navy during World War II in numerous instances. So, it's a cycle.

SY: Nothing's ever new, is it.

JR: Nothing's ever new. It just amazes me. I'm really glad you touched on that, because Dahlgren's history is cyclical, and that's going to be one of the themes of the book, is there's always cycles which just repeats itself. So that's one of the points we want to get across, hopefully, to our readers later on who may or may not be placed enough that they'll recognize the value, that, "Okay, maybe we should leave Dahlgren alone," because at some point in the future, the Navy is going to need it. That's a good point. That's a really good point. Internal challenge within the department.

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SY: We are a graying department. I mean, there are a lot of people with a lot of years of experience, who are able to walk out the door today or yesterday or two years ago, and over the next several years. And everybody says it is a challenge, but, god, these young people are smart. I mean, they can do it, and we just have to remember back to the mid-sixties, how long from me coming here to getting a branch job, it wasn't all that long. That was because the organization was growing, and now the fact that we're going to have a lot of people leave, I think it's going to be fine, because the people who are here, we have hired, we have taught them, and they are capable of doing it. But it is a challenge.

When the economy turns around, what we pay computer scientists and mathematicians and physicists and what industry will pay them are quite a bit different, and people will look at some greener pastures and think about going outside the gates for other employment. But the kinds of programs we work on, people feel that they do something that's important, and they see the results. They feel like the country is better off for what they did, and they're doing something real. So, that snags enough people that you get long-term commitment.

JR: Earlier you mentioned culture. How would you characterize the culture within Strategic Strike Systems?

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SY: It is a little bit—well, first of all, it's disciplined, because whether it be cruise missiles or SLBM, I mean, we have never had an accident with a nuclear missile, and the kinds of processes we've put in place to make sure that the software is high quality and as error-free as can be, and it has to pass nuclear safety kind of inspections and assessments from outside organizations. So there's a deep discipline approach to doing our work.

It is a little bit insular. People will say, "I worked in this program for thirty years, and I don't even know what goes on in N Department or T Department." We get that reputation, but it isn't true, because when Aegis was started, they took people out of SLBM to start Aegis. When Tomahawk was started, they took people out of SLBM to start Tomahawk. So a lot of the newer programs here at the base grew out of foundations here within this department. But then people forget their roots, you know. So that's a little bit.

The other thing here is management style. Whereas we have a lot of discipline in the way we go about doing our technical processes, management philosophy is more like—like I said, Ralph Neiman. I hope you do a big thing on Ralph Neiman, because he was one of the—well, we laugh. When we were youngsters here in this department, we said Ralph didn't do anything but manage the Xerox machine. [Laughs] He decided that K Department did not need but one Xerox machine, so he bought a big Xerox machine and he put it in one place and he wouldn't let anybody else buy a Xerox machine, and then he

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managed how we were all going to get time to make our copies. And that's sort of the way it is.

Like I said, he concentrated on the environment and putting the people in place, but then he did not get down and try to micromanage what was going on within the organizations under him. We sort of still have that culture that says "Don't tell me how to do my job. Tell me whether I'm doing it. If I'm not managing it properly, then fire me, but otherwise, don't tell me how to do everything." That's sort of the culture, I would say, within the department.

JR: That's interesting, because that reflects in a way what we've run into, known as the "Dahlgren way." The initial formulation of this concept goes all the way back to Dr. Thompson again. It sort of ties into essentially freedom, the sense of [inaudible] within a given department to set your own agenda, set your own research goals, or write about a concept and follow it through. Thompson came up with this in the twenties and thirties, and after he left in '42, Dahlgren lost a lot of it, especially in the fifties. It was just the context of the times; it wasn't the people here fault or anything. Just new people came in after he left.

But Thompson, after World War II, became the first technical director out at China Lake, and he carried this system with him, and he trained Jim Kolver and Barney Smith, and

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when they came back here in the early seventies, they had to bring the Dahlgren way back to Dahlgren. It sounds to me like you just defined in a lot of ways what that was all about.

SY: Yes.

JR: Does the department initiate its own research, or do you really respond to requests from the fleet or from the Navy?

