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Mr. Terry Greenfield's

3

Oral History

4

Kennedy Space Center

5

Held on June 11, 2001

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Interviewer: Dr. Henry Dethloff

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Dr. Lee Snaples

9

Elaine Liston

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1 Henry Dethloff: OK. Well, let's go ahead and get started. Today is Monday, the
2 11th of June (2001). Terry would you please give us your full name and tell us a little bit
3 about where you born, when you were born, and your background and how you came to
4 be with NASA.

5
6 Terry Greenfield: OK. Well, my full name is Terry Donald Greenfield and I was born
7 in this little steel mill town in Pennsylvania called Coatesville, Pennsylvania. It's about
8 30 miles west of Philadelphia. I guess I was always interested in electrical things,
9 electronic things and so forth in the old days.

10

11 Dethloff: When were you born?

12

13 Greenfield: I was born in 1930, September 7, 1930. I guess, in high school I was
14 always part of the stage crew or something that had to do with wires and things. I had
15 gotten a scholarship to Penn State. It wasn't a university then, but Penn State, and I
16 studied electrical engineering and graduated in 1953. And went to work for the steel
17 company in my hometown there.

18

19 Dethloff: Which was what?

20

21 Greenfield: Lukens Steel Company then. It has been bought out by somebody else
22 now. And since I had a deferment in going to college from the Korean War and then I

1 had a deferment because I was in the defense industry with the steel mill I was 25 years
2 old and had never been in the service. So I volunteered for the draft.

3

4 Dethloff: Did you?

5

6 Greenfield: Private First Class Army.

7

8 Dethloff: My brother did that.

9

10 Greenfield: And so I got sent to Fort Jackson, South Carolina where we did basic
11 training for, well normally it's 10 weeks. My basic training was 12 weeks because the
12 train caught on fire on the way from Philadelphia to Columbia, South Carolina and we
13 ended up off-cycle. And that's bad news because what we did was they would come
14 around and get us in the morning in a bus. And then they would go get the prisoners
15 out of the stockade in the morning and we would go around and cut down trees and
16 build parking lots and so forth for about 2 weeks until we got back to another start date.
17 But, anyway I was able to get into what they call a scientific and professional program
18 even though I wasn't commissioned.

19

20 Dethloff: Excuse me. I bet you were an unusual species though. You had a
21 degree and you were 25 years old with that bunch.

22

1 Greenfield: I knew how to keep out of trouble in basic training. So we got stationed
2 then at Redstone Arsenal. I went to work at what was then the Fab Lab, Fabrication
3 Laboratory, and I worked . . .

4

5 Dethloff: OK. So you went then as a . . .

6

7 Greenfield: GI.

8

9 Dethloff: . . . GI.

10

11 Greenfield: Right.

12

13 Dethloff: To Redstone.

14

15 Greenfield: To Redstone, yes. And we were . . .

16

17 Dethloff: With how many others?

18

19 Greenfield: There was probably a hundred I guess at Redstone. A hundred GI's and
20 they were all professional. They were all chemical engineers, electrical engineers,
21 mechanical engineers, structural engineers, and aeronautical engineers. The whole
22 gamut there.

23

1 Dethloff: So they did some selection to pull that pool together and get it there.

2

3 Greenfield: Right. And we all worked under the German . . .

4

5 Dethloff: What year was that?

6

7 Greenfield: This was 1955.

8

9 Dethloff: That's interesting. I didn't know they did that.

10

11 Greenfield: And we all worked under a German. This was Dr. Pates, I think was the
12 guy at the time, who was head of the Fab Lab. My job up there at the time was taking
13 care of the, they had . . . You have to appreciate that in those days they had what they
14 called the arsenal concept where everything was done with Civil Service. There were
15 no contractors. None. Zero.

16

17 Dethloff: Yeah. So you built it.

18

19 Greenfield: I was assigned to a group that took care of the automatic welding
20 machines because they were electronic in nature. I kept those running. And then we
21 had heard that there was some interest in having some GI's come down to the Cape
22 and participate in launches of the Redstone. There were 2 of us, Ted Hershey, who

23

1 died last year, and myself. Actually Ted and I went through basic training together. He
2 was an H and I was a G so we had bunks above each other there. So we came down .

3

4 Lee Snaples: Did you volunteer or did they just select you?

5

6 Greenfield: No they selected us to come down. It was paratroops or that. {laughter}

7

8 Snaples: You didn't like the idea of jumping out of airplanes?

9

10 Greenfield: Not unless I have to. So we had come down in January of 1956 and our
11 home was the second floor transient barracks at Patrick Air Force Base. That's where
12 we stayed there. The first thing I did was go swimming. It was January and we headed
13 for the beach and went swimming. That was kind of interesting.

14

15 Dethloff: I can imagine.

16

17 {laughter}

18

19 Greenfield: But I was assigned to a fellow by the name of Ike Rigell, who I hope you
20 have on your list to talk to. He is one of the old tops guys there. I worked as a, what we
21 called then, blockhouse engineer. We took care of the electrical systems on the ground
22 and also the electrical systems on the Redstone.

23

1 Dethloff: Now was Rigell with Air Force Patrick?

2

3 Greenfield: No. No. No. These were all Civil Service.

4

5 Dethloff: These were all Civil Service?

6

7 Greenfield: In fact . . .

8

9 Dethloff: Did they come from Huntsville?

10

11 Greenfield: We were all assigned to Huntsville. But they were TDY. Except for us, we
12 were permanent change of station down here. But they would go up and participate in
13 the final check-out in the quality area up there. And then they would come down. In
14 fact, they used to bring the, they would bring the firing equipment down in their trunks.
15 There would be about maybe 10 of them who would drive down and they had all of the
16 equipment in their trunks. And then we would take it out and dry it off and hook it up.
17 Because each one was a little bit different so they had a shop up there that took care of
18 the configuration of all of that.

19

20 Dethloff: Did they call those development groups or something like that? It seems
21 like I read in the Debus papers and he was referring to them as development groups.
22 You know these were the guys that were in transit that came to fire the shots and went
23 back or disappeared or something like that.

1

2 Greenfield: I've never heard of that phrase development group. They were all
3 assigned to a lab up there. And then they all just kind of came down and launched.
4 Then they went back. Of course we stayed here. A lot of them then started staying
5 here permanently. They still got TDY, but they had houses. They quit coming back and
6 forth there for a while. That's when we kind of began to build the original Missile Firing
7 Lab, which is what it was called, Missile Firing Laboratory at the time. That was under
8 Marshall. So at that time I worked pretty much as an engineer in the blockhouse
9 running tests. We were test conductors for what they called overall tests. These were a
10 series of tests that we ran to check out all of the detail circuits and so forth.

11

12 Dethloff: You were working primarily with Redstones for the first couple of years?

13

14 Greenfield: That's all it was, Redstones. Then I went from Redstone to Pershing. But
15 what I did was then I got discharged. I had to go back to Fort Jackson, South Carolina.
16 That was interesting because there was no place to buy khaki clothes down here.
17 Everything was blue. So when I went back to . . .

18

19 Dethloff: You were wearing Blue?

20

21 Greenfield: Well, I had a rope belt. I had a nylon belt. And I had argyle socks. I
22 wasn't going to buy anymore clothes my last week in the Army, but I had fire watch at
23 night. I had KP. They really put me through hell the last week just because. I wasn't

1 trying to be a rebel. I just didn't want to buy anymore damn clothes. Anyway, I came
2 back really in the same job as a civilian. I came back at that time as a GS-13.

3

4 Snaples: So you would have gotten an increase in pay I would assume.

5

6 Greenfield: Yeah, it was big. I think I got \$124.00 a month. Fortunately I had saved. I
7 had worked for 2 years there anyway.

8

9 Dethloff: So you were in the service for 2 years?

10

11 Greenfield: Right. And I got discharged in August of 1957. Then I worked more
12 Redstone. Then I got assigned to Pershing. The Pershing Missile was still, well, I
13 guess in 1957 I think it became ABMA, somewhere in 1956 or 1957. I'm not sure just
14 when. But when I was in the service we became ABMA and General Maderis came
15 over and took over the Redstone Arsenal there.

16

17 Dethloff: When does Debus appear on the scene down here that you recall?

18

19 Greenfield: He was always here.

20

21 Dethloff: He was always here?

22

23 Greenfield: He was always here. Yeah. Right.

1

2 Dethloff: Now were you at the Explorer 1 Launch?

3

4 Greenfield: Explorer 1, right.

5

6 Dethloff: In 1958.

7

8 Greenfield: Right.

9

10 Dethloff: Any special recollections about that particular launch?

11

12 Greenfield: Oh yeah. Well, that was the guy. My console was the one that spun up
13 the, well actually we balanced. I was the liaison with JPL and I worked over at the Spin
14 Test Facility with JPL balancing because I had the ground support equipment that spun
15 up the tub. The tub was 4 stages and it had old Sergeant rockets around it. In other
16 words, to keep the thrust reasonably symmetrical we spun the tub up at 450 for lift off
17 and then it went up to 750 during flight because of the (vibration) nodal changes. In
18 other words you burn off propellants. The resonance frequency of the Redstone
19 changed so we had to keep the speed going up there. So it actually at the time that the
20 Sergeants fired it was going 750 rpm.

21

22 Dethloff: When you did that, do you remember any special significance to that at
23 that moment of launch or did that all come later?

1

2 Greenfield: Oh no. Well we . . .

3

4 Dethloff: Because that was a lot of pressure.

5

6 Greenfield: Well, we were able to launch. We could have launched an Explorer 1
7 about 2 years before that because of the Vanguard mess and everything. It was a
8 Redstone 27 and it was completely ready to go except the 4th stage had sand in it rather
9 than propellant. In other words I'm sure they didn't trust us that somebody would go in
10 and hook up that 4th stage and it would go anyway. But we had to just kind of sit out.
11 So they put Redstone 29 in storage up there until Vanguard had failed there twice or so.
12 And then the Army . . . you can read about that. I mean there is a whole bunch of
13 intrigue there. But we finally got the . . . And of course this was, the same way with 27,
14 the first time we had ever used a different fuel. We generally used alcohol and this was
15 UDMH, which was the first use of unstable dimethyl-hydrazine. As far as we knew then
16 it was lethal. If you sniffed it, you're dead. You know? So there was a lot of anxiety of
17 the first handling of the propellants there which was the UDMH.

18

19 Dethloff: Excuse me. Then you go from Redstone, and there were 12 or 14
20 Redstone launches, then you went to Pershing.

21

22 Greenfield: We went to Pershing. Right.

23

1 Dethloff: OK. And any significance in the transition?

2

3 Greenfield: Well, actually we went from Redstone to Jupiters in that same time frame.

4 We were in competition with Thor's at that time. Then I got sent over to Complex 30

5 where we actually built Complex 30. Then I was assigned as a liaison with the Martin

6 Company over here in Orlando that built the first Pershing.

7

8 Dethloff: And in fact, Martin kind of got organized for that purpose I believe.

9

10 Greenfield: I think so.

11

12 Dethloff: Or very close to . . . I don't know if it was that . . .

13

14 Greenfield: Well, actually that's where the Bee-Line Road was first funded. It was

15 called "Scoot and Shoot." That was the buzz phrase back then, "Scoot and Shoot."

16 They were going to check it out in Orlando, scoot it over here, and launch it. Well, in the

17 missile business, what happens is that when it leaves the factory it's never done or it's

18 done wrong and you've got a whole bunch of engineering change orders to do after you

19 get it over here. So that thing didn't really pan out. But we used to go over and it was

20 checkpoint 104 was their final check out area over there. And a group of us went over

21 there. I actually got fired by G.T. Willey who was the . . . G.T. Willey was the Chief over

22 there. I had been over there 2 days in a row. We were outside, 4 or 5 of us, were out

23 there having a cigarette and G.T. Willey comes stomping in there and said, "What are

1 you boys doing out here?” and I said, “well we were taking a break.” (And he said),
2 “Well we don’t do that here. You guys go in and get your slips.” He didn’t know we
3 were Civil Service, you know. So we went back and called our bosses and they called
4 up the General up there. And the General, I think, politely called G.T. Willey and told
5 him that he didn’t have much authority over “my boys” down there. {laughter} Anyway,
6 so about 3 of us got fired by G.T. Willey, I guess, over there.

7

8 Dethloff: You are getting close to the transfer of the Missile Laboratory . . .

9

10 Greenfield: Right. In 1960 we became Launch Operations Center (LOC). And that
11 was when we became NASA.

12

13 Dethloff: Now. Tell us your impressions about that transfer. Were there any?

14

15 Greenfield: Oh yeah. There was. All of a sudden, in fact, we had all of the leaders
16 from here went up to Headquarters to meet their new bosses. Of course, Dr. Hans
17 Gruene was Chief of Guidance and Control. And Albert Zeiler was the Propulsion
18 Mechanical, and Karl Sendler, who just died about a month ago here, was
19 Instrumentation Tracking, and of course Kurt Debus was the Center Director. Each
20 German had a counter-part. In other words, under Hans Gruene was Ike Rigell. And
21 under Karl Sendler was Grady Williams. And under Al Zeiler was Bob Gorman. Most of
22 those folks are not with us anymore. As they went up and walking down the halls of the
23 new NASA Headquarters Building they saw the signs on the door that said Director of

1 Guidance and Control, Director of Mechanical and Propulsion, Director of
2 Instrumentation Tracking, and their first impression was what do these guys do? You
3 know? What do they do? What is my interface with them? But it was the beginning of
4 the bureaucracy. You know? We were very informal in those days. In fact we had no
5 Safety Department. We had no Quality Department, no Reliability Department. Each of
6 us did that as part of our job. We were conscious of safety, reliability, quality. And this
7 is with a turn, because now we started getting, not necessarily scientists involved in
8 NASA, but business people involved in NASA. And all of a sudden we got more formal
9 in the way we did business. Our countdown used to be 3 pages long. In fact you
10 probably have some of those 3 pages back there (meaning in the archives). Maybe
11 some of them were 6 pages. Most of them were done for coordination with the range or
12 outside services. But it would say, you would go around the consoles and everybody
13 did what they knew to do . . .

14

15 Dethloff: Checking?

16

17 Greenfield: . . . without much of; they may have their own check sheets, but there was
18 a trust in people rather than paper. That was my key phrase, these days even. They
19 trusted people more than paper. Today, it's not that way. It's the other way around
20 pretty much.

21

1 Dethloff: Was there in your mind any significant shift in philosophy, attitude,
2 between having been primarily engaged in the development of weapons to being now
3 engaged in the development of a peaceful space vehicle?
4

5 Greenfield: Not from my viewpoint.
6

7 Dethloff: OK.
8

9 Greenfield: We didn't care what the payload was really. You know? Because we . . .
10

11 Dethloff: Well that's good. I'm glad you told me that because . . . yeah.
12

13 Greenfield: We did a lot of research. In other words the ablative (nose cone). . . We
14 launched some of the upper stages there with ablative material on it. Which was the
15 heat protection system in those days. We launched scientific payloads. We launched
16 monkeys. We launched people. The biggest change, I guess, was when we went from
17 unmanned to manned. That was probably the biggest transition where we had to man-
18 rate a vehicle that was never, and we didn't really know what man-rated meant. That
19 was triple modular redundancy and things that would make it intrinsically safe, as well
20 as ways to get escape. Ways to get out.
21

22 Snaples: When it was informal did you have a lot of access to your superiors?
23

1 Greenfield: Access?

2

3 Snaples: In terms of being able to go up and talk to them.

4

5 Greenfield: Oh yeah. Right. You could talk to anybody. And Debus would come out
6 and he would pick up Coke bottles in the area. If there was something around, he
7 would walk out and clean up the place.

8

9 Snaples: Did that change when it shifted over to NASA?

10

11 Greenfield: Oh yeah. Their time was taken up that way, rather than this way. They
12 became more . . .

13

14 Snaples: Top.

15

16 Greenfield: Right. Their time was taken up by the leaders at Headquarters . . .

17

18 Snaples: Meetings and requirements and all of that.

19

20 Greenfield: Yeah. Right.

21

22 Dethloff: Was there a big moment of change now when the word on Apollo Man
23 Programs began to develop, Gemini and Mercury?

1

2 Greenfield: Well Mercury Redstone, yeah, that was really the beginning of the
3 manned-rating there. And of course . . .

4

5 Dethloff: Did you have much personal interaction with the Johnson Space Center
6 people?

7

8 Greenfield: The Space Task Group we did in those days. And we had of course the
9 McDonnell Company had the rear part of the blockhouse there. We had the front with
10 the console and they had the rear. That was our really first interface with the other
11 NASA people and the contractors.

12

13 Dethloff: How did that work? Any comments there?

14

15 Greenfield: It was tough.

16

17 Dethloff: A whole new world . . .

18

19 Greenfield: Yeah, it was a new world. You didn't know how to deal with people that.
20 At first you didn't know how to deal with people that weren't part of the clan, so to
21 speak.

22

1 Dethloff: Did you notice much difference in philosophy, attitude, character, when
2 these other groups came in?

3

4 Greenfield: Oh yeah. There was a big difference of philosophy between the Space
5 Task Group and at that time the Missile Firing Lab. I guess it was Missile Firing Lab
6 then.

7

8 Dethloff: Could you kind of develop that a little bit?

9

10 Greenfield: Well, I don't know. There was an ego thing. I don't think any of us had
11 much ego. We didn't know what that meant. But it was our first interface with a lot of
12 those people that (rejected) "here's how we do business here." Like we cooperate with
13 the Range. In other words, one of my jobs was to put together what we called safety
14 circuits. This described to the ordnance people at the Range on all of our ordnance
15 circuits in the vehicle. And the Space Task Group people said, "We're not gonna do
16 that anymore. We don't need to do that. They're not important." And so forth. So
17 where we had a kind of a pretty good relationship with the Range, this tended to depart
18 from that. In other words, they just said, "We are us and we're in charge here." That
19 came together after a while. But it took a while. They were an autonomous group that
20 when they went someplace they wanted to take over the place.

21

22 Dethloff: They were in charge.

23

1 Greenfield: Right. And they weren't in charge here. That was tough for them too.

2

3 Dethloff: And there was quite a period of territoriality conflict.

4

5 Greenfield: Yeah, right. The king of the mountain.

6

7 Dethloff: Determination of who was in charge of doing what. And in fact there is a
8 lot of paper in those files . . .

9

10 Greenfield: I'll bet.

11

12 Dethloff: . . . of that too. What you're in with Marshall and with Johnson, and with
13 Headquarters as a matter of fact.

14

15 Greenfield: Right. The whole thing kind of came together without a whole lot of
16 leadership. They just kind of put a whole bunch of different philosophies together there.

17

18 Dethloff: During the Mercury/Gemini any special recollections or significance you
19 attach to any of those? You're seeing man go up now. Had the world changed for you
20 in any way?

21

22 Greenfield: I don't think it changed any. We just . . .

23

1 Dethloff: And your job is still primarily testing and quality assurance on launch
2 operations.

3

4 Greenfield: It was to check everything out.

5

6 Dethloff: Were you in the console during launch?

7

8 Greenfield: Right. I operated what we called the network panel. And network in those
9 days meant something else than network does today. Network was the electrical logic.
10 This is before software and before web sites and everything. The networks were the
11 intelligence of the system there that we were taking care of. The network's panel had a
12 readout of everything that was happening, most everything that was happening that
13 someone had picked out as being important. And so I sat there. And Ike Rigell sat
14 there.

15

16 Henry Dethloff: Do you remember some of the early Saturn Launches?

17

18 Greenfield: I remember those very well. But I remember the first Mercury launch
19 where we, it was unmanned and we had a lift-off and it settled back down and it fired off
20 the escape rocket. It was rather embarrassing. But what happened, it had been
21 completely disconnected from the ground. So it was sitting there live, the ordnance was
22 live, the destruct system was live and of course the LOX tank pressure had built up and

1 was venting off on the emergency relief valve. So we figured out what we needed to do,
2 other than shoot a bullet through it like was in the book. OK?

3

4 Dethloff: Kill that sucker! {laughter}

5

6 Greenfield: So what happened was Ed Fannin who you probably need to talk to too.
7 He was an interesting guy that knew the electrical systems as well as the mechanical
8 systems. Anyway, they figured out if they could send one guy out and open up the
9 access to the tail that they could hook up a test line with 750 psi of nitrogen. And slowly
10 crack this valve so that it would slowly build up to 750 and then run like hell back to the
11 blockhouse. And that's what they did. What happened then, we couldn't see it but,
12 what happened was all of sudden then the main vent valve opened and all of the . . .
13 So essentially it safed it from that standpoint. Then we wanted to see what happened.
14 Well I happened to be the next guy to go out and I was to go out and find out the status
15 of the electrical connectors.

16

17 Dethloff: Did you volunteer for that?

18

19 Greenfield: Oh yeah. So I walked out and looked. What happened was that we had
20 lifted off and come back down again just slightly off. So what we had to do then was to
21 take the ground plugs loose from their housing and start plugging them back in. We
22 had to figure out which one to plug in first. So we had to come back in and look at the
23 drawings and figure it out.

1

2 Dethloff: Meanwhile the fingers on the button to blow it up.

3

4 Greenfield: No. No. No.

5

6 {laughter}

7

8 Greenfield: Everybody got together to figure out what to do and then we hooked it
9 back up and then we safed everything. But what happened was one of the technicians
10 had modified a block. There is a block that holds these plugs. And it didn't fit quite
11 right. He didn't tell anybody but he just took it in and filed it and put it back. And what
12 happened was instead of all of the plugs coming out at the same time, when the plugs
13 came out, the ground reference came out first and it allowed the ground (power) bus in
14 the vehicle to float and pick the cutoff relay is what happened. And that's what
15 triggered all of the rest of the event. I think every rocket since we've fired since then
16 has had a follow-up ground cable to make sure that would never happen again.

17

18 Greenfield: I'm gonna have a slight drink break here. I don't usually talk too much.
19 Let's see, where are we here? We're back at Mercury/Redstone.

20

21 Snaples: Did you have very many points where you were actually afraid for your life
22 on some of these launches?

23

1 Greenfield: No.

2

3 Snaples: Looking back would you say that was out of confidence or perhaps out of
4 ignorance?

5

6 Greenfield: {laughter}

7

8 Snaples: I don't mean that insultingly.

9

10 Greenfield: No, no. I understand.

11

12 Snaples: Was it being a young man and thinking it's all going to go right.

13

14 Greenfield: No. I had a wife and family. I didn't want to do anything stupid. It was
15 confidence. I had all the confidence. I would have ridden in a Redstone without a
16 problem. Man, I had a lot of confidence in that because it had heritage. And that's one
17 of the interesting things about the program here, until Shuttle, was that every program
18 from Redstone to Juno to Pershing to Saturn I to Saturn IB and to Saturn V had a
19 thread of maturity in it. In other words, either the guidance system had roots back to the
20 original one so it wasn't anything new. It was things that were mature because they
21 worked. And then were either adapted or improved upon to get to the next stage. And
22 to me that was the way to do things. Of course Shuttle came in and everything was
23 brand new.

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Dethloff: When did you first become involved in Shuttle? We're really missing Apollo, but . . .

Greenfield: OK. Well, I stayed out here until 1966. And then I was personally so upset with the bureaucracy and the inability to get stuff done that 2 of us left and started a little business down in Rockledge. We were trying to take some of the Space Age knowledge and infuse it into some of the commercial products.

Dethloff: Good. What were you doing? What was your business?

Greenfield: Well, business was to survive. The business was we were supplying engineers to IBM. Because IBM didn't want to hire people short-term. So we were able to pick out some people that we knew that wanted to work outside. We had probably about 20 people that worked for IBM. And that was money because we could get G&A and overhead and profit on those people. We also had a precision machine shop and a cable shop where we had a contract out here with at the time it was Bendix and NASA both where we built cables and we built parts and so forth for spares and things like that. But we were trying to get into the closed circuit television business where we built some equipment for putting the time and weather on an unused channel of the cable system which was just starting out then. But our timing was very bad because we lasted about 4 years.

1 Dethloff: When did you start that?

2

3 Greenfield: 1966-1970. All this time I was in Operations. Before I left I was in
4 Operations.

5

6 Dethloff: Did you sell out or close down?

7

8 Greenfield: I sold out to my partner and he ended up closing down about 2 years later.

9

10 Dethloff: Is that right?

11

12 Greenfield: Yeah.

13

14 Dethloff: Are you working with primarily NASA contracts or are you working through
15 the Contractors.

16

17 Greenfield: We had a NASA contract for what was called BPA, Blanket Purchase
18 Agreement, to do cables and different machine parts and so forth.

19

20 Dethloff: And then you supplied the industry with engineers and specialty services?

21

22 Greenfield: Right.

23

1 Dethloff: That's interesting. It could have flown.

2

3 Greenfield: Right. It could have gone. But it came to the point where I needed to, I
4 had 2 boys growing up and we needed to get a little more security in the family. So I
5 ended up calling Kurt Debus and said I need a job back. That was on a Friday and I
6 went to work on Monday in Design Engineering. That's where I came back in Design
7 Engineering. And one of my first jobs was really the early days of developing the launch
8 processing system, which is out there today. So that was kind of my first Shuttle part.
9 Then I . . .

10

11 Dethloff: That was 1970, when you went back?

12

13 Greenfield: This is 1970, yes. And then we worked on some of the sighting for the
14 runway. You know, what was the orientation. Should it be north, south? So we took a
15 study on prevailing winds and that kind of thing. I worked a little bit on that.

16

17 Dethloff: Did you enjoy that more or less than your previous operations type?

18

19 Greenfield: Well, I liked it pretty much. Back when I was with the Launch Operations
20 Center I also had a little design group where we built test equipment and so forth. So I
21 had a pretty good feeling on documentation and the Specs and Standards and so forth
22 to do things.

23

1 Dethloff: Did your design work include the Shuttle launch towers?

2

3 Greenfield: No. Well, I was more in the electrical world. What we were able to do
4 was to take; we took a lot of the old Apollo equipment and we stashed it over in the old
5 Mission Control Center which you read about in Chris' book there. We stored all of that
6 over there and then we went in and picked out terminal (boards), patch panels, some of
7 the DC control panels.

8

9 Dethloff: So you worked primarily on Shuttle control systems?

10

11 Greenfield: Right. But we were able to utilize a lot of the old Apollo stuff back into
12 Shuttle there. So that was one of the things we did.

13

14 Dethloff: What were the key requirements of the Shuttle that did not exist, let's say,
15 for the Apollo in terms of the Operations Center, Control Center? And I don't know if
16 that's a good question either. But what kind of conversion, what kind of equipment, new
17 equipment needs did you have? That may not be a good question.

18

19 Greenfield: No. That's good. Well, we had hypergolic; both the fuel and oxidizer to
20 deal with, which we never had to deal with before. And hydrogen and LOX; they stayed
21 pretty much the same. But you know, I guess the main difference was the launch
22 vehicle was kind of the payload itself and it was all together really.

23

1 Dethloff: Now, at this point are you noticing a different, and I don't know that you
2 would, a different climate here at KSC in terms of your relations to. Of course Apollo is
3 gone and that changed the world I think, but how is it affecting life at KSC in terms of
4 dealing with the public, dealing with a broader science/engineering community? Did
5 that happen? Are you feeling that you are a much, part of much greater operations than
6 you used to be?

7

8 Greenfield: I think so. Well, I think it was Apollo probably was where we got to be the
9 overwhelming organization there that you had virtually; you had very little to say and
10 you had very little influence on what was going on.

11

12 Snaples: Was that frustrating for the old crowd?

13

14 Greenfield: Oh yeah. Particular if you grew up in a different environment where you
15 were kind of. . . I know in the early Saturns, this is the unmanned Apollo . . .

16

17 Dethloff: Test Saturn.

18

19 Greenfield: There used to be a Saturn/Apollo and then it became Apollo/Saturn. We
20 were all working, you know, like many, many hours and we finally went to Dr. Debus
21 and said, "Hey, we need some thinking time. We need some quiet time." And he said,
22 "Fine." So we just changed the schedule. We just moved the schedule out a probably a
23 couple of weeks to allow us to go through all of the drawings and the procedures to

1 make sure we felt as a launch team that we were not being, we weren't ready. So we
2 just stopped. I'm not sure you could do that today. If you went out and said, "We're not
3 ready." They're going to say, "Get ready or we'll come down there and show you how to
4 get ready." OK. In fact, that was something that was told to Debus some time ago
5 before he retired. They weren't real happy with the way he was running the Center and
6 they told him if he didn't shape up there, they were going to bring somebody down here
7 and show him how to run it.

8

9 Dethloff: Headquarters did that a lot?

10

11 Greenfield: Oh yeah.

12

13 {laughter}

14

15 Dethloff: The truth was they didn't have anybody up there that could come down
16 and do it. That was the sad part of it. Did you begin to feel, I'm not sure this is a good
17 question, but had KSC during the Apollo, maybe on into the Shuttle, pretty well
18 established itself as at least a co-equal if not dominant partner in the NASA
19 organization?

20

21 Greenfield: No. We were always the stepchild, kind of.

22

1 Dethloff: You were still under duress, all the way through? That's what I'm
2 wondering.

3

4 Greenfield: And it was evident when we would go to these management charm school
5 things, in Wallops or Headquarters, or wherever, we were always looked down upon as
6 being just an old operations center. And we did really do a lot of development that we
7 never got credit for back then because we weren't a development center. We were an
8 operations center.

9

10 Dethloff: Well, my sense of it is that KSC is so integral to a whole operation of
11 NASA and every other Center. That really, whatever succeeds is in good measure
12 because of what you do here.

13

14 Greenfield: Right.

15

16 Dethloff: And that's never been fully appreciated.

17

18 Greenfield: No it hasn't. As I said earlier, in most every program, and I used the word
19 Pershing, but it was also true with Shuttle, that they were going to bring it down and
20 launch it. And it turned out that the truck that brought the paper that told us what we
21 had to do to finish was as big as the "truck" (747) that brought the Shuttle. There was
22 just a lot of open work that had to be done when it got here.

23

1 Dethloff: Now what about, and again I'm, I guess, moving here maybe too fast, but
2 when you could begin to develop the Space Station, did you have any direct
3 involvement with Space Station, other than the launches?
4

5 Greenfield: Well, right before I retired, I retired in 1989, and we had, Bob Ferguson
6 and myself put together a presentation to do an intermediate Space Station kind of
7 thing. Which is almost like the old Skylab. Let's just get something up there, you know?
8 And it didn't go anywhere. But Space Station to me was just a disaster. I mean, they
9 just kept putting money, and money, and money, and money into paper and didn't get
10 anything. And then it got to be into this partnership business with International and that
11 even made it more complex.
12

13 Dethloff: And that's what I'm wondering too now, that thing is up there just about
14 and it's going to be there for 20 years. It's got to be serviced. I assume that's going to
15 be primarily the role of KSC to guarantee that that thing continues to exist and fly and
16 operate.
17

18 Greenfield: Well at least the transportation part of it to get it up there.
19

20 Dethloff: And if that doesn't work, you don't get there in NASA. So in a way I see
21 the Space Station, and I'm just curious of your reaction, as part of the wherewithal of
22 KSC for the next several decades. In other words, as the Space Station goes so goes
23 Kennedy Space Center in a sense and vice versa.

1

2 Greenfield: That's all we have right now.

3

4 Dethloff: Now what about the expendable launch vehicle thing. That's becoming a
5 big part, in theory at least, of the KSC activity. How did that figure into your history, your
6 experiences here at KSC? The expendable versus the . . .

7

8 Greenfield: I guess in the beginning, we were expendable launch vehicles except we
9 weren't called that. And then another grew up over there because of the McDonnell
10 Douglas Delta program over there and it kind of grew off to the side there. But that
11 certainly is a much more economical way to do some scientific payloads there.

12

13 Dethloff: Did you have any appreciation or concern about the division or the conflict
14 or the, whatever it is, the complimentary of ELV?

15

16 Greenfield: No. I thought they . . .

17

18 Dethloff: They are all part of the same program?

19

20 Greenfield: . . . right. I think so. Yeah.

21

22 Dethloff: That's what I was wondering.

23

1 Greenfield: Back into philosophy. I wanted to kind of make a point that way back
2 when, when we were becoming a Launch Operation Center and had to get outside
3 resources. We spent a lot of time and focus on getting little contracts where we had the
4 fire guys were a contract and we had Wackenhut for the security and we had a smaller
5 base support contract was broken up. You know certain people cut the grass and so
6 forth. The reason for that was our experience when we were here with the Air Force
7 that they had Pan American here for 20-something years and they couldn't get rid of
8 Pan American because . . .

9

10 Dethloff: . . . they were so dominant.

11

12 Greenfield: . . . they were so dominant and they had everything. What we never
13 wanted to do was to get into a situation where we had a large base-ops contract, which
14 we happen to have today. This is a major difference of philosophy from the old days to
15 today.

16

17 Dethloff: That's a good point because I never would have picked up on that I don't
18 think just looking at _____.

19

20 Greenfield: We were very, very careful in making sure that if, hey, if the people cutting
21 the grass were bad we could go get somebody else to cut the grass. If the people at
22 the guard gates were bad, we could go do that without a major interruption in the
23 operation. But now with USA, I mean they are getting ready to recompute USA I think

1 and that's going to be an interesting competition. If they ever have to . . . Not only did
2 they take a big base support contract here at NASA, but they also included it to the Air
3 Force so now we have a really major single contract there who they went ahead a
4 subcontracted their stuff, you know, so it's almost like paying an intermediary to do what
5 we used to do a long time ago. I don't know how they show that that's an advantage
6 business-wise.

7

8 Dethloff: Do you see more or less integration, harmony, whatever it would be,
9 between Air Force and NASA operations?

10

11 Greenfield: I don't see much harmony.

12

13 Dethloff: You don't see.

14

15 Greenfield: No.

16

17 Dethloff: It never has been in your experience?

18

19 Greenfield: Never has been.

20

21 Dethloff: That's kind of what I see. I just wondered.

22

1 Greenfield: Well, it's a different philosophy. In fact I would predict that you know, we
2 have an Air Force General as a Center Director. We have a major number of people
3 from Wright-Patterson here. His buddies, if I can say that. This place is almost like Air
4 Force.

5

6 Dethloff: Well that's what I'm wondering.

7

8 Greenfield: Air Force philosophy. Why wouldn't this become . . . The Air Force
9 philosophy is Government owned contract, GOCO, Government-Owned Contractor-
10 Operated. And I would say maybe, you know, in a number of years, 3 or 4 or 5 years
11 maybe, this place would be turned into a GOCO kind of thing. I don't know.

12

13 Dethloff: One unit. Yeah, I've wondered about that.

14

15 Greenfield: The whole philosophy is totally different. They destroyed what I knew as
16 Design Engineering. Because they . . .

17

18 Dethloff: Contracted out?

19

20 Greenfield: No. They took the guys, what I would consider the upcoming technical
21 managers, and they moved them out. They are sitting over in R&QA, Reliability and
22 Quality. And they brought in their own people. And of course the philosophy in the Air
23 Force in that engineering belongs under logistics.

1

2 Dethloff: Yeah.

3

4 Greenfield: Right? Well, that's not true in this kind of environment in my view. But so
5 we have a whole different focus on design. We haven't kept our Specs and Standards
6 up to date. Most of them were made in 1962. And if they have been updated, (it was)
7 only to go to the metric system. You know things like that. But not really a focus on
8 say, in order to run a design organization you've got to have some specifications and
9 standards and procedures and so forth to do that work. Now I'm getting on my
10 soapbox.

11

12 Dethloff: No. That's what I want. Because that's really the tough part of the whole
13 scheme of things, is this relationship with the Air Force and NASA.

14

15 Greenfield: But I see us becoming more Air Force-ish today.

16

17 Dethloff: Well I think I see that too. I'm not sure. I'm just an outsider very casually
18 looking in you know. And that's what I was curious about. And I'm also still very
19 curious about the relations between KSC and the NASA organization and other
20 Centers.

21

1 Greenfield: General to general they are probably OK. I don't know, I don't work in that
2 area that much. I kind of work in a development lab. But I do, you know, hear things
3 and see things.

4

5 Snaples: I was curious. You mentioned earlier that when you started there was no
6 Safety and there was no Quality Assurance.

7

8 Greenfield: No formal organization for that.

9

10 Snaples: Right. And that there was more of a trust in people rather than paper and
11 that that has been reversed.

12

13 Greenfield: That's right.

14

15 Snaples: To some extent is that simply a product of a bigger and bigger operation
16 and hence you don't know your engineers as well?

17

18 Greenfield: I think what really created this was we got into our contractors were
