# ORAL HISTORY 2 TRANSCRIPT

JOHN C. STONESIFER
INTERVIEWED BY KEVIN M. RUSNAK
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RUSNAK: Today is April 16, 2001. This interview with John Stonesifer is being conducted in the offices of the Signal Corporation in Houston, Texas, for the Johnson Space Center Oral History Project. The interviewer is Kevin Rusnak, assisted by Tim Farrell and Carol Butler.

Thank you once again for joining us today. As we just discussed, if you could give us a little bit more detail on your days working at Langley the few years you were there both before it became NASA and before you joined the Space Task Group.

STONESIFER: All right. Well, that was a long time ago. It was back in 1957 when I went with NACA [National Advisory Committee For Aeronautics], Langley Research Center [Hampton, Virginia]. They had a big recruiting drive along about that time. I don't remember the significance of it, whether they got an increase in budget or what, but I was amongst thirty or forty new recruits that joined the engineering force there at Langley.

I was assigned to a group of people that were looking at flutter and elasticity of high-performance aircraft. Well, actually, flutter is a phenomena where you get an aerodynamic surface that extracts energy really from the air stream and begins to vibrate. If it vibrates too much, then it fails, causing an aircraft crash. We were engaged in looking at the flutter and elasticity of the high-performance aircraft that were being either designed or flown at that time.

What they liked to do is determine the limits of these aircraft in the wind tunnels before they really begin their all-out flight testing to determine what the margins are and what the

airplane should not exceed before it gets into trouble. So it was quite interesting work. It was new to me. I had majored in mathematics and physics in college, and if you get into the theoretical parts of flutter and elasticity, you begin to get into the complex mathematical equations of vibration.

But, anyway, the parts that really were enjoyable were the testing in the wind tunnels. We would either get from the aircraft companies or from the model labs there at Langley, either a tail section—we usually did not test the full airplane, but we tested a wing section or a tail section represented by a model and put it in the wind tunnel.

Some of the models we tested were the old [F-]105. This was an interesting aircraft. It was a real workhorse for the Air Force. The Air Force loaded it down with bombs and Sidewinders, and what we tested were the various configurations representing clusters of 500-pound bombs or 1,000-pound bombs, full fuel tanks that were hung under the [wings]. So there were between thirty-five and forty different combinations of stores, what we called stores. They were all stores that were hung on the wings or on the fuselage that we tested in order to determine what speeds and what altitudes the full-scale aircraft could achieve and still remain safe.

One of the more interesting ones were the tail section of the X-15, which at that time was somewhat classified. The whole idea here is to reduce the weight of a panel or an aerodynamic surface, but if you reduce the weight too much, you reduce the strength, and therefore, you get into problems. So it's always the idea, make it as strong as you possibly can, make it effective to do its job, and keep it low in weight. So we were always trying to scale our model results up to the full-scale airplanes to determine what they could modify or change.

Another very interesting one was we tested the tail surface on the Redstone missile. What they were trying to do was reduce the weight. If you remember, the Redstone stood on the pad, and it had the tailfins on it. We were doing some research to try to reduce the weight on those tail surfaces, again, to get a better or a higher payload. If you reduce the weight in the tail section or anywhere on the rocket, you could then increase the payload. So we did some work on that.

The P-6M, which was the [Glenn L.] Martin [Co.] flying boat, I guess you'd call it, we tested. I was involved in testing the tail surface of that. The full-scale aircraft ran into a lot of other problems and was eventually cancelled, so we didn't do any further testing on that.

Another very interesting one was the B-58, which was the *Hustle*r. I was involved in testing that in the 19-foot wind tunnel at Langley. It was a model that represented the whole configuration. Unfortunately, on one of our first test runs there, we blew the model down the tunnel. It was a $250,000 model that just went down through the turning vanes and the propellers, and it wasn't a very interesting day at work.

But after a few years testing the aircraft and working in the wind tunnels, then that's when Space Task Group was formed, and I started looking and things sounded interesting. Although we were all faced with the idea that we wouldn't stay at Langley very long, that Space Task Group was destined to leave and go somewhere else, and, of course, I was hesitant about leaving the area, but I realized that there was an opportunity and something different, space business and space flight. That's when I looked around and went and talked with the folks down the street there at Langley and took the job with the Recovery Operations Group.

RUSNAK: The Full-Scale Research Division that you were in has gone down in historical record as one of the more conservative groups in terms of their adherence to aeronautics instead of astronautics. So I was wondering, you being in that and looking for these new opportunities, what did those around you think of what was going on as this was becoming NASA and the priorities given to aeronautics and what this new space venture might hold?