SY: We initiate our own in areas that seem to help us do our job better. It's software development, so the ability to continue to produce quality products and go to COTS kind of equipment, the ability to retain control, we did a lot of architectural kinds of things. I mean, like, for instance, one example was something we did and now has gone to a contractor, but UAVs. The old paradigm was, you'd go to a contract, you'd buy a UAV. Well, you have to buy a ground control station. Well, that means that you have to have—you've got two different kinds of UAVs. You've got to have two different kinds of ground control stations. It doesn't really make any sense.

So what we did in this department was come up with a universal ground control station that you had to buy from the contractor, a plug-in, for how to manipulate the vehicle, but then getting data from the vehicle sensors, processing it, getting it out to the people who need it, the pictures, the users, all of that would be common, so that this one ground station, the different modules, could control all the UAVs. So we did research in those

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kinds of areas, new constructs to put the Navy in a better position with respect to the products we did.

Another example is, the mission planning for Tomahawk right now is done at either a ground-based place or has to be done on a carrier. None of the platforms, the cruisers or anything that carry Tomahawks, or submarines, they can't plan missions on those platforms.

JR: They just launch them.

SY: They just launch them. They can't plan the mission. The mission has to be planned elsewhere and sent to them, either in the media or in a message. Well, we thought that wasn't a real good situation, so we started working on simplified ways of doing mission planning for Tomahawk that would indeed fit in the computers on the launch platforms, and we worked on that for a while. Now, it doesn't have all the bells and whistles, and it doesn't let you do some of the real detailed targeteering that can be done on some of these other platforms, but it's perfectly adequate for most missions. And we got that accepted so that when the next version of Tomahawk that goes out—as a matter of fact, we've had some test flights, where the missions have been planned on board, using the mathematical and then turned into software concepts that came out of this department.

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JR: Recent history. What has the department done? Gulf one, Gulf two, "war on terrorism." What are some of the contributions we can talk about?

SY: Well, as I say, every Tomahawk shot is shot using our software. And we respond to fleet problems or initiatives. If something goes wrong in some of these war kinds of shots, then we can get data back here and simulate and see what we think happened. The other kinds of things, the new Tomahawk version is going to be deployed in '04, is in the test phase now, and we have a laboratory here that has been certified by OPTEVFOR to be part of OpEval, so that they can fire one or two missiles and we can simulate fifty or sixty flights, so that you get a good database without spending all the money that it costs to fire a million-dollar Tomahawk.

JR: You've been here a while. What kind of stories do you know, that you've gone through or had the benefit of experiencing, or some interesting things that could go in the book?

SY: I don't know. Depends on what kind of stories. One story that was sort of interesting, when I came back here, I had been gone for nine years. I had left in '90; I came back in '99. The office on the other side of the stairwell from where you came up is Dr. Dignato, and he was old when I came here in '66, old from my perspective. He was old. But he just got his fifty-year pin not too long ago. Has been here fifty years. That kind of longevity and dedication, I couldn't believe it when I came back and said, "Dignato's still

here?" I couldn't believe it. I just couldn't believe it. I don't know. I have a million stories, but they're almost insider stories. I don't know what kinds of things.

JR: Just interesting things, humorous, even insider general information or personalities. Anything of that nature. Have any funny incidents with some admirals or some captains from the fleet, maybe clueless about what you do here?

SY: When we were first starting up the cruise missile program, an admiral came here and walked into this conference room downstairs, turned around, said, "What a shitty little conference room." [Laughs] "Wait a minute. I've been dealing with the strategic systems."

JR: While you were still at the [inaudible], yes.

SY: And not one of them, as far as I was concerned, the higher in rank you got, the more gentlemanly you were, the more tolerant. I couldn't believe that this flag officer came in and said something like that. I said, "There's another Navy out there that I am not familiar with." I think that is part of the insularity here in K, is that we have dealt with a very select part of the Navy that has the highest standards, as far as I'm concerned, for integrity and every other thing. I mean, when you get out and deal with some of the other parts of the Navy, it's very different.

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JR: That probably ties in with the lingering tension between the fleet Navy and then the research and development end of things. There's still some guys out on the high seas who are clueless about the cool technology and weapons they have, they don't know where they come from. They don't respect the fact that the shore establishment, i.e., Dahlgren, has made it possible for them to have this. So, there's a little bit of contempt there, perhaps, still lingering. With that, we'll conclude the interview. I do appreciate your time. It's great information. Thank you very much.

[End of interview]

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