

ORAL HISTORY TRANSCRIPT

JAMES A. LOVELL, JR.
INTERVIEWED BY RON STONE
HOUSTON, TEXAS – 25 MAY 1999

STONE: This is the Johnson Space Center oral history project. James A. Lovell, Jr. May 25th, 1999. We're at the [Lyndon B.] Johnson Space Center [Houston, Texas]. When you were a little, bitty kid, you saw a rocket go off and you said, "I want to do that." Is that how it—is it that simple or that complex?

LOVELL: Well, you know, Ron, I was interested in rockets and in astronomy long before the [John H.] Glenns [Jr.] and the [Alan B.] Shepards [Jr.] of the world could spell rocket. I was interested in it way back in high school. I went to try to build some rockets; wanted to become a rocket engineer as a matter of fact. Wrote to the American Rocket Society at that time—which is now the AAIA [American Institute of Aeronautics and Astronautics], something like that—and I said, "I want to," you know, "I want to become a rocket engineer." And they wrote back a very nice letter, but essentially they said, "Well, you ought to go to either MIT [Massachusetts Institute of Technology, Cambridge, Massachusetts] or to CalTech [California Institute of Technology, Pasadena, California]." I couldn't afford either, and so I took a secondary goal. I got a ROTC [Reserve Officer Training Corps] appointment to [the University of] Wisconsin [Madison, Wisconsin] and then from there I went to the [United States] Naval Academy [Annapolis, Maryland]. And from there I got into flight training, which was the second thing I wanted to do. I became a naval aviator and lo and behold, in 1958 NASA was formed and they were looking for astronauts. And so, I was one of the original, I guess, 110 people who were selected to go for interviews.

STONE: Let me go back to your Naval Academy days. You almost didn't go to the Naval Academy, am I right about that?

LOVELL: That's right. I had 2 years at Wisconsin, and I was in a naval aviation program. This was right after World War II. And I got down to preflight, started through preflight. My mother, when I was at the—at University of Wisconsin said, "Would you apply for the Naval Academy?" So, just to pacify her, I said, "Sure, I'll do that." Never expected—in fact, I became first alternate, which normally doesn't make it anyway. And when I was down there preflight, I got orders from the Bureau of Personnel to report to the Naval Academy for the physical to be inducted into the Academy "if you so desired." And then I had a big question mark. Should I go to the Academy?

The young Marines just back from the war said, "Don't do that. You're already got 2 years of college. You're already in naval aviation. If you go back, you're going to have to start all over again. You might not get back into aviation." But there was an old captain there by the name of Capt. Jeeter, and he said, "Look it, son, you want to make the Navy your career? You want to get your education right now? Get yourself up to the Academy." And so, that's what happened.

STONE: From the Academy, how'd you get back into airplanes?

LOVELL: Well, I spent, of course, 4 years at the Academy. In my term paper—my first class term paper—I wrote on the development of the liquid fuel rocket, which by the way I just donated to—just last year to the Academy. And I was one of the first 50—because I was so much interested in going back into aviation, that they selected 50 people to teach at the

Academy after I graduated, teach the plebes coming in. And then that September, I was transferred down to Pensacola [Florida].

STONE: And what kind of planes did you fly?

LOVELL: Well, in those days we flew SNJs [SNJ-6 *Texan*], which was the basic trainer, all the way up through landing on a carrier with SNJs. And we did formation and some night flying and, you know, basic training. And then I was transferred from there to Kingsville [Texas], actually Corpus Christi [Texas], then Kingsville, and did my instrument training and my advanced training was in a modern airplane called the *Hellcat*, the F6Fs. And then I got my wings and then I was selected to go back into jet training. Now in those days, jet training was, you know, the epitome of everything—

STONE: Oh yeah.

LOVELL: —I mean, and not too many people were in it. So, I was very, very lucky.

STONE: Did you enjoy flying jets?

LOVELL: Oh yeah, yeah. Jets were—I still enjoy flying jets if I can get my hand on one. But I—after I got through training, my first assignment was to a squadron called VC-3. And when I got out there, I found out it was a night fighting—night fighter squadron. They sent teams out because, in those days, we didn't fly whole squadrons off of aircraft carriers. And I told the skipper, I said, "You know, I'm having a little trouble flying in the daytime yet. Yet you want me to go out at night!" But it was great training, a great experience, and I learned an awful lot.

STONE: Anything quite compare to that first landing—night landing on a carrier?

LOVELL: There is nothing! You know, night flying off carriers separates the men from the boys, as they—the takeoff, of course, into a black void with no horizon and then coming in at night. And in those days, we didn't have modern techniques like a mirror system and, you know, almost like a GCA [ground controlled approach]. You had to come in low, and you had a guy with paddles and a lighted suit. That was how we did it in those days.

STONE: So, at what point did you hear about NASA trying to select people to become astronauts and decide, "Hey, I want to do that!"?

LOVELL: Well, when I got back off a cruise, I spent some time training people. But then, some of my contemporaries, my older—the pilots that were in my squadron had already gone through a thing called Test Pilot School. And I thought that would be a kind of an interesting thing to do. So, I applied for Test Pilot School and I went. And just as I had graduated from the school, which was 6 months long at that time, of course NASA was formed. And then they were talking about putting a man in space. And they had put out, at this time, secret orders to all the people who both the Air Force and the Navy thought were qualified. And NASA had certain criteria that they went by. And it just so happened that I had just finished the school, and that was one of the criteria that you had to have. And we—I went up for that original Mercury selection.

STONE: How far did you last in that?

LOVELL: Well, it got down to the last, I guess, 32 people, and I was one of the people through

all the interviews. Sent out to—went out to Albuquerque [New Mexico] to the big—what was the name of it?—the—well, anyway. It was a big hospital out there. And—Lovelace Clinic.

STONE: Okay.

LOVELL: That was it. And we went through our physicals. Now today I just finished a physical. But that physical was nothing like anybody had ever heard of before! You know, it was—what they did to us was unknown to the medical profession because they knew that they had guinea pigs. Not only should we be in good shape, but they knew we were going to go into an environment that was completely strange. So, they did things just for background and, you know, for data. And I went through there. But when I got there, the next selection was to go on to—down to a second group at Wright-Patterson Air Force Base [Dayton, Ohio] for some more tests and things like that. The doctor called me in and said, “Well, you’re finished.” And I said, “Finished? Why? Am I not accepted? Now,” I said, “what’s wrong?” And they said, “Well, you have a high bilirubin.” I said, “I don’t even know what a high bilirubin is. What is it?” “Well, it’s too much paint—pigment in your blood.” And so, I went home and was very, very much dejected. And so, I missed out on the second selection.

STONE: So, this liver problem, even though it was a relatively minor thing, said, “No way.”

LOVELL: As a matter of fact, on Gemini XII [Edwin E.] Buzz Aldrin [Jr.] had the same thing that I had. And we were forced—but you know, there’s a unique aspect of that physical. I got back to the squadron—and this is not too well known—I got back to the squadron and I got a set of orders to go back out to Wright-Patterson! Now my skipper said, “These orders

are probably not correct. Maybe they don't know what the choice—" I said, "Listen, I'm taking them!" I went out to Wright-Patterson and they were sort of expecting me.

I got out there the night before. The people that were all getting together at the BOQ [bachelor officer's quarters] said, "Oh yes, we got 7 people. And you're number 7." I said, "Oh, I'm great!" The next morning we all went down to breakfast to get ready to start our physical, and a fellow walked in and said, "Say, I'm sorry I'm late. I just came in from Edwards [Air Force Base]. My name is [Virgil I.] Gus Grissom." And he was number 7 and, of course, I wasn't supposed to be there. And so—and pretty soon NASA hierarchy found out about it. I was packing my bags, going back to the squadron!

STONE: How disappointed were you when you didn't make that first cut?

LOVELL: Very, very much disappointed. Because you see, I was interested in rockets and things like that way back as a high school kid. And I, you know—I didn't make it.

STONE: There was no indication, past that original 7, that they were ever going to find any more guys, was there, at that time?

LOVELL: No, no.

STONE: Did you know there was a second chance?

LOVELL: They—no one actually knew how far NASA would go or whether man in space—

STONE: Right.

LOVELL: —was a possibility—

STONE: Sure.

LOVELL: —or not. And so, you're absolutely right. But that was something I always wanted to do.

STONE: How long did it take you from that disappointment to get back into the loop and get rid of the liver problem and—?

LOVELL: Well, I got back to the squadron. Got transferred down to Oceana [Virginia]. And I was going through, you know, training people at this time. I was an instructor. And in *Aviation Week*, there was a little article: "NASA Wants To Select Some More Astronauts." And so, before I knew it, the Navy called me down again and said, "Do you want to be in another selection?" They didn't know that I was kicked out because of a physical. And I said, "Sure." And so, I put my name in again, and I was selected to—again to go for the physical. This time at Brooks Air Force Base [Texas]. Air Force physical. Much more practical. Much more, you know, looking at what's wrong and what's right. And I had no problems passing it. And that's how I got selected to the second group.

STONE: When you first went for a selection to the original astronaut corps, nobody knew what an astronaut was. The second time you went, they were the biggest heroes in the world.

LOVELL: Well, that's true. Yes. I can recall very vividly the very first time we went, after we had our interviews in Washington [D.C.] at the old Dolly Madison House. We all

gathered back at a hotel room, and we were talking about it. Wally [Walter M.] Schirra [Jr.] was there because, you know, Wally and I were in the same class. Al Shepard was there. And Wally was saying, “You know, I don’t know if I want to get in this program or not. You know, I’m—to go into some wacky program when I should be going up the ladder in naval aviation—”

STONE: Yeah.

LOVELL: “—in, you know, Navy hierarchy.” And, of course, now I look back on it again. It was really something.

STONE: How did the Original 7 accept the next group?

LOVELL: Very cool at first. I mean, you know these were the days when, I guess, there was this—the *Life*/World Book contract, you know, and all that sort of stuff. And they were, you know, they were pretty high on the totem pole; they were muckety-mucks. They were well known and everything like that. And the nine of us walk in there. But they warmed up after a while. And pretty soon, after a lot of negotiations, we all got on the same bandwagon with regards to these personal stories type things. But—

STONE: Did you get one of those Corvettes to run around town in and all that sort of thing?

LOVELL: After a while, yeah! It was not bad. We’d buy the one wholesale, I think, and then we’d drive it for 6 months then we could trade it in and get another one and trade it in. I guess I went through about three Corvettes during my whole period, about the time was there. I remember Pete [Charles C. Conrad, Jr.] and I lived at Ellington Air Force Base. Our

wives were still—Jane was in California, and my wife Marilyn was in—in Virginia Beach. And he and I shared a BOQ room; and I remember when he got that Corvette. He had the top in the room, and he was driving this Corvette. I just—what I—the car I got was just an old station wagon. You see, I had a family and I needed a station wagon and that's what I got.

STONE: What—how did your life change when you became an astronaut?

LOVELL: Well, I don't think it—it really changed in a way. It—we got to be a little bit of a celebrity, but, you know, we didn't even do anything at first. And I can recall the very first time I went back to Milwaukee to my high school, and I gave a talk to the high school people. And I just went right to the school and got in and went to school, and in the back of the room, after I was giving my talk, the mayor of Milwaukee was there! And he was sort of mad that I didn't stop by and pay my respects to the mayor before I went—you know, all this kind of protocol, I knew nothing about at that time. And I thought, you know, "Heck, I haven't even been in space and people are asking me, you know, what's going on? What's happening? And all that sort of stuff." So, there was a little bit of false—of being a false idol at the time.

STONE: What was happening to you during those Mercury days? What was your job?

LOVELL: Well, during the Mercury days, I got down into the space program about the time Wally was flying. In fact, the very first thing I did before I even moved down to Texas was to go down to Cape Canaveral [Florida] and watch Wally take off. And then we got into some of the simulators that they had—they were not too good at the time—and we started doing some training. It amazes me now, because I was just talking just today to a brand-new

astronaut. He's been here a year; he's never flown. And he says, "Well, I'm still going through ASCAN." I said, "What's ASCAN?" I have no idea. He says, "Astronaut candidate training." I said, "Astronaut candidate training?" I said, "When I went through, it was all hit and miss. We had people come in to teach us a little bit about orbital mechanics, and then we went out to the plants to learn all about the systems themselves, and that's how we got most of our training."

STONE: When did you move into the Gemini Program? And what was your initial job there?

LOVELL: Well, Ron, we got in the Gemini Program and started learning all about the spacecraft itself. But my first really assignment was as backup to Gemini IV, that was [James A.] McDivitt and Ed [Edward H.] White [II]. And Frank Borman and I were the backup to that flight. And so, we were training for that one. It's kind of interesting. I met Ed White, and I didn't know it until that Gemini. One time we were down at the Cape talking, and he was a plebe at West Point and I was a plebe at the Naval Academy and we traded cufflinks. And then we disappeared. And, of course, it was years and years later that we're sitting down at the Cape, having breakfast, when he brings up the story. And I said, "That was me!" You know, it's strange how we—our lives crossed and then disappeared for a while.

STONE: Ed White's job on that flight was to do an EVA [extravehicular activity].

LOVELL: Yes.

STONE: That was a very big deal at that time.

LOVELL: Yes, it was. And one of our jobs, we had what we called an air-bearing trainer. And we had that little like a squirt gun that we would use to fire our way around and try to do something on that. It was the initial attempt at EVA work. And Ed was out for a while, but it was not until later on that we really found out that we had a lot of problems with EVA.

STONE: How did you train for a spacewalk? How did you and White train for that first thing?

LOVELL: Well, we, of course—we got in the suits. We had this air-bearing trainer, which is only two-dimensional. You're on sort of a—an air—you're on a platform that is, you know, held up by air; and then you can shoot this little gun. It's like two little jets and try to maneuver yourself. But I have to tell you, quite honestly, it really wasn't any good. I mean, it was the best thing they could do at the time; and it was not until later on, in Gemini XII, that we learned what to do.

STONE: So, the mission takes off. What did you do once it left the ground and he's up there doing that? What was your job?

LOVELL: Well, I was down at the Cape watching the launch. And then I flew back and was in the Control Center, you know, when he was doing all his work.

STONE: It's been a long time—reasonably long time—since you got here. You ready to fly? You ready to go yourself now?

LOVELL: Oh yes. I got here in October of '62 and that went up in, oh, '64 or something like that—

STONE: Yeah.

LOVELL: —and—

STONE: 2, 3 years.

LOVELL: —yeah.

STONE: Yeah.

LOVELL: And then my first flight wasn't until December of '65.

STONE: So, you and Frank Borman get that first flight. Tell me about how you felt when they told you, you were going to go.

LOVELL: Well, it's kind of interesting. Of course, Frank and I were about the same rank and everything like that. But he got, you know, Air Force; and he got to be commander of it. And that's fine. But it was a 2-week mission. It was a medical flight, as a matter of fact. And you know, 2 weeks with Frank Borman anyplace is a challenge! But this flight, we trained very hard. We had different types of suits. And these were sort of get-me-down suits that we could—you didn't EVAs in them. You couldn't get outside. You should not open up the hatch. But, the very first takeoff was almost like it flying us for a while. We got used

to it—to pretty good, you know, pretty fast we were able to get the idea of it. And I—the spacecraft is very tight. So, I didn't feel too nauseous at all; it was pretty good. But the suits were very hot, sweaty, and bulky. And they didn't want us to take off our suits. These were the old days when they were very worried about leaks in spacecraft or something like that. Well, we knew the spacecraft wasn't leaking.

STONE: One of you had to keep a suit on at all times, right?

LOVELL: Yes, it was sort of a ridiculous regulation at that time. And so—but I started to unzip my suit and my rear end was going out of the suit, and we're getting out farther and farther, and pretty soon the suit was over here. And pretty soon I slipped the helmet down. I'm out of my suit. I'm in my underwear. And so, Frank wants to get out of his suit. So, he—so, the ground, you know, for 3 days, the ground argued with him. And the poor guy was hot, sweaty, and finally they let him get out of the suit. And, of course, my young son at that time said, "Dad orbited the Earth in his underwear," which is essentially what we did.

STONE: You said it was a medical experimental flight. Did you feel like you were an experimental rat up there, as it were?

LOVELL: A guinea pig. Absolutely a guinea pig! The doctors, of course, were, you know, this was, "can man live in space?" And the reason for the mission was that the maximum time to go to the Moon and back—and we're already planning for Apollo—was 2 weeks. And so, they said, "Well, if we could put people up into zero gravity for 2 weeks, it'll prove out one aspect of the Moon flights." So, we stayed up there. And the old spacecraft had lots of problems with it. The fuel cells were dying, slowly but surely. And I can remember quite vividly, you know, Frank doesn't even like to fly over water, much less spend 70% of his

time over water! And he was anxious to come on down. And between Chris [Christopher C.] Kraft [Jr.] and myself, I argued with Frank. I said, “Frank, don’t worry. The Navy can find us regardless of where we come down.” And Chris also talked to him; and so, we stayed up the full 14 days.

STONE: There was some talk early on about landing Gemini on the ground, was there not? Or—or am I dreaming this?

LOVELL: Yes, there was. As a matter of fact, one of my jobs when I first got assigned was the recovery aspect. And we were looking at making a [Francis M.] Rogallo wing, which was developed by a NASA engineer—they’re called paragliders now or parawings—and it’d come on down and this thing would inflate, and it would be like a V-shaped thing. And then a guy inside the spacecraft could guide it down. And it was really going to be on the last one. The test results out at Wright—or out at Edwards were not too good and they thought it was very prudent not to even put it on there. Why do it for the last flight?

STONE: Can you give me some idea how you spent 14 days in that little, cramped quarters with somebody else without going absolutely mad?

LOVELL: It’s not easy. But you have to remember that you work so long—I was there 3 years—for a spaceflight, so I’d go up with just about anybody. And Frank and I were, you know, just this close together. And you get to know each other quite well.

STONE: Yes!

LOVELL: I mean it was something. As a matter of fact, Frank went, I think, 9 days without having to go to the bathroom.

STONE: 9 days?

LOVELL: And he said, “Jim, this is it.” I said, “Frank, you only have 5 more days left to go here.”

STONE: What—how was space food in those days? Because I want to get back to space food a little bit later on. But how was it then?

LOVELL: Strictly freeze-dried. And these little bite-size sandwiches had wax over them, because everybody thought that they needed wax to keep the produce—and the wax would coat the roof of your mouth, and it’d taste awful. I think one of the best things they had onboard in those days were bacon bits. They would have a little square of bacon, and they would squeeze—after they, you know, cooked and everything, they would squeeze it down. And that was very tasty. Then they had—you put water into various freeze-dried food. Much like campers have these days, but you couldn’t heat it. It was luke-cool water. But it kept us alive for 2 weeks.

STONE: Looking back on it now, all of that seemed very primitive. But at that time, it was state of the art.

LOVELL: That’s right. And when I look back on how ultra, ultra conservative they were. For instance, John [W.] Young got in such a flap by taking a sandwich up on a 3½ hour or 4 hour

flight. Even if it was—it had, you know, poison in it, he probably would've lasted for the whole flight! And now, of course, things are entirely different. And then, you know, now—I know we—they were afraid of anything floating around. But now we found out that if the food is thick enough, you can eat it with a spoon.

STONE: When you came back from Gemini VII, what had NASA learned from these two experimental guinea pigs?

LOVELL: Well, they learned, number one, that man could live very nicely in—for 2 weeks. That the cardiovascular system would adapt quite readily. The heart slowed down. Blood volume decreased, which is the normal case in a 2-week-type mission. And we were able to navigate ourselves across the deck. We didn't have this orthostatic hypertension, where your blood would drain down as soon as you stood up. I mean, the symptoms were there, but, I mean, we could overcome that. So, I think basically it was the fact that, hey, spaceflight is possible longer than the 3 or 4 hours that, you know, they had been doing in the past.

STONE: Was it as exciting as you thought it was going to be?

LOVELL: Yeah, it was very exciting to me. I mean, it was tedious work, you know, 2 weeks. We did have a, you know—a break when Schirra and [Thomas P.] Stafford came up and rendezvoused with us. And then they were up, I think, 24 hours and they went back down again. And we stayed up there for the full time. But it was quite rewarding.

STONE: Stop just a second, will you please?

VOICE OFF CAMERA: Tape is rolling.

STONE: All of these missions now, as we look back on them, fit like, you know—they all fit together. They all get us to the Moon. But at the time, you were trying to do something that had to be done before we could get to the Moon; that is, figure out whether you could dock in space. Am I right?

LOVELL: That's right. The first thing we had to learn about it is to rendezvous in space. Can we get two spacecraft together which will eventually lend itself into docking? And then we can, you know, take the lunar module out. And the very first one, of course, was the Gemini VI/VII flight. Gemini VI was supposed to dock—rendezvous and dock with an Agena vehicle but it had—something went wrong with it on its takeoff, and so that delayed their flight. And so, they moved Gemini VII up to fly instead, and when we were up there, Gemini VI was going to rendezvous. We couldn't dock with Gemini VII; they were going to rendezvous; and of course, the first attempt to take off on Gemini VI resulted in a shutdown, which very fortunately Wally didn't punch out—

STONE: Yeah.

LOVELL: —he was cool. The second time up there, though, they did. And they came up. I guess we were up there 11 or 12 days by that time. And you could see them coming up. They—we—they came up at night. And we had a blinking light on and I—we could see the jets firing as they came up. We were like this, and they were coming up just like this. And finally, you know, we all rendezvoused. We stayed together. We each took turns flying around each other to see how nicely the spacecraft would control on something like that. So, that was the very first big step towards the rendezvous and docking, which, of course, were very necessary for the lunar flights, too.

STONE: You then were Capcom [capsule communicator] on—on VIII.

LOVELL: Yes, I—

STONE: Gemini VIII.

LOVELL: —yeah.

STONE: Right. And there was a problem. Talk about that problem.

LOVELL: Well, Gemini VIII had a problem, probably one of the first big problems. And unbeknownst to us, when they were out of radio contact a stuck thruster had occurred. And originally Neil [A. Armstrong]—Neil and Dave [David R.] Scott were on that flight—thought that it might be the Agena. And they were trying to somehow, you know, slow the thing down. It was starting to make them roll. And so, they thought, “Well, we’d better get rid of the Agena.” They had already completed a rendezvous and docking; and so, they jettisoned the Agena and the—the spin-up increased. And it turned out finally that it was one of their thrusters that was firing. And so, they managed—and they were very cool about this whole thing. They managed to pull the circuit breaker and get the thruster off the line. And then using their—the reentry thrusters, which were normally only used for reentry, they were able to slow the vehicle down; and, of course, they had to come back early.

STONE: What happened in Mission Control? What going on around you while all of this is going on up there and nobody is sure what’s going on?

LOVELL: Well, everybody's trying to think up solutions on what the problems are. We did—the problem hit us all of a sudden, because when they came back into radio contact, well, they said, “Hey,” I guess they used to use the old phrase long before 13, they—“we got a problem.” And—but I think they managed to jettison the Agena and then determine their problem; and so, it was sort of an aftermath back at the Control Center. Because I don't think there was much that we could've done in the Control Center for a problem like that. If they kept spinning up faster and faster, they would've blacked out.

STONE: But this was—you realized after the fact, because you didn't know it was happening then, once they got around, you realized they had a very serious problem.

LOVELL: Oh yes. If they didn't correct the problem themselves, they would've been in deep trouble.

STONE: Did that make you rethink anything about how safe or how unsafe this sort of thing is?

LOVELL: No, Ron. It's surprising. In this business, that problem was over there. You know, nothing's going to happen to me! Everything's fine. Don't worry about it. Spaceflight is so interesting, the rewards far overshadow the risks. And so, that was my feeling.

STONE: That kind of a test pilot mentality permeated everybody at NASA, did it?

LOVELL: I think so. I think the people who want to become astronauts, at least in those

days—most of us were test pilots in those days—had that sort of a curiosity and an adventure spirit to them that we were able to take that in stride.

STONE: You were next assigned to back up the Gemini X crew, but [Charles A.] Bassett [II] and [Elliott M.] See [Jr.] were killed—

LOVELL: Yeah.

STONE: —and things changed. What happened after their deaths?

LOVELL: Well, it's sort of fate. We were backing up X, but the IX backups became the prime backups—that was Stafford and Gene [Eugene A.] Cernan, I believe. So, we became the backups to IX. And then what we did was to become the prime crew for the last Gemini flight, that was Gemini XII.

STONE: Did you realize that was the last one? Was it the last one scheduled, or—?

LOVELL: No, that was the last one.

STONE: That was the last one scheduled.

LOVELL: It was—I wasn't going to go on Gemini if I was X—

STONE: Yeah.

LOVELL: —you know.

STONE: So, it gave you an opportunity to fly Gemini again.

LOVELL: Yeah. And it gave me a little bit of a command opportunity, which I wanted.

STONE: And you were involved with a spacewalking mission on that. Talk about that.

LOVELL: That's very interesting because, after Ed White's Gemini IV, which really didn't do much to learn about walking in space, they decided to do some pretty detailed work in—outside the spacecraft. It started with really Gemini IX. They were going to have an AMU, an astronaut maneuvering unit, and it was in the back of the spacecraft. Gene Cernan was going to do the work on it. They got outside and tried to do the work; and the handholds were not good, the toeholds—he heated up; his visor fogged over; he had trouble doing things which he could do easily in training. And so, eventually he came back into the spacecraft and they abandoned that.

They again attempted on X. Not the AMU, but they attempted to do work on X. What happened was that on IX and X, and then eventually also XI when [Richard F.] Dick Gordon [Jr.] was outside and he overheated and everything, all of us forgot about one of Newton's Third Laws of Motion: to every action there's an equal and [opposite] reaction. Consequently, when they went to touch the spacecraft, the spacecraft repelled them. You don't see that on Earth, but you sure see that up in space in the zero-gravity atmosphere when you have a big mass like the spacecraft. And so, when XII rolled around, they said, "Let's devote a lot of time on XII to find out how we can really work outside the spacecraft."

And it just so happened that someone, I don't know who it was, said, "Well, how about under water? Wouldn't that give you sort of an idea of zero gravity if we can make the astronaut neutrally buoyant? And a spacesuit will work just as well under water as it will in

space.” So, NASA rented a swimming pool in a boys’ school up in Baltimore. Buzz and I went up there, with the—all the crew; and we put Buzz in a spacesuit, got him in the water, made him neutrally buoyant. I had communication with him, and I sat on the side of the pool as if I was inside a spacecraft and we went through some of the basics—we had a crude mockup in the water itself—learning about working in space. Learning about the proper handholds and the proper footholds to make sure that everything would work. And, of course, on XII, Buzz completed three spacewalks of about 5½ hours, I guess; and, you know, everything was fine.

STONE: Did everything you were supposed to do?

LOVELL: Everything we were supposed to do. And no problem at all. So, it was a major turning point in the ability to work outside a spacecraft.

STONE: But it also points out this sort of thing of somebody saying, “Hey, why don’t we try a swimming pool?” Were there those people all along the way saying, “Hey, why don’t we try this? Why don’t we do that?”

LOVELL: Yes. As a matter of fact, at NASA there’s a lot of people who use their imagination and, of course, it came to really the forefront on 13. But I mean, new ideas. That was the whole idea of NASA. New ideas. What can we do differently? How can we do this? And there were a lot of mistakes. There were a lot of blind alleys we went up to. Perseverance, though, was predominant in the program at the time. “Let’s keep on trying.”

STONE: Then comes the Apollo Program and, of course, the Apollo fire. Do you recall where you were when you heard about the fire?

LOVELL: Oh yes. Yes. Very much so. I was in Washington, D.C., at the White House. I was up there for the signing of the Space Treaty, which essentially, you know, meant that space is available to everybody. There are no boundaries. And also that astronauts, if they have to land someplace else, will be welcomed rather than be treated as prisoners or something—

STONE: Yes.

LOVELL: —like that. And we had just finished that thing at the White House and the four of us were going back to the hotel when we walked in and there was messages for us to call NASA back again. And then they told us what had occurred; and we spent the night there. They said, “Don’t go outside. Don’t make a round,” you know. “Just lose yourselves.” So, we did. And the next day, we went home.

STONE: You were assigned to a panel to study what went wrong. What was your study job?

LOVELL: Yes, there were some 20 panels, plus the major panel. And then there was 20 subpanels. And I was with [John L.] Jack Swigert and I think it was [Ronald E.] Ron Evans that—we looked out at how we can cope with in-flight emergencies—fires—to see what we’d have to have onboard or how we can do for it. A very interesting investigation. I was, in my past career—I was a safety officer in a squadron and went through Aviation Safety School, so, some of the stuff I had learned back then I applied at that time.

STONE: I suppose the question that I need to ask in light of the fact that this is a very

conservative, safety-minded bunch of people up to this point: How in the world did Apollo 1 happen?

LOVELL: Well, I think, you know, when you look back on it, the fire in Apollo 1, we should've had plenty of warning ahead of time. We flew Mercury. We flew Gemini. All those spacecraft were tested on the ground by pumping in pure oxygen, and so that they could breathe, you know, after the prebreathing, because we flew at low pressures. Well, on the ground, to be sure because spacecraft leak, you always pressurize it about a pound per square inch higher than the ambient pressure. So, on the ground we were—they were at 16 pounds per square inch, where outside by about 15. Pure oxygen. Now for the—all of the Gemini flights, the Mercury flights, no problems. But Apollo, probably maybe due to the rush they were trying to do—the Block I was a disaster anyway, and they pumped it up—we should've realized that you didn't have to put pure oxygen into that spacecraft. You should've put a mixture in it anyway of oxygen and nitrogen, because anything will burn in pure oxygen, as found out in the Apollo 1 fire.

STONE: Was there also any of the case to be made for the fact that the contractors quit listening to the astronauts and said, "We don't need your input anymore"?

LOVELL: In some respects, what I remember in that particular aspect: one of the reviews we had out at North American at that time was the hatch. They were telling us how this hatch was built. It was in two sections. There was an outer section and an inner section, and the inner section was there because of the spacecraft pressure. It would always keep the thing sealed against the side. But, if you ever had to get out of the thing on the ground, it was disaster! And even in space if you had to do an emergency return from the lunar module to go into the hatch side, you had to take off two hatches to do it! I mean, and so, we mentioned

that. We said, "You ought to have a single-piece hatch here of some sort. Something we can normally use and close. We had it in Gemini. I mean, you know, it is not impossible to build one of those things. We had one built and tested in Gemini. Why don't you do it here in Apollo?" But no one listened until, of course, the fire started. And of course, there was a time constraint I would suspect, too; and they were looking at, "Gee, they want to modify the spacecraft again!"

STONE: That also meant a longer time before anybody was going to fly again. It means a longer time before you're going to fly again. It means a longer time before anybody's going to fly again.

LOVELL: Well, that's right.

STONE: Are you worried that maybe somebody's going to say, "Let's just forget the whole thing"?

LOVELL: Well, yeah. If you recall, the fire took place in 1967. We had a commitment made by President Kennedy that we would land a man on the Moon and bring him back home safely before the end of the decade. And when the fire occurred in January of '67 and we didn't know really what it was going to do, everybody was really down in the dumps, saying, "Holy cow!" So, I have to admire the engineers, the technicians, and the scientists and everybody here who found out the problem, and the contractor people who finally realized that, "Hey, let's get a new type of spacecraft. Let's build something that people really could use and it doesn't happen."

STONE: By the time Apollo 8 came along, you were backup to Mike Collins. Were you convinced then that the capsule was okay? Flyable? Safe?

LOVELL: Yeah, I was. I mean, you have to—you have to go by faith. You have to believe in what the people are going to hand you, you know. Al Shepard's old, old joke was, you know: "How does it feel to sit on top of something built by the lowest bidder?" But the lowest bidder was, you know, pretty expensive. But you have to believe that whole thing. And I did. I was, you know, Mike's backup and spent a lot of my time up at Boston working on the guidance system.

STONE: Where were you when you found out that he had a bad back and couldn't go, and you were going to go?

LOVELL: I don't really recall where I was. I think I'd come back here, and finally they said—you know, I was his backup. So, that was the thing. And Mike had this bone spur and I think he held off as long as he could. But I think his leg was getting numb. And so, finally they replaced me and I went. You know, faith has sort of strange things because I never expected to be on Apollo 8. But I have to tell you, that was the high point of my space career.

STONE: But if you hadn't been that backup, you might've been on 11.

LOVELL: Yes, I was assigned to 11. I was assigned to 11. But, still, I prefer 8 to my position on 11.

STONE: Okay.

LOVELL: Yeah.

STONE: 8 turns out to be a significant flight once it takes off. But when you're assigned to it, it's still not what it turned out to be, was it?

LOVELL: No. It was still Earth orbital.

STONE: Yes.

LOVELL: And we were going high up. We were going to do 4,000 miles so that we could test the lunar module, the command module, and then come back at a high rate of speed so that, you know, we could test the heatshield and things like that. It wasn't—and I recall this very vividly. The three of us were out at Downey at North American testing our spacecraft; and Frank got a call to go back to Houston. We—so, Bill [William A. Anders] and I still stayed out there. We were working out there. And Frank came back again, back to Downey, and said, "Things have changed." And we said, "Viz. a what?" He said, "We're—if everything goes all right with Apollo 7, we'll—Apollo 8 will go to the Moon." I was elated! I thought, "Man, this is great!" I mean, I had already spent 2 weeks in space in Gemini VII with Frank Borman. I didn't want to spend another 11 days, or something like that, you know, going around the Earth again. I said, "This is fantastic!" And on the way back of the T-38, when it was my turn to sit in the back seat and either Bill or Frank were flying, I drew the Apollo 8 insignia. You know, the—the V-shaped thing—

STONE: Yeah, right.

LOVELL: —with the Earth and Moon. So—

STONE: That happened because of Cold War considerations, did it not?

LOVELL: Oh yeah. Well, two things occurred. The lunar module wasn't ready. And the lunar module was supposed to go up there, you know, and be tested out. And also, as you probably know and it's well known now, we had intelligence information that the Russians were going to put people around the Moon. They were really attempting to land people on the Moon! But—

STONE: Okay. Let—let's stop there—

LOVELL: Yeah.

STONE: —and we'll pick up, okay? We'll come back to the politics of 8.

LOVELL: Right.

VOICE OFF CAMERA: And we're recording.

STONE: This is Tape 2. James A. Lovell, Jr. We were discussing Apollo 8 and the politics behind Apollo 8. The Russians are going to try to land on the Moon and trump everything America has done.

LOVELL: Actually, the Russians, believe it or not, were interested in lunar landings about the same time we were and had tried all sorts of things to get there and were building a huge rocket called the N-1. Built 10 of them. Flew 4. None was really successful. Some of them they flew even after we had landed. But they were very persistent people. And they thought that using a different type of a booster, called the Proton, and a vehicle called Zond they could fly people—just circumnavigate the Moon. Just go around it. Not to land or not even to orbit it.

And they were very, you know, close to actually doing that. They had sent a couple of spacecraft up. Went around the Moon. One was not successful. One was partially successful. The next one, the two cosmonauts, and I know them, wanted to go. And then they hesitated back and forth. The hierarchy argued, “Should we send another unmanned or should we not?” And when they did that, on this side of the Atlantic bold leadership at this time, they said, “If the lunar module’s not ready, the command service module, if it proves out on Apollo 7, will be okay. [Marshall Space Flight Center] Huntsville [Alabama] thinks the booster could be okay.” And so, they said, “Let’s send Apollo 8 to the Moon.” And so, that’s how it came to pass. We—and then after we got to the Moon, of course, the Russians said, “We never planned it in the first place.”

STONE: As a rocket man, and you remind me that you were from the very beginning, as a rocket man did you think, “We can do that.”

LOVELL: Oh yes. Looking at the Saturn V and what it could do, and this is of course not only the first flight to the Moon but the first flight—first time we used the Saturn V booster.

STONE: Tell me about the flight. Tell me about how you felt as you approached that Moon and knew you were going to go around it.

LOVELL: Well, my first sensation, of course, was “It’s not too far from the Earth.” Because when we turned around, we could actually see the Earth start to shrink. Now the highest anybody had ever been, I think, had been either—I think it was Apollo or Gemini XI, up about 800 mi. or something like that and back down again. And all of a sudden, you know, we’re just going down. And it was—it reminds me of looking—driving—in a car looking out the back window, going inside a tunnel, and seeing the tunnel entrance shrink as it gets—as you go farther into the tunnel. And it was quite a—quite a sensation to—to think about. You know, and you had to pinch yourself. “Hey, we’re really going to the Moon!” I mean, “You know, this is it!” I was the navigator and it turned out that the navigation equipment was perfect. I mean, it was just—you couldn’t ask for a better piece of navigation equipment.

STONE: Were you guys just riding? Or did you have a lot of work to do before you got there?

LOVELL: We had a lot of work to do. I mean, this is the first test of an actual lunar flight. The vehicle had been tested before, but, you know, we were all looking at it. And we—I did a lot—the navigation was something new for going out there. But—and we had a TV program when we got to the Moon. But then, come in to the Moon itself; the last day, our blunt end was towards the Moon. And we didn’t see it as it got bigger. Going out there, it’s not—it doesn’t grow gradually like this. It stays sort of small for a while, and all of a sudden it gets bigger like this. That’s what it appears like anyway. And our blunt end was towards

the Moon so we didn't see it as it got bigger. But the ground called up, and Mission Control said, "Now at such-and-such a time," and they named it right down to the second, "you'll lose communication with us because the Moon's gravity will swing you around to the far side."

Right to the second there was static in our earphones! No comm. And then, of course, we lit the engine to slow down; and we got into lunar orbit and this is where we started to look at the Moon, you know, and be all those nice things we said. And by the way, I'll put everything to rest right now. As I was coming around, when we saw the Earth coming up, who took that famous Earth rise picture they made into a stamp in 1969? Now you—you'll likely get a different view from Borman or from Anders. But I'll have to tell you right now. Now you think I'm going to say that I took it? Now, I—but for 25 years I said that only to keep the things going, to keep us young and happy. Keep a little—keep a little controversy in the game. Actually, I think Anders took the picture. But you have to remember, I was the director. I told him where to take it. I told him how to compose the picture. He just happened to have a telephoto lens.

STONE: It's—everybody wants to be a director, you know.

LOVELL: I know.

STONE: Tell me what you—tell me what you thought when your—two things. One is, you're no longer connected to the Earth. That you can't yell "Help!" They can't tell you what to do. You're on your own. First time you've ever been up there when that's happened, right?

LOVELL: Well, yes. Except the Gemini, when we didn't have communication.

STONE: But—

LOVELL: Yeah.

STONE: —here you are—

LOVELL: We're 200,000—240,000 miles away.

STONE: You're 240,000 miles away from this place that's telling you what to do. Nobody's talking to you. Nobody can hear you. You're just looking at it. What do you think?

LOVELL: We were so curious, so excited about being at the Moon that we were like three schoolkids looking into a candy store window, watching those ancient old craters go by from—and we were only 60 miles above the surface. That—we didn't have any kind of feeling, at least myself, of, you know, fear or—or if, you know, are we going to get back or not? It was just to be there was such an exciting moment that, you know, we'd have done it all the time. I felt very, very honored and lucky to be there.

STONE: That particular Christmas, 1968, was the end of a tumultuous year. Really a tumultuous time in American history. And there was a very salutary effect on this country and the world because of your flight. Did you anticipate that or—?

LOVELL: At the time, we didn't know what the effect of the flight would be. We didn't know whether the flight was going to be successful or not. But you're absolutely right. You know, with riots and assassinations and the war going on, I was part of a thing that finally gave an

uplift to the American people about doing something positive, which was really—that's why I say Apollo 8 was really the high point of my space career.

STONE: There are people in NASA who will say it's the high point of NASA's career. That the landing, of course, is what we were shooting for.

LOVELL: Yeah.

STONE: But that proved that you could do all the things that everybody said you could do.

LOVELL: Yeah. I sort of lean that way. On Apollo 11 I was honored to be with [Charles A.] Lindbergh watching the launch from the Cape, you know, as—and I said to General Lindbergh, "Isn't this really apropos? I mean, this is the most auspicious moment. These people are going to go up there and they're going to land on the Moon!" And Lindbergh looked at me and said, "Well, yes, to a certain degree." He said, "But Apollo 8 was the real charger of this whole program."

STONE: How did you choose that Christmas message that you all delivered?

LOVELL: Good story, the Christmas message. When we determined, first of all, that we would get and burn into the lunar orbit on Christmas Eve we thought, "Boy, we—something's got to be appropriate to say. We ought to say something. What can we say?" And we couldn't think of anything. Then there was a fellow that I think Borman knew, his name was Si [Simon] Bourgin. He was with the U.S. Information Agency, I think had gone with them, some of the astronauts, around on their trips. Frank asked him, could he come up with something appropriate? Well, he couldn't. But he knew another person, I think it was a

newspaper man; I forget his name [Joe Laitin] that he said, “Okay, I’ll think it over. I’ll try to see what I can do.” And he was working almost all night trying to think out appropriate words and his wife came down and said, “Why don’t you have them read something from the Bible?” And they said, “Well, that’s, you know, the New Testament.” “No,” she says, “the Old Testament. Read it from the—because, you know, this would be very appropriate. And most of the people in the world will be listening in. And most of the people in the world are not Christian.” So, that’s how it came to pass that he said the first 10 verses of *Genesis*, which is really the foundation of many of the world’s religions. So, that’s how it got started.

STONE: And you’re sitting there, looking as you’re reading, “And God created the heavens, and the Earth was without form and void, and darkness was on it.” And it must’ve been almost mystical of—to your feeling.

LOVELL: It was. And at the same time, we had this sort of now rudimentary TV camera, black-and-white camera, that was pointing out the window watching the craters go by and slowly slipping into daylight.

STONE: Yes, yes.

LOVELL: Yeah.

STONE: Oh I remember it. It was a marvelous time for America and the world. But a particularly marvelous Christmastime after what had been a terrible year. Let me go to Apollo 11. You’re the backup on 11.

LOVELL: I was the backup commander on 11. My philosophy is, “Never miss a chance.” I

mean, if I had a chance to be the first person to land on the Moon, I was going to take it. It was the natural competition among all of us. But being backup is something I thought, “Well, there’s an opportunity.” I was the backup on Apollo 8 and I got to fly Apollo 8. So, I went to 11. I think Frank thought I was crazy; but I thought that, “Hey, that’s what I’m going to be doing.” And so, I went through the whole thing with them.

STONE: What was the feeling among the astronaut corps when everybody realized Neil Armstrong got the—?

LOVELL: Well, I think everybody, you know, resigned to the fact that Neil was going to go. And, of course, being a civilian, maybe that was a good choice. We were either Air Force or Navy and there was no military implication to this landing. So, Neil actually went. And so, someone had to go!

STONE: Did that figure into it, do you think?

LOVELL: I don’t think so because all the flights before 11 were chancy. If 8 proved out to be—needed more training or was a disaster and then 9 came, or 9 had something wrong with the lunar module, you know, or if everything went fine, you know, if 10 had a full lunar module, they could’ve landed, you know.

STONE: Okay. Let’s go to 13.

LOVELL: Yeah, yeah.

STONE: The—that has reached almost mythic proportions because of the book, the movie,

and all about that. I want to try to separate a little myth from reality here, or maybe add to the myth. I don't know which we'll do. We'll do whichever you want to do, okay?

LOVELL: We'll make it reality.

STONE: All right. Okay. That was not supposed to be your flight, right?

LOVELL: No. I was assigned to Apollo 14. Because in the time period of the earlier flights Al Shepard, who had been grounded with a—Ménière's syndrome or something like that in his ear and losing his balance. Finally he went to California at the suggestion of Tom Stafford, who knew about a doctor out there who could cure this or could operate. So, Al said, "Hey," you know, "I want to go fly again. I'll try anything." So, he went out there and, by gosh, he got ungrounded. And so, he came back.

Now you have to realize that Al Shepard was a—the ultimate politician. Very well respected for his flight he did, so he talked NASA into giving him—talked [Donald K.] Deke Slayton into giving him the very next flight, which was Apollo 13. And then after he started working 13 and I was getting my crew together for 14, I think that the NASA hierarchy—not Deke, I think the NASA—had second thoughts. They said, "Look it, Al's been grounded for, what, 8 or 9 years and you're going to give him the very next flight? And he only made a 15 sub—minute suborbital flight into space? Now come on. Let's get serious about this thing." So, Deke said, "Okay, I'll slip him one." And so, one day when I was training for 14, Deke came in and said, "Jim, how would you like to take 13 and we'll give Shepard 14." I was delighted. I said, "Hey, yes!" I mean I—you know, I was on 8, backup on 11, and I'm all set to go! I mean, you know, I needed the training. I needed to know where I'm going to, you know, experiments and things like that. But, I'm ready! So, that's how it came to pass.

STONE: Can you put to bed or add to the story that one hears that you guys would kill your grandmother to get a flight and there was a great deal of heavy competition between all of you for those jobs?

LOVELL: Well, I could put to bed the fact that it was aggressive, but it wasn't that aggressive. I mean, the people that really controlled it was Deke Slayton. He was the person. And then he'd put his suggestions up to Chris Kraft or to [Manned Spacecraft Center Director Robert R.] Bob Gilruth at the time; and that went up to—up—you know, unless there was some real reason why not to make a change, I think that that stood. And if you look at the rotation, pretty much we were in a rotational mode. You know, I was originally on Apollo 11 and Mike was on 8; and then he just—you know, I was backup on 8, you know, and then going to 11. So, it was a—just a rotationary period with new people eventually feeding in. So, Deke really held the whole ball of wax as far as selection goes, I think. And—but there was competition. You know, people were disappointed that they couldn't get on. Some people thought that they should. And other people, you know, had too many maybe.

STONE: So, the commander is bumped from 13 and you take over.

LOVELL: Yes.

STONE: And another member of the crew, at the last minute, is bumped and somebody else comes in.

LOVELL: Well, yes. Just 4 days before we were to take off on Apollo 13, you know, the doctors discovered—well, [Charles M.] Charlie Duke [Jr.] came down with the measles. He

was the backup lunar module pilot, I guess. He came down with the measles. And so, you know, he had been working with us all the time. And so, all of a sudden the doctors said, “Oh gosh, all these guys have been exposed to the measles. And they’re all going to come down with them about the time they’re orbiting the Moon. It’s really going to be a disaster.” So, they went in to look at our blood work—before we even knew anything about this—and found out that the indications were—and [Fred W.] Haise [Jr.] and I had measles when we were kids and, you know, our kids had the measles; and so, we were immune to the disease. [Thomas K.] Ken Mattingly [II] was a bachelor. Never been married. Never had any kids. And certainly never had the measles. And so, they bumped Ken and put Jack [John L. Swigert] onboard, who was his backup. Now, very fortunately, you know, the movie shows you a little bit different. Let me give you the reality here.

Jack happened to have written the malfunction procedures for the command module. So, he knew the command module pretty good. He—it is true, he had not trained for the last month and a half because normally the backup crew at that stage are the gofers. You know, they get the hotel rooms for the guests. They do this, they do that. But we—after we trained for it about 2 days with Jack, mainly to say—because when we are by ourselves, when he was by himself and we were coming up to rendezvous and all that, that we knew how each other would act and everything. Because training was something for a long period of time. I knew even the inflections on Ken’s voice coming up, you know, how he was doing things. But Jack proved out to be a very, very competent pilot.

STONE: But didn’t it worry you when Mattingly was scrubbed and Jack goes in?

LOVELL: Oh yeah!

STONE: It had to scare you to death, I think.

LOVELL: Oh yeah, because, you know, when Mattingly was scrubbed and Jack hadn't really been part of the team, we thought, you know, because we had worked such—close together as a team. But we had already slipped the flight once from March to April, and the 2 days we worked with Jack, he appeared perfectly comfortable with the vehicle. And so, I said, "Go." Because they came to me privately and said, "Are you happy? Are you satisfied? Do you want to go?" I said, "Sure."

STONE: Did you just want to go? Or were you happy and satisfied?

LOVELL: Oh, I was happy and satisfied that we were going to go. Normally on the first two flights to the Moon, they tell the crew privately, "Now look it, if anything goes wrong, don't worry about it. Come back. We'll give you the very next flight." That was on Apollo 11. On Apollo 12, they got Conrad's group, "Don't worry about it. Don't take a chance, you know. We'll give you the very next flight." They didn't say anything on Apollo 13!

STONE: Did it—are you—obviously you're not superstitious?

LOVELL: No, I'm not superstitious now and I wasn't then. Although the coincidence is—

STONE: The 13th hour of the 13th minute, Apollo 13—

LOVELL: Takes off and it explodes on the 13th.

STONE: Yes.

LOVELL: An interesting sideline: Apollo 13 was the last spacecraft, to my knowledge, that was—ever had the number 13. If you look at the history of all the follow-on spacecraft, all the Shuttles and all the Orbiters and all that, they're all sort of like 41-G, 53-L or something like that.

STONE: Yeah.

LOVELL: There is no 13. NASA will claim that they are absolutely not superstitious. But I'll bet you my last dollar, they'll never name another spacecraft, as long as this place stays alive, 13.

STONE: The launch is perfect. Everything went well.

LOVELL: The Saturn V worked fine up till the second stage.

STONE: And so, what's happening here?

LOVELL: Well, then the center engine of our second stage of our vehicle shut down 2 minutes early, probably due to a high vibration which we have a safety feature to shut it off. And for a while there we thought, "Boy, is there a crisis? Is there a problem with this thing? Do we have enough fuel? Do we have enough power to get into Earth orbit then kick ourselves around to go all the way to the Moon?" Well, very fortunately the folks at Huntsville overbuilt the vehicle. And we did. We had enough fuel. It took us about a—an extra minute and a half to get into Earth orbit, but we still had enough fuel on the third stage to go all the way to the Moon.

STONE: But the crisis is over. No problem.

LOVELL: Yeah. We thought that was the crisis.

STONE: That's it.

LOVELL: Because almost every flight, even today probably, has—

STONE: Something happens.

LOVELL: —you know, something happens.

STONE: Yeah.

LOVELL: An experiment doesn't work. An instrument fails. Something, you know. Something goes wrong. And we thought, "Hey, that's a—" I told the guys, "Hey, that's our crisis."

STONE: That's it.

LOVELL: "We got rid of it. We're on our way!"

STONE: So, you're out how long before the accident happens?

LOVELL: We're out 2 days before the accident happens. But 30 hours after we took off, we

got onto a different course because the course we were on originally was called a free-return course to allow us to get back to the Earth. But—about 30 hours, we changed course to land at this place—we were going to land at a place called Fra Mauro and the sunlight would be in the proper position to see the shadows. And then 2 days out, on this hybrid course, the explosion occurs.

STONE: You're just getting ready to go to sleep, am I right?

LOVELL: Yep. Yeah, the—we were just finished a TV program. That was the last thing that evening. I think it was either 9 or 10 o'clock back here at Houston. And I'm coming back down through the tunnel, and suddenly there's a hiss-bang! And the spacecraft rocks back and forth. The lights come on and jets fire, and I looked at Haise to see if he knew what caused it. He had no idea. Looked at Jack Swigert. He had no idea. And then of course, things started to happen.

STONE: What started to happen?

LOVELL: Well, it went in various sequence. The light came on. Something was wrong with the electrical system. We started—we eventually lost two fuel cells. We couldn't get them back. Then we saw our oxygen being depleted. One tank was completely gone. The other tank had started to go down. Then I looked out the window, and we saw gas escaping from the rear end of my spacecraft.

STONE: Well, you didn't see that, now, for about—according to the record, for 14 minutes before you saw the gas coming out, right?

LOVELL: Oh yeah, yeah.

STONE: Okay. Let me go back—

LOVELL: Okay.

STONE: —I just blew you up. I don't have time to see the gas yet. You just blew up. You don't know what's going on.

LOVELL: Have no idea.

STONE: Now you say, "Houston, we've got a problem."

LOVELL: Yeah.

STONE: Okay? And what did Houston say?

LOVELL: Well, first of all, it was Jack that said, "Houston—

STONE: Okay.

LOVELL: —we've got a problem."

STONE: Okay.

LOVELL: And Houston said, “Say again, please?” And I say, “Houston, we have a problem. We have a main B bus undervolt.” Now that was a case of electrical system. And about that, Haise yelled down and he said, “You know, during training we had a problem with one of those fuel cells. This might be our big problem. It’s an electrical problem.” And so, we looked at the fuel cells for a—we were looking to see—and pretty soon, you know, they got back online, and they—all of a sudden they died again. And then at one time the oxygen tank gauge went “Full High” then it went “Full Down.”

STONE: All the way down.

LOVELL: And we didn’t know, “Is that a, you know—instrument problem? Because obviously we couldn’t lose all the oxygen. And, you know, this went back and forth. Well, we—and another thing we tried to do: we didn’t know if something hit us. The first thing we really did was try to put the hatch back between the lunar module and the command module, because we noticed that the command module was okay but the lunar module got a hit, we’d slowly lose all the oxygen inside the spacecraft. And so, I said, “Jack, close the hatch.” Jack went up there and tried to close the hatch; he couldn’t do it. I said, “I—” So, I went up there to try to close it. I couldn’t do it! So, I said, “Hey, let’s forget it. You know, secure to our couch. If the lunar module was hit, we’d be dead by now anyway.” And that started the whole sequence of events. Then we started going “Look at the instruments.” And things slowly deteriorated. We looked at the gauges, and then, of course, we looked out the window.

STONE: You look out the window and you see something, and then you know. Did you know what that was you were seeing?

LOVELL: It didn't take much intelligence on my part to realize that the gas escaping from the rear end and the needle on my second and last tank were one and the same, and very shortly we would be out of oxygen.

STONE: At this point, what did you do?

LOVELL: Well, we were trying to figure out how much time we had. Do we have enough time, you know? It—is this a gauge problem? I mean, are—we're talking to the ground. And by that time, I think we're losing the third fuel cell. And, you know, the oxygen fed the third fuel cell anyway. If we were going to lose the oxygen, we were going to lose the fuel cell. And about that time, we were thinking about, "Hey, the lunar module. Maybe we ought to try to use it somehow, you know. Get back in there, at least to protect ourselves, because it has oxygen inside."

STONE: Had you ever thought of it as a lifeboat?

LOVELL: I never did. There had been work done in some of the previous simulations of using it; but basically using it as an emergency vehicle around the Moon, in case something happened in the command module. Say the engine, you know, fired too much, it didn't fire enough, and we were in some strange orbit about the Moon; they'd use the lunar module's descent engine to straighten things out. But we never thought about trying to use the lunar module for a 4-day mission to get back to the Earth! Because the lunar module was only built to last 45 hours! Only built to support two people! And, you know, here we are: 200,000 miles from Earth and 90 hours from Earth.

STONE: 240,000 miles from Earth—

LOVELL: Yeah.

STONE: —and did you—I know what your answer is but I have to ask you anyway: Did you think at any time that you were going to be a perpetual monument to the space program, the three of you floating around out there forever?

LOVELL: The thought crossed our mind that we were in deep trouble. But we never dwelled on it. We never, you know, sort of gave up and said, “What are—what’s going to happen if we don’t get back? Where are we going to be?” My thoughts were this: if everything failed and we still had life support in the lunar module but we couldn’t get back to the Earth, you know, the heatshield was damaged or we just went past the Earth. Because the orbit we were on would take us past the Earth. It was—closest to the point of approach was about 40,000 miles. I said that, “We will send back information. We’ll keep on operating as long as we can. And then, that’s the end of the deal.” So, that was what I had planned to do in my mind should—you know, should something happen. People often ask, you know, this poison pill deal’s ridiculous.

STONE: Tell me about that. You didn’t have anything to kill yourself with?

LOVELL: Well, all we had to do was open the—

STONE: I understand.

LOVELL: —cabin vent. Yeah. And, you know, we could've gone just like that. So, why bother—even bother carrying poison pills, you know?

STONE: Did the three of you at any time have any conversation about the fact that, “We bought the farm.”

LOVELL: We never did. We never admitted to ourselves that, “Hey, we're not going to make it.” Well, only one time when—when Fred looked at the—after the lunar module and found out we had about 45 hours' worth of power and we were 90 hours from home. He says—I think he said something like, “I don't think we're going to make it the way we are right now.” And I said, “Fred, I'll agree with you on [that]. The—what we're doing now isn't going to hack it.”

STONE: How did the ground sound to you at that time?

LOVELL: Well, they—first of all they started up, you know, I—we sent down everything we could when we had the explosion. They said that we—this was after we saw the oxygen. They said, “Yeah, we got a lot of guys working on it down here. We'll help you out.” I said, “Thanks a lot!” But they—I have to tell you, that's when they started getting that teamwork together.

STONE: Let me check off some things here that I would think about. Oxygen first of all. You weren't worried; you had enough oxygen, did you not?

LOVELL: We didn't have hardly any in the main tanks of the lunar—of the command module.

We did have in the lunar module oxygen, plus the fact we had oxygen in the backpacks, which, you know, we're not going to use on the lunar surface so we could tap into that.

STONE: Yeah. Okay. So, you—we—we can breathe.

LOVELL: We can breathe.

STONE: Okay. Electricity.

LOVELL: The power: used batteries on the lunar module. Good for 45 hours. That's—that was the normal use of the oxygen—or—of the electricity.

STONE: Water.

LOVELL: Water was important, too. Not just to drink, but we had to cool all of our electronics systems. And so, water was very critical. More so than the oxygen. Of course later on, we turned off all the electric equipment anyway.

STONE: But you almost dehydrated through this whole thing when you got back, did you not?

LOVELL: Well, yeah—

STONE: Because you didn't drink enough?

LOVELL: —because of an edict that I had put out by—reduce of the water intake to make sure

we had plenty of water for our systems. I probably went overboard in that, and we probably could've used a little bit more water.

STONE: Food.

LOVELL: Didn't think about it. Absolutely did not think about food.

STONE: You had 4 days! You've got to think about it somewhere along the line.

LOVELL: I know. We went up there and, you know, we grabbed something and—whatever it was, whose ever it was, we ate it. The hot dogs, you know, the movie was correct. The hot dogs were frozen. I did get Jack up there to get all the water out of the command module, either I put it in orange juice bags or something like that so that—before it froze, and to—you have enough water down there for that. And so, that's what he did.

STONE: How uncomfortable was it?

LOVELL: Cold and clammy. The—it was very sort of clammy. Very cold. The temperature kept dropping all the way down, because we normally would keep the temperature normal or by balancing the heat load from the electrical systems. And people often ask, and I've thought about it, too, "Should we put on our spacesuits?" And then I thought against that, because they'd be very bulky with three of us. You know, the lunar module's only built for two people.

STONE: Not room enough.

LOVELL: Not room enough and also that it's—it'd be clammy; it's rubberized; and if we started to perspire inside and it's cold outside, that wouldn't be too good anyway. Haise and I did put on our lunar boots. We put those on. Poor Jack didn't have any, and so—

STONE: Yeah.

LOVELL: —then we had a leak in the water system a little bit, and we got a little bit of water in there. So—

STONE: The inside of the place is—there's moisture all over everything. The last place you want to see moisture collect.

LOVELL: That's right. Especially in the command module, which was really dark and clammy. Nothing in there. Not even body heat, because most of us spent our time in the lunar module. It was bad.

STONE: The jerry-rigged box for the lithium hydroxide—

LOVELL: Yeah.

STONE: —is that what it's called?

LOVELL: Yeah, they're—

STONE: That has—everybody talks about that. Tell me the truth about that.

LOVELL: Well, the truth is that what you saw in the movie is pretty much the truth. What happened was, in the lunar module, which we didn't think about at the time but some of the people in [Manned Spacecraft Center] Crew Systems [Division] did, that the round canisters were devised and developed to support 2 people for 2 days and that they were round and that they were lithium-hydroxide that would remove the carbon dioxide. Now they were becoming saturated. And the partial pressure of carbon dioxide was rising—something that we didn't really notice at first. But the ground started to notice it and they started to try to figure out what they could do. Now in the dead command module, they use in their environmental system *square* canisters. Had plenty of them, but you can't put a square canister in the round hole of the lunar module system. Big engineering goof. Why we had square there, we had round over there, we'll never know. So, what the Crew Systems came up with was how to jerry-rig a square canister to work in the lunar module. We did it with tape, plastic, cardboard, and a little sock. And, by gosh, it worked!

STONE: They call up to you and say, "Take a piece of tape about as long as your arm."
Or—

LOVELL: Yeah. Well, first of all they said, "Take a piece of duct piece about 3 ft—well, maybe as long as your arm."

STONE: Yeah, okay.

LOVELL: And so, that's what we did.

STONE: Okay.

LOVELL: And—

STONE: And you're saying, "Well, for what?"

LOVELL: And essentially Jack and I started to build this thing. And we—just according to the instructions—the instructions were explicit and it was a great job. And, if you look at the one that the Crew Systems had made to show the people in the Control Center and you look at the one that's hanging on the lunar module wall, they're identical.

STONE: All this time you have—all of you must have serious sleep deprivation problems. I mean, you guys have got to be just dog-tired!

LOVELL: Yeah. Actual sleep was very, very limited. Maybe I had 1 hour, if you want to count it, in 40. You—we tried to sleep up in the command module. A funny phenomena, though. If you go in the command module and no one else is around and you stay very quiet, your body heat heats up the air next to you because in zero gravity there's no convection, so hot air doesn't rise and so it doesn't bring in cold air. Your body is like a little blanket. But, you know, it worked to a little degree. We found out, though, that sleep is something that you could get a few winks of and then—and be relaxed again. For instance, even on duty, I put my fingers like this and I closed my eyes, and maybe I'd fall asleep for a minute or two and wake up, and I'd be okay again. So, it's a—it's, you know, catching a little naps at a time.

STONE: Were you—did you allow everybody to sleep at once? Or did you try to sleep—

LOVELL: No, we all had to—

STONE: —in shifts?

LOVELL: —someone stayed on duty.

STONE: You had to—somebody had to stay awake all the time?

LOVELL: Yeah, we kept somebody awake. And usually it was Fred by himself and Jack and I trying to get some sleep.

STONE: We get to the point where things are as under control as they're going to get for a while. But you've got to figure out something to see so you know when to fire your thrusters. And there's a telescope, an [AOT] [alignment optical telescope], in here. And you're supposed to find two stars with it, is that right?

LOVELL: Well, there's two things about the telescope.

STONE: Okay.

LOVELL: When we were going to come around and we're going to make a second burn, a speed-up burn to come home, we were worried that I made a mistake—including myself was worried—of transferring the angle data from the command module's guidance system properly into the lunar module system. Now we had to have that guidance system in the lunar module to get the proper attitude to make the proper speed-up burn. So, the ground

then determined a method of trying to see if that data was any good by—I mean, we could not see any stars. There was no—all the debris was around the spacecraft and was following us, so there was no way of seeing stars to do the normal navigation. But the Sun is a star.

So, we put into the computer and the guidance system to point the telescope at the Sun, which is a star. If it did, then we knew that the information was correct in the computer. So, that's what we did. We put it in there. We let the spacecraft jog around and then point the telescope. And if you'll hear our conversations, it's a little bit like *My Fair Lady*, you know. "Oh, she's got it! I think she's got it! Oh, oh, yeah, I think she's—yeah, yeah, she's got—yep, you've got it! Yeah! There it is, the Sun!" So, that was the first thing. We passed that, so we knew the guidance system was okay for that long burn. So, we made that long burn and everything was fine. And right after that, we shut everything down because we had to save electrical power. We're flying by the seat of our pants now.

STONE: Is this a fast burn you're talking about here—

LOVELL: Yeah, 4½ minutes.

STONE: —or did this come later? Yeah.

LOVELL: It stayed on for 4½ minutes, this rocket engine pushing us faster and faster on the way home.

STONE: Yeah.

LOVELL: Then the ground had been tracking us by this time. And they thought, and we got back on that free-return course on an earlier burn, but they looked at it and tracked us and

interpolated our course all the way back to the Earth and found out we were going to miss the Earth!

STONE: Going to miss.

LOVELL: We are no longer on the free-return course. Well, what could we do? We had—everything was shut down. We don't have that guidance system anymore. We don't have anything. And that's when they said—you know, they gave us the procedures about using the Earth. And I said, "I know those procedures, because we had them developed in Apollo 8. And when I was doing the navigation stuff, we developed those procedures. But we took them out of our flight manuals after Apollo 8 because we never thought they'd ever be used." And I remember the ground said, "Yeah, we thought you would remember those procedures." And so, maybe it was very appropriate that I was on Apollo 8. And we used the Earth and the Earth's terminator as a guiding post, and we burned to get back in the proper angle to get back home again.

STONE: You're coming down. You know you've made it. But you're not quite sure whether anything's going to work. Do you know the parachute's going to come out? Do you know the heatshield's going to work? Do you know anything's going to work?

LOVELL: Those two things you mentioned are very important: the heatshield and the parachutes, because when we jettisoned the service module and it floated on by, we saw this big, gaping hole, this panel blown out. That worried us that our heatshield was damaged, because it was right next to our heatshield.

STONE: Sure.

LOVELL: And there was nothing we could do about that. I mean, we were coming—we were aimed for the Earth. We're going to come into the Earth. That was the end of the deal. If we're going to burn up, we're going to burn up. And then, of course, we knew all the way through. The ground didn't know for the longest time what happened. The last crisis, of course, were those parachutes. Because the pyrotechnics that put out those chutes, which we normally keep warm with electrical power, were cold-soaked for 4 days. So, we didn't know they were going to fire. And if they didn't fire, even though we got through the atmosphere, we'd still hit the water [at] a pretty fast rate of speed.

STONE: But they fired.

LOVELL: They fired. We came down.

STONE: At that point, you know you're home free?

LOVELL: I knew I was home free. Eventually home free completely, when the spacecraft bobbed up and I saw water on the windows and the thing didn't sink.

STONE: But up to that point, you—I'm looking for the most frightening point in this whole thing. When it exploded? When you realized that you had a problem? Or when you were coming down, wondering whether that chute's going to deploy?

LOVELL: The most frightening moment in this whole thing is when the explosion occurred, and then after a little period of time—and saw the oxygen escaping and we didn't have solutions to get home. Because we knew we were in deep, deep trouble. And you know, I

always compare this like a solitaire, a game of solitaire. You turn up a card and that's a crisis. If you can put it someplace, the mission keeps going. The game keeps going.

STONE: Yeah.

LOVELL: You pull another card and there's no place to put it, the game's over. That never occurred to us.

STONE: What kind of impact did that adventure, and I use that word advisedly, have on you personally?

LOVELL: I don't worry about crises any longer. I mean, seriously. I mean, I look at them. I say to myself, whenever I have a problem with something like that or I'm in trouble with someone or somebody's sick or something like that, I say, "I could've been gone back in 1970. I'm still here. I'm still breathing." So, I don't worry about crises.

STONE: What caused you to write *The Perilous Voyage of Apollo 13*?

LOVELL: After we got back on the carrier, the three of us, Swigert, Haise, and myself, and we looked at each other and we dusted ourselves off and—"Hey, we're still alive!" And we said, "You know, this flight has got a lot of adventure to it. Even before the explosion, you know, things happened that were entirely different on this flight. We ought to put this down on paper. We ought to write something about it." So, we all vowed that we would write something on paper. Of course the best, you know—the best intentions. Jack eventually went into politics; Fred went in the aerospace industry; I got in the telephone industry. Jack died in '83, and I retired in '91. And I still had my office and my secretary, and I went—the

day after I retired, I went back there and said, “What should we do? Don’t have to worry about telephones any longer.” And she said, “Why don’t you write that book you’ve been telling me about for the last 14 years?” I said, “Good idea, but I’m not an author.” I’d written a lot of articles; and fortunately about that time, a young man who was a writer for the *Discover* magazine, Jeff Kluger, wrote and said, “I’d like to do a story on it.”

STONE: You okay?

VOICE OFF CAMERA: We’ve got to stop now.

VOICE OFF CAMERA: And we’re recording.

STONE: This is Tape 3. James A. Lovell, Jr. Your secretary said, “Why don’t you write that book you’ve been talking about for 14 years?”

LOVELL: And I said, “Not a bad idea.” I said—so, I started to, you know, try to figure out how to write the book. I’m not a professional author. And about that time, though, out of the blue, very fortunately a young man wrote me a letter and said, “I’ve never written a book before, but I’m a writer for the *Discover* magazine. I think Apollo 13 would make an interesting story. Can you help me?” His name was Jeff Kluger, and I said, more than that—I said, “I’d like to do the same thing.” I liked the way he wrote, and so we co-authored the book *Lost Moon*.

STONE: How long before Hollywood discovered *Lost*—that book?

LOVELL: It’s kind of interesting. We wrote one chapter. And then we put an outline on

either side of that chapter. This is a proposal for a book publisher. And so our agent sent it around to various book publishers to see who would want to back us up. And we finally found one, Houghton Mifflin, and so I was very happy. This was something to keep me off the golf course. This was post-retirement. And I—we had not yet written another chapter. We were doing research. We were calling up, you know, people down here at NASA, our old friends, to say, “Could you help us out? Could you give us a hand?” And I was sitting at my desk—this is about 2 months after we started—and I got a call from our agent. And he said, “Are you sitting down?” And I said, “Yes.”

And I thought maybe the book publisher was going to back out of this whole project. And he said, “We just sold your book to the movies.” I said, “We haven’t written it yet! Isn’t that illegal?” you know. And he said, “No, it’s done all the time!” What he—they actually sold was an option to do the story to Imagine Entertainment, which was Ron Howard’s company. And what turned the option, of course, into a finished product was the lead actor, Tom Hanks. He was a closet astronaut. The guy is a space enthusiast. When he heard through his agent that Ron Howard had an option to do a story on Apollo 13, which he knew about and I didn’t even realize that, he lobbied for the job. And when Universal heard that Ron Howard had Tom Hanks, who had just gotten the Oscar for the movie *Philadelphia*, I think it was at that time, they decided to do the movie. And that’s how it got started.

STONE: And what did your wife say when you said, “Guess who’s going to play me in the movie?”

LOVELL: Couldn’t believe it! Couldn’t believe it. Actually, when I had an interview with Ron Howard after he bought the option—and this was before Hanks or anybody [was] aboard; this was—we went out there for about 5 hours to talk over the story about Apollo 13—at the end, when I was about ready to leave, he said, “Who would you like to play your

part?” And I don’t know much about actors or actresses, but I had seen the movie *Dances With Wolves* about 6 or 8 months before and I said, “Kevin Costner.” And Hanks never lets me forget that I said that, you know! And of course, but Hanks did a great job.

STONE: Were you frightened about what Hollywood might do to your story?

LOVELL: Yes, I was to a degree. Because I had heard these stories of famous authors who don’t like the way their books are portrayed on the screen. And, of course, when you buy—and after I read the contract, when you sell the book to the movies—

STONE: You’ve sold it.

LOVELL: —you’ve sold it. They can put it on Mars, you know—

STONE: Yeah.

LOVELL: —and do anything they want. But I have to be quite honest. We—I could not have picked a better production team with Ron Howard. A better group of actors and also Kathleen Quinlan, who played my wife, than the group that they had gathered together to do that movie. It was perfect. And it was a win-win situation for everybody. NASA certainly, I think, liked it. We used the zero-g airplane to get the zero-g sequences; that was the first time it had ever been done. The public enjoyed it, I think. I’m happy. Jeff Kluger’s happy with the way the book was portrayed. So, it was quite a deal.

STONE: There have been all kinds of books about the astronauts and about the various

spaceflights. Have—has NASA and have you gentlemen been treated fairly by the popular press?

LOVELL: I think so. There's always critics. And I—and especially the movie. The—when the movie came out, some—the space enthusiasts here, you know, all the space guys here said, “There's 125 mistakes in that movie.”

STONE: Oh, yeah.

LOVELL: But, you know, we've been nicely handled by the press with the book. I wrote it—we wrote it, I should say, in the “we” frame. Not—never said “I did this” or “I did that.” It was not a biography or an autobiography. It is—we talk about Lovell; we talk about Haise; we talk about [Eugene F.] Gene Kranz; we talk about, you know, all the people because we wanted to write it in that way.

STONE: Why did you decide to leave NASA?

LOVELL: A good question. I—while I was doing some work towards the—after my Apollo 13 flight, I was originally on some of the work on the initial Shuttle. And then I went over and became a Deputy Director of the Science and Applications Directorate; and during that period of time, NASA sent me to the Advanced Management Program at Harvard and there I probably learned just enough about business to be dangerous. But I came to a crossroads.

The Navy had been calling me, “What do you want to do? Come back in the Navy. We'll try to get you the proper assignment.” I could've stayed here at NASA, but probably retired from the Navy and become a GS of some sort. Or I could retire permanently and go into private enterprise. And when I looked back in the Navy, I said, “Well, you know, I was

a Captain for 6 or 7 years.” And I said, “If I’m up for selection for Admiral and there’s several people to fill that billet and I was a selection officer, who would I pick? Would I pick Lovell, who spent 11 years at NASA? Or would I pick this fellow, who spent, you know, two terms—two tours at Vietnam and the Naval War College and all these really, you know, positions to go up to be an Admiral?” And I said, “I’d pick that guy over there. Not Lovell.” And that made the decision that I should go into private practice.

STONE: You were in the towing business, the boat business for a while.

LOVELL: Right here in Houston, Texas in Bay-Houston Towing. I tried my hand at that for 4 years. A very lucrative business. Enjoyed it, but there was no future for me there.

STONE: Telephone business.

LOVELL: I got in the telephone business at the right time, at the right place. By the husband of Ed White’s widow, who she married 5 years later, and it was just when AT&T, the Bell system, was getting ready to deregulate—

STONE: Yeah.

LOVELL: —divestiture was coming up. We were selling telephone systems. Our little company went from \$8M to \$40M and then CenTel Corporation bought us and—and then I went up to CenTel.

STONE: Now you work with Mission HOME. What is Mission HOME?

LOVELL: About 7 years ago, the National Space Society and the U.S. Space Foundation got together with the Alliance of Aerospace Companies, trying to educate the public on the real benefits of the space program. To show them what—what has been accomplished that is helping them out today and what can be done in the future and Harvesting Opportunities for Mother Earth is HOME. And that was the whole idea. To do—at that time, to do seminars around the country. I wrote a piece, which is still going on in various newspapers. And to try to get people interested. And they got other astronauts, retired guys basically, to do it. It's changed its name a little bit now. I think it's called Space Alliance, and they're still trying to accomplish that goal.

STONE: Are you disappointed that here we've gone, what, 30 years since we walked on the Moon and we haven't gone any further than we've gone in the space program?

LOVELL: Yes, to some degree I am. The disappointment comes from the fact that, I guess this being a democracy, we got all sorts of controversy and we weigh things. Compromises are always the name of the game. But we waffled in the late '80s and the early '90s on the—on a space station. I don't know how many designs of the space station we had. Either it was too big, too complicated, too expensive. And we didn't realize at the time that maybe a consortium of countries work it together. In that respect, I think the present Administration eventually did—the Administrator, Dan [Daniel S.] Goldin, finally realized that. Although some of our partners are lacking quite a bit, like Russia. But I think we're finally on the right track. But we did waffle. We wasted an awful lot of money. We wasted an awful lot of time and a lot of effort of not really knowing what we wanted to do. How we wanted to proceed with NASA. You know, it's like that old saying: after you've been to Paris, what else is there? After we've been to the Moon, what else is there?

STONE: Yeah.

LOVELL: Well, that was a great triumph. Everybody still relates back to that. But that's 30 years ago.

STONE: Yeah.

LOVELL: We've got to work now today. We've got to do something today. And we are doing a lot of things today. But, you know, you get repetition. You get 90-some Shuttles now and one accident. Everybody says, "Ho hum." They don't—we're trying to tell people what we really do up there.

STONE: But you know, Captain, we went to the Moon the first time because of the Cold War. Apollo 8 speeded up because the Russians were coming. We—there really was a space race. I mean, you know—

LOVELL: Absolutely.

STONE: —that may be an old saying. But there is no race anymore. There's nothing to propel us to go if we don't really think about it, you know?

LOVELL: Well, you're absolutely right as far as competition goes. There is not that incentive to try to beat somebody else. And that was the whole deal. And, you know, the Russians themselves were interested in beating us not so much in military missiles, but going to the Moon. That was their goal just as much as it was our goal.

STONE: Sure.

LOVELL: But now we have cooperation. Now it's a little bit more subtle. Now if we can all work together and work as a team to accomplish things, and get our mind off of other things, I think there is a hope for us. But whether that will ever come to pass in real life, the Russians still are very much interested in their *Mir*. I mean, its theirs. It's long past its time. It should've been brought down a long time ago. They can do a lot more on the International Space Station than they could ever do on the *Mir*. And we have to wait till it gets done.

STONE: Will our grandchildren see people go to Mars?

LOVELL: Perhaps your grandchildren. I think a lot of the—there'll be the attempts. There'll be the work on doing it. I think the Mars mission is within the next 20 to 25 years. Now that seems strange for me to say, when you look back on going to the Moon in '69 and you say, you know, 20 years. That was in '49. You know, no one ever think—if someone asked me in '49, 1949, are we going to land on the Moon in 1969? I'd say, "You're absolutely crazy."

STONE: Yeah. Yeah.

LOVELL: So, it might be that it's speeded up. I hope so.

STONE: But it's interesting that you say—think about it and say "probably." The old way of saying it would've been, "You bet! You bet." But now there's not a certain "you bet" about it anymore, is there?

LOVELL: No, I have to be pragmatic about the whole thing.

STONE: Yeah.

LOVELL: We have to know—there are other commitments we have to do. Mars will be a, again—a consortium of countries. It will not be just the United States. And these countries have to get together to work together. It'll be a major project! And there is some doubt whether we could ever do it. I know I talked to Bill Anders, who got his Masters in Nuclear Engineering. And he said, “You don't understand the radiation once we get out there for long periods of time. You know, it'll do you in before you get there.” So, if he's right, then maybe a Martian trip is not feasible.

STONE: What's your—what was your finest moment at NASA?

LOVELL: I think the finest moment in NASA was the time we landed on Apollo 8. It came back, and had the press conference. And it suddenly dawned on us, is to suddenly realize what we had done. You know, at the time you're doing something you don't realize what you're doing. You know what I mean? It's work—

STONE: Yes.

LOVELL: —you're doing this. You're doing that. It's only when the thing's accomplished and you come back again and say, “Gee, we did that!” You know. “This really was the case. We were there! And we saw the Moon.” We saw the far side of the Moon, which no one had ever seen, you know, before. Live. And we had some pictures of it, but that was it.

That was the high point of my career. And I can agree with a lot of people at NASA. I think that was the high point of NASA's career, too.

[END OF INTERVIEW]