STONESIFER: Well, there was kind of a mixed feeling there. That the true aerodynamicists, I think, as I recall, we used to have discussions. It was so new. First of all, to launch satellites, that was the first thrust, put something up there. Then kind of in the back rooms it was man in space. All of you remember the first drawings of a nose cone with a man in it. It was kind of a mixed blessing.

There were a lot of them that thought, "Hey, this is some Buck Rogers stuff. Nothing is going to come to of it." The true aerodynamicists, still they were interested in aircraft. It was all new, and you certainly didn't expect it to take off and be where it is today.

RUSNAK: So, you personally then, did you have any reservations about moving to it, thinking there may or may not be a future here?

STONESIFER: No, I didn't. The more I talked with the people, I focused in on recovery operations, because it just sounded interesting and somewhat akin to my Navy background. I loved the Navy, and I knew that we were in for water landings. That's the only kind of landings we had at that time, so it struck my interest, and I certainly didn't miss the aerodynamics part of the research.

RUSNAK: When you moved into recovery, as you talked about last time, you mentioned a lot about the actual operations going along, about some of the missions and such, but I was wondering if you'd give us some details on actually setting up recovery operations, how far along that was when you joined up.

STONESIFER: That's a very good question. When I joined, we hadn't launched the Glenn flight. I think they had one. Yes, Shepard had flown and Grissom had just flown when I joined the Group. Everything was fairly new and novel. The guys, I must admit, did their homework for those flights. But I was intrigued by the amount of planning that went into recovery. I was amazed that you just can't consider the launch abort problem, because the launch and return, those are the two most dangerous parts of a mission. It was quite interesting.

I'll start with the launch area. Again, they had done their homework. The launch area was supported by, first of all, what do you use to cover the swamp areas at the Cape in case you have a launch abort. You remember the early flights had the escape tower on, which would have pulled a space capsule—I call it the space capsule—from an exploding rocket so you land somewhere in the swamps. So what kind of a vehicle? What kind of recovery operation do you put into force?

You have the surf, which is somewhat different from farther out where the water is relatively calm. Well, relatively calm; it's not surf conditions. So they come up. Of course, helicopters were always available, or we trained helicopter crews from the military. But they also had a vehicle called a LARC [Lighter Amphibious Resupply and Cargo]. I forget what the acronym stands for, but it was an amphibious vehicle, a wheeled vehicle, that could also go in

the water. I rode a few of those sometimes out into the surf, and it's pretty rough. You'd better hang on. The primary function there was to get to the floating spacecraft or the space capsule as quickly as possible.

Then farther out, then you had some of the Navy [salvage ships], but, in fact, they used them when the *Challenger* crashed. They used some of the Navy retrieval vessels that are capable of operating right out there off the surf and they have lift capability.

Then farther out, then you start getting into the worldwide recovery forces of the destroyers and the carriers and the aircraft. But it amazed me how far-flung this is and how worldwide. I went into that somewhat the last time, that on those early flights we had destroyers strung across the Atlantic Ocean, and we had aircraft carriers at the end of all of the orbits, at least for those that flew the first three orbits. Then gradually they backed off on that.

But the planning would start with, first of all, we'd get from the mission planners the ground track coordinates, and we'd draw up our maps with all the ground tracks, and then we would decide where we would recommend to the Navy and the Air Force where they should deploy their forces to effect a recovery within a certain number of hours or as quickly as possible and still being reasonable. I mean, we couldn't have ships all over the world.

So the plan back in those days, you planned and you executed one of the missions, and you were always planning one or two missions ahead because you always had to go to the military and request their support. Of course, they have a primary duty also. So we were cutting into how they used their resources.

Then once we did the planning and went to the military, the DoD [Department of Defense], for our requirements, we issued requirements to them, and they came back then and identified the resources or the ships or the aircraft, what basis would support. Then our task

became very important. We had to go out then into the field and train these people, brief them on what to expect, what happens when, and what kind of equipment to supply to them to do their job. As I said before, the Air Rescue Service, the Air Force Air Rescue Service has bases around the world, and not always where we needed the support, but sometimes the aircraft from a particular Air Rescue Service base would have to deploy to another base somewhere along the ground tracks to provide service for us.

So we'd have to go to those Air Rescue Service bases, which were worldwide, which was one of the nice things about it. We got to travel a lot in some nice places. And would train those forces. I'm talking about the pararescue people, primarily, also the search aircraft. We provided them with certain equipment that they could use in assisting locating the spacecraft and then, if necessary, to drop their pararescue men to the scene. But we had to instruct them on what to do once they got to the spacecraft. We had to instruct them and train them on the use of the flotation collar and what to expect, how to avoid the hazards and things around the spacecraft.

Once the Navy designated their ships, then fellows in the outfit would travel to those ports where those ships were located, and we would train and brief the people on what to do if they got the spacecraft onboard, how to assist the astronauts, what to expect, and be able to assist in whatever.

One of the things, the engineers in the division designed what we called a davit crane. The destroyers had no capability to lift the spacecraft onboard, so the engineers designed a crane that was installed on the aft deck of the destroyer. It was a fairly shipyard major modification to put this crane on the fantail so that it could swing out over the water and lift the spacecraft and bring it aboard. So we always had training exercises.

We'd go to sea with the destroyers, and we shipped all over the world, it seems, what we called boilerplate spacecraft. These were what I liked to call iron-shaped spacecraft that represented a true spacecraft in the weight, size, the way they floated, and so forth, for a ship to train in lifting this spacecraft out of the water. We had to supply them with these boilerplate spacecraft. Throughout the program, I don't how many Mercurys and Geminis and Apollos we shipped all over the world.

Apollo always caused us a problem because it was a wide load, and you'd have to get special permission from the states to ship it through the states, and a lot of red tape.

So once that was in place, and then the mission came up, all these forces were ready, unfortunately, the next mission, we would get new people, new ships, new bases called in to support, and we would do the training all over again. So it kept us busy between missions just doing the planning and then just doing the training of all of these new people that were being assigned to the mission.

Then once we got to sea, I can speak primarily for the—well, we did this even on the ships and aircrafts supporting the secondary areas, but I can speak from the carrier standpoint. Once we went to sea, and even before, we held simulations. I know you're familiar, and most people are familiar, with the simulations that were conducted in the control center. Well, we did likewise once at sea. We played so many "what if" games. I mean what if the helicopters can't get airborne? What if the communications fail? What if we have a man overboard emergency at the same time and we have a spacecraft out there and we're trying to get the people back? What if it lands at night? Just what if.

What if the aircraft that supports from a command and control situation [developed a problem]—we always launched an aircraft that was above the carrier that was the command and

control aircraft because we'd have probably three primary helicopters. We'd have what we call the primary helicopter, which was the one to bring the astronauts back aboard the ship. Then we had a photo helicopter and probably a backup to each. Then we had some fixed-wing aircraft overhead. So it took a command and control and a communications commander to control this operation.

So we had all kinds of simulations [for] different [situations]. So it was a full-scale operation, and, believe me, we played "what if" games. We had many, many drills out there where we would put the spacecraft in the water and then sail off and then locate it and sail over to it. [We] just went through simulations like that time and time and time again. I must say it paid off, because we really never had a problem that I can recall that could have led to some disaster.

RUSNAK: I think, as you were saying, right about the time you came on, Gus Grissom flew, and that was, of course, where his capsule sank. I was wondering what sort of fallout there was from that, what kind of changes perhaps in procedure were instigated.

STONESIFER: As I recall, we didn't make any changes as I recall when I came aboard. I don't recall that there were any significant changes made as a result of that. We still had to use the same helicopters, because those are the helicopters that were available to us. As far as I know, there weren't any procedures on his part, you know, on a crew part. But that one was a close call. That was a close call.

RUSNAK: Yes. We've heard about that from a couple of people, I guess. Of course, just a few years ago, they dredged it up from the bottom of the ocean again.

STONESIFER: Right. I think, as we discussed, I don't think they'll ever be able to, in examining the spacecraft, determine what happened or what didn't happen. I have my own feelings of what happened, but I would not want to put them on tape.

RUSNAK: Well, maybe afterwards you can share those with us.

STONESIFER: Right.

RUSNAK: That brings to mind some other things. What sort of dangers did the spacecraft itself pose once you got it aboard ship? What would you do with it?

STONESIFER: That's a good question, because I wanted to include as part of the training, we had a special team that once we had the spacecraft onboard, the recovery engineers would go in and record all the switch positions and make sure it was powered down. Usually, the astronauts powered down sufficiently according to their checklist, but, you know, for any investigative work afterwards about what happened or what didn't happen, you always want to record switch positions and make readings and things like that.

That was another thing that we did, working with the manufacturers in the various program offices, came up with manuals, you know. By the numbers, here's what you do once the spacecraft is onboard. One thing we were always concerned about, though, was, that

spacecraft still has propellants onboard, and if something goes crazy, you could start firing thrusters. I must say we took precautions but, again, I think we were fortunate in that we never ran into any of those problems.

I think back now, some situations probably could have gone bad, because usually when you pull into port there's always some VIPs, you know, the mayor of this city or the governor here or the senator or somebody, they want to come and have pictures taken next to the spacecraft. I used to shudder at this overwhelming influence to have these VIPS have their photographs taken next to the spacecraft. The astronauts were gone by then, except for the Apollo 11 and 12, where we brought them [into] the [post] quarantine facility.

I thought back many, many times, that could have been a problem, because at that time still we had not deactivated. Now, that was one of the processes that we went through once we took the spacecraft off the ship. Then we escorted it to a remote area on, say, the Navy base or the Air Force base, wherever we happened to pull in with that ship or wherever we were going with that spacecraft. Then there was a special team that came out to deactivate it. They actually took panels off and bled off these hypergolic fuels that were still onboard the spacecraft.

If you remember on, I guess it was the Apollo-Soyuz mission, where the crew, on descent, and I'm not sure on the details of this, but on the descent, when they expel some of the fuels, they came in through the vents, and they were subjected to some of the hypergolic fumes and were quite ill there for a while. In fact, before they came back to Houston, I think it was in Hawaii, they spent some time in Tripler Hospital out there in Hawaii.

RUSNAK: At what point was your job with the spacecraft finished?

STONESIFER: Usually my job was finished—well, the deactivation crew, they still worked for the recovery. They were still part of recovery. But usually at that point I left the scene, and those fellows then were in charge of getting it back to the Cape, usually. Except with, again, Apollo 11 and Apollo 12. It was not until that spacecraft was delivered and hooked up to the Lunar Receiving Lab and that was it.

RUSNAK: A little bit more complicated there for the obvious reasons that you talked about last time.

You said earlier how water landings were the only option you had at this point, and for Gemini they obviously discussed other things, using a paraglider to land it on dry land, and they briefly discussed these for Apollo, too. I was wondering what sort of investigations you had in that or what kind of preparations were maybe made if they got around to using that.

STONESIFER: Well, as you mention, as we all know, it was interesting watching the development of the Gemini spacecraft and with the [Francis M.] Rogallo wing, which was supposed to be a land landing or land on the skids… In fact, that's why the spacecraft when it floated, it floated in [a horizontal] attitude rather than the Mercury attitude, upright, which reminds me we'll have to get to the bit of Apollo later on. Apollo had two flotation angles, stable 1 and stable 2. It could come in and float upside down.

But, anyway, yes, we looked at that and looked at the various airfields around the world where we might use as contingency landing areas. We were prepared for that, but it never got to the point where we really had to execute any of the planning associated with that kind of a

landing, because it never really got to that point. Once we knew, then, it was going to land on the water with the parachutes, all of the old Mercury planning was pretty effective.

RUSNAK: In terms of changes from Mercury to Gemini to Apollo, were there significant ones or did you just use the same tried and true format?

STONESIFER: Basically, we used the same tried and true format. We had to develop a little bit different equipment. For example, the davit crane on the destroyer. For example, there was a large ring that would go around the spacecraft to stabilize it as it was lifted out of the water and brought onboard. We'd have to change the shape of that for Gemini, of course. Apollo then was much larger. We had to change that.

Basically, it was still the same kinds of support around the world, but less of it as we became more confident, I think, in the systems and knew more about the possibilities. Really, it was the fact that we didn't have to have as many contingency landing areas and we didn't have to have all of these ships spread across the Atlantic. It was just basic pretty much the same, I would say, except less of it.

RUSNAK: At some point, I think you moved from having destroyers as the prime recovery ships to carriers.

STONESIFER: Yes, right. In Mercury, and I'm not sure whether far into Gemini, but always in the primary recovery area we always had a carrier and an up-range and down-range destroyer,

150 miles up range, 150 miles down range. We gradually did away with that and just had a carrier in the primary recovery area.

RUSNAK: Did that provide any particular advantages?

STONESIFER: Not really. Again, we were confident in the systems, and the landing accuracies were getting better all the time.

That brings up an interesting point. For, again, historical purposes and for technical purposes, NASA always wanted to know the exact landing point. That meant the burden was on the navigators out there onboard ship to always have a good position of where splashdown occurred. If it were two miles or three miles or four miles off, they'd have to plot where the ship was and then where the spacecraft landed. Usually they'd have two or three individuals doing the navigation, somebody on the captain's or the admiral's staff, and somebody on the ship's staff. There was always a little bit of [competition]—and, again, they wanted something exact.

It was interesting, and I think this didn't occur until Apollo, sometime in Apollo, when the global positioning systems began, were very early in the game, and NASA funded putting that system onboard the primary recovery ships so that they could really pin down their navigational positions. As far as I know, once it was put on these ships, it was left on. It wasn't something that they'd transfer from one ship to another. And you can bet the navigator always liked having that on his ship as a backup to any of the typical navigation methods.

So they always wanted to know exactly. That was one of the things we always had to bring back to NASA, was the exact landing position. And it got pretty good, because as I recall

on the Apollo missions that I was out on, I don't recall, ever, one of them landing far enough away from the ship that we weren't able to see it, which was pretty exciting. Except Apollo 11. It was still dark when that landed. But the first clue we always had was the sonic boom, because when Apollo came back in, it was coming pretty much over the landing area, almost straight down, and you knew when you got that "boom, boom," we'd always yell, "It's overhead." So then we began to really start looking for it.

RUSNAK: I meant to ask a little bit earlier, during Wally Schirra's flight on Mercury, his mission was during the Cuban Missile Crisis, so I was wondering if that had any effect on either the availability of DoD resources or the whole situation there, if you recall.

STONESIFER: Not that I recall that it did. I may not have been in some of those discussions. But as far as I know, it did not.

The biggest problem we had, and I think I mentioned a little bit of this [earlier], was some of the later flights [were] right at the height of the Vietnam War. As I mentioned, many times the carrier that was designated to support us in the Pacific was a carrier that was just returning from its duty in Vietnam waters, and here NASA was really taking away their liberty time or their in-port repairs and refurbishment for that returning ship, which was really a hardship on the folks onboard those ships.

RUSNAK: In terms of recovery contingencies, I guess the mission that would have probably pushed the recovery forces most would have been Gemini VIII.

STONESIFER: Yes.

RUSNAK: When it became clear that it was going to come down in some emergency fashion, how prepared were the forces to deal with that in that specific instance?

STONESIFER: Well, they were prepared. Again, that ship had been trained, and we had a NASA representative onboard who knew what to do as far as based on the manuals that we had prepared on it, and he had been through the training. But the mission rules dictated that if that particular problem that they had comes up, the mission rules dictated they'd land or they'd head for the next contingency area, which happened to be that one in the Pacific. There was a destroyer there, and the Air Rescue Service aircraft were deployed to that area. I forget what base they were operating out of, probably Guam.

But as soon as it was indicated and the transmissions went out to the military to transmit to that ship that the spacecraft was coming down in that area, they were prepared. I forget how long it took them to locate the spacecraft, but the aircraft, I think, were able to home in and drop their pararescue men and wait for the ship to come over.

So there again, the planning paid off. The contingency, the designation of these contingency areas and their locations were such that I think it reflected the planning that these were things [that would happen]—I had an interesting part in that mission, and I was in the control center for that mission. My boss, Bob [Robert F.] Thompson, came to me and said, "John, are you ready to go to Guam?"

I said, "Well, yes." That night, that very night, I was on an airplane from Houston to Fairbanks [Alaska], to Tokyo [Japan], out to Guam. The spacecraft had already been offloaded,

and we were going through the preparations for getting into it and [going through] the various [procedures]. We had an unfortunate thing. If I recall correctly, I believe the engineer on the ship, and I'm not sure on this, but it goes something like this, closed the hatch with the hatch tool inside. We got to Guam, and now how are we going to get into this?

Fortunately, we had a McDonnell engineer with us, and I tried to recall last night whether he flew out with me or whether we met him there or what, but we were able to remove the window to get in to open the hatch and do our post-landing procedures. Kind of interesting.

RUSNAK: Were you worried about the ejection seats?

STONESIFER: We were, but, again, it's like ejection seats in aircraft. If you don't play around with it and don't pull the pins, and, you know, pay attention to all the warnings, why, you're all right. So we paid attention to those kinds of things.

RUSNAK: Since Gemini was the only program to have used those.

STONESIFER: Right. Yes, that made an interesting situation, too, for recovery at the launch site if there were a problem, so that was another problem that we had to face. Again, our early planning for the Mercury launch aborts and things paid off here, and we had the right kind of support available in case they had to eject while they were there on the pad. But that would have been a hazardous operation.

RUSNAK: You mentioned before having a story about the stable 1, stable 2 position for Apollo.

STONESIFER: Right. Again, I like to emphasize that we played so many "what if" games, and I think we covered almost every one that we could possibly think of out there. We learned somewhere along the line that Apollo spacecraft had two flotation attitudes, what we called stable 1 and stable 2, 2, I think, being upside down. That led to the development of these floatation bags, if you've seen some pictures.

If it landed and turned over, these flotation bags, which were like the big balloons, automatically inflated and would right the spacecraft, and it would pop up and float in the upright position so that the swimmers, if it landed in the primary landing area, or pararescue men, if it landed somewhere else, could put the collar on so they could help the astronauts.

But we played the "what if" game. What if the bags don't work and this thing is upside down? We even practiced with using a helicopter to hook onto the recovery loop and hoist it and pull it upright. So we felt we were covered in that situation.

It's interesting, too, prior to these missions, we had, I mentioned, the boilerplate spacecraft. Well, we had some boilerplate spacecraft that were very sophisticated. In fact, I guess you can't call them boilerplates anymore; they were mockups. They had the seats in them and they had a few of the other instruments. They had the beacon, the light and the beacon. We would train the astronauts out in the Gulf. We'd put the astronauts, before their mission, out in a spacecraft like that, put it over the side, pull away with the *Retriever*, which was our landing and recovery ship, and sometimes bring aircraft in to home in on the spacecraft. We would train the aircraft that we were going to use in the mission, let them locate the spacecraft. I mean, it was usually within visible range of the ship, but at least the aircraft coming in from a hundred miles out could home in on the spacecraft. And we would use our NASA swimmers usually, or

sometimes we brought in the DoD swimmers or pararescue men, had them install the collar, and go through a typical astronaut egress and retrieval so that they got some familiarity with the procedures, the communications in egress and recovery.

Even on—I think it was Apollo, I think we had two astronauts out there, I'm not sure whether it was twenty-four or forty-eight hours, just, again, to check out some systems, not the real spacecraft systems, but familiarize ourselves and them on some of the things that they would go through in this spacecraft for a period of time. So that, again, was part of our training.

RUSNAK: Can you explain what the *Retriever* was and how you came by it?

STONESIFER: The *Retriever*. Well, back in Virginia, we used to use fishing boats and almost anything. Some of the fellows in recovery, I think, had fishing boats. Again, it was all water landing, so there was a lot of activity to be done in the water, development of the collars, development of any flotation device, develop anything that was associated that you needed water to do the testing.

But then when we moved down here, the Gulf was a good place to do our testing, although we learned very, very quickly the Gulf does not simulate the open ocean in any respects. You may get three-foot waves out here, or four-foot waves or five-foot waves. There's nothing like those five-foot waves on top of swells, ocean swells and things out in the ocean. So we always had to keep that in mind if we did something out here. It was not as true as it was going to be out there in that open ocean. You could just add a factor above what the conditions were back here.

But we knew we needed something to do this routine testing and quite periodic testing. It was not just once a month or once every two months. We needed something of our own. In fact, there for a while, when the Navy was having trouble supplying us with ships, there was a study for NASA to buy their own recovery ship, oceangoing recovery ship. In fact, we even looked at a few of the Navy carriers that were about ready to be decommissioned. You know, you take off all the gun turrets and the armament and you really skeletonize it, if that's a word. We did some studies on that, and we never did it, but I know I spent a lot of time looking at ships and the possibility of refurbishment.

But, anyway, we needed something to do this work in the Gulf. I don't know all the details of this, because I wasn't too heavily involved, but they ended up buying or having transferred a landing ship, LST, I think it was, landing ship tank, and then went to one of the shipyards and modified it to suit our purpose. We made a lot of use of that old *Retriever*. We called it the *Retriever*, and we had a ship captain. Many times we went out and they had cooked meals and things, and we went out there for a few days at a time. But it was very instrumental in training.

I can remember one of the highlights of my career was onboard the *Retriever* when we went out before Apollo 11. I briefed the three Apollo 11 astronauts on what to expect, because that's when we got into the quarantine, you know, and who would do what, and the equipment and all the quarantine procedures and things. So that was quite interesting.

I mentioned earlier that our training was, we always got new ships, new aircraft, new people. Very seldom did we ever have the same people that were involved early on or on a previous mission, until we got into, I think, from Apollo 10 or maybe Apollo 9, we finally convinced the DoD that why not, at least on a primary recovery ship, give us the same

helicopter people, because they are so prime in this whole area of retrieval of the astronauts. We got the same squadron. In fact, we used the same recovery helo [helicopter], I think, in two or three missions, and I think that recovery helo is in a museum somewhere. I don't know.

Also, I'd like to mention that the USS *Hornet* is a museum ship in Alameda [California], in the San Francisco area. There is a museum onboard, and they feature quite a bit about Apollo 11 and Apollo 12 recoveries onboard. I've been in communications with the individual that promoted it and has a lot of influence and a lot to do with the museum onboard. He's written to me several times about if I have any artifacts and goodies that they could put in the museum.

RUSNAK: I think they just got a hold of one of the mobile quarantine facilities.

STONESIFER: I don't know whether they did or not. There was one at the museum in Huntsville. There's one there. The other one I lost track of.

Maybe I mentioned this before to you, I don't know. We were contacted shortly after we had no more use for them. We were contacted by I think it's the Communicable Disease Center [now Centers for Disease Control] in Atlanta. You may remember reading something about this. They wanted to transport somebody from Africa with, I don't know, ebola something, or one of those rare disease in Africa, and they wanted to use it to transport that individual back here to the States. At that time I guess I wasn't in recovery anymore, and I lost track of whether we ever supplied it or not. But I've lost track of one of them. We had only two, and one of them was in the museum in Huntsville. Now, I don't know whether they were able to get it at the *Hornet* or not.

RUSNAK: I think I just read that somewhere.

STONESIFER: It would be a good display onboard the *Hornet*, because that's where we really used it.

RUSNAK: Before we move on to the rest of your career, are there any more recovery stories or episodes or points you want to make?

STONESIFER: Let me check. No, I think I've covered most of that.

I think the last time I mentioned, before we were on tape, I always like to remember that we did lose some military folks in support of the NASA program. I don't think it's very well recognized either in NASA history or even in the DoD history. But I do recall during, I think it was Mercury Program where we lost one or two. When I say "we," I mean the team, the DoD lost one or two sailors overboard on some of those destroyers that went out.

I particularly remember we were conducting training out of Bermuda. This was pararescue training. Well, it was actually search training and pararescue training where we had a boilerplate spacecraft out there in the water, and we were using the aircraft to home in on it, and then they were to drop pararescue men to the scene. There was a photograph airplane and the operational aircraft that crashed, and we lost a number of DoD personnel in that midair crash. I don't recall the number. I wish I did. The number seventeen sticks in my mind.

We had NASA people in the boat in the water, but we had no NASA people onboard the aircraft. But I can remember the stories from our NASA man in the boat of how it was a pretty

horrifying sight to pick up bodies, retrieve bodies. So I just like to mention that, the fact that there are some of the unsung heroes in all of this.

RUSNAK: I'm glad you take the opportunity to recognize that, because, as you said, it doesn't seem to be well documented.

STONESIFER: That's right. We had a number of accidents, too, where maybe putting a boat in the water, retrieving a boat, there were people injured and flown off to hospitals, but it makes you think about there were some accidents.

RUSNAK: You talked a little bit last time about your move into the Bioengineering Division, that kind of thing, and integrating experiments into Skylab. One of the specifics I wanted to ask you about that was the SMEAT tests, the Skylab Medical Altitude Tests.

STONESIFER: That's good, yes. SMEAT. Everybody always wanted to know what does SMEAT stand for? SMEAT, Skylab Medical Experiments Altitude Test. The word altitude there is very important, we used to think. But basically what it was, was there was a lot of discussion about all these medical experiments that are going to be conducted in Skylab. There was a lot of discussion and debate, how important are they, are we going to learn anything, and why are we doing this, and so forth. So, NASA being very strong on simulations, we got the investigators together and thought, well, now, what can we learn from doing a so-called simulation of the medical experiments in Skylab for this period of time?

First of all, we have to remove the absence of gravity. We can't simulate that, but what else can we simulate? We can simulate the confinement. We can simulate all of the experiments, all of the equipment. We can simulate the food system. We can simulate the reduced atmosphere. So that's what we decided to do.

They picked the three astronauts: [Karol J.] Bobko, [William E.] Thornton, and [Robert L.] Crippen. We put them in the chamber. We configured the chamber as much as we could to simulate a Skylab configuration. We put the medical experiments in there that the investigators felt we could learn something about those medical experiments, excluding the absence of gravity. So naturally most of the investigators chose to run their experiments, and we duplicated quite well all the experiments, the medical-type experiments that we were going to do on Skylab. And we brought in the flight controllers, some of the flight controllers to sit at the consoles. We had daily meetings as a result of the experiments. Just really ran it as close to a mission as possible.

I'm glad you mentioned that. My son mentioned the other day to me, he said, "Dad, isn't that something." He said, "About thirty years ago, you ran that SMEAT test and you were in charge of the division that developed all the experiments." And he says, "Here I'm involved with that ninety-day test that they ran," what, about two years ago, that ninety-day test in the chamber.

I said, "Well, that's life." But he thought that was rather coincidental, that here I was involved in one thirty years ago, and he's involved in the ninety-day test.

So, anyway, we learned a great deal in that test, and I think it benefited us tremendously once we started running Skylab.

RUSNAK: What kinds of things specifically did you do that were most valuable?

STONESIFER: Well, first of all, we were interested in the performance of the equipment more so than—and you'd have to ask the doctors and the investigators what they learned basically from it. But we learned that the equipment worked. I'd like to emphasize that all through Skylab our experimental equipment performed beautifully. I mean, we had so many troubles and problems in developing it, but it just performed great during the missions. So it was really a good shakedown for all of our equipment and our procedures. So that was the basic part of what we learned.

RUSNAK: Did any of these experiences with Skylab translate into your work with Space Shuttle?

STONESIFER: Yes, strangely, or not so strangely, a lot of the experiments are very similar to what were being done on Shuttle, especially on Spacelab, the life sciences missions on Spacelab. In fact, some of the things they're still running today are just really takeoffs on some of those experiments on Skylab, and that's understandable because you still have the same problems of flying in zero gravity back there that you have now, and you're still trying to understand the physiological phenomena of space flight and the long duration in flight.

Now, we were very disappointed in [Spacelab], because when we first started doing our studies for Shuttle and the life sciences role in Shuttle, especially Spacelab coming on, it was first advertised as thirty-day missions. Even Shuttle at first, it was going to stay up twenty-eight days. We went out with our first call for experiments based on thirty-day missions. Then when

they got farther along in the design of Shuttle and it went from twenty-eight days to maybe twenty-one days and then down to fourteen days and down to ten days, we had to go back out to the investigators and ask them, "Now, all right, what did you propose for a twenty-eight or thirty-day mission? What is still effective from your research standpoint for a reduced mission, say, of fourteen days or whatever?"

Well, you know what the answer is. They all want to fly. "Give us three days if we can get it." So, basically, all those first experiments that were proposed were the early ones, and a lot of them are the same type things are still being flown today: the cardiopulmonary experiments, even food and nutrition, they're still looking at food and nutrition, sleep studies. All of those things that we looked at in Skylab, many of them are still being done. They're being refined greatly, and technology allows them to do some things that we weren't able to do back there then, just the instrumentation and technological advances.

RUSNAK: You've continued to work with life sciences with NASA and with a contractor, is that correct?

STONESIFER: Yes, I did. I did for ten years after I left NASA, right. It was much the same work. It was the contractor. First, it was Krug Life Sciences, and now it's Wyle [Laboratories]. They support the docs in the control center. They are the biomedical engineers that sit at the consoles and assist the doctors in monitoring the flights. So, operationally they're involved. They operate the clinical laboratories. The contractors operate the clinical laboratories over on site.

A large part, also, is the development of some of the devices, the exercise devices, and that kind of experiment equipment is designed and developed and supplied to NASA. So it was somewhat of a continuation of the same type of work that our group over in the Bioengineering Division at NASA performed.

RUSNAK: How has the role of life sciences changed from the start of your involvement with it until you left, if it has at all?

STONESIFER: I'd say on the early missions I guess the right word to use, it was kind of an adjunct to space flight. It was care and feeding of the astronauts. Now one of the major justification for Space Station has been life sciences research, so it's gone from care and feeding and making sure that we get them back in a healthy condition, to really a fundamental thrust of space flight, that is, being able to determine what it will take for long-duration missions in space.

RUSNAK: That's an excellent point, particularly now as the Station is getting into the stages where they're able to do some work up there instead of just assembling and such.

STONESIFER: Right.

RUSNAK: I wanted to give Carol and Tim a chance to ask some questions if they came up with any. Carol? Tim? Okay.

That was all the questions I had up to this point, but I want to give you an opportunity to make any final remarks or if any other stories came to mind before we close since I know we're almost out of time for you.

STONESIFER: I think I covered most of the things I could think about that. Everybody urges me to write a book and tell a lot of the behind-the-scenes stories, but I don't care to do that.

RUSNAK: Hopefully, as I think we talked about last time, the recovery story will get included in some of the books in the future, like it hasn't been in the past.

STONESIFER: Right.

RUSNAK: Then I'd like to thank you once again for taking your time out, both this time and last time, to talk with us.

STONESIFER: Thank you. I appreciate it and, as I said, I hope I didn't ramble too much.

RUSNAK: Not at all, not a bit. So thank you.

[End of interview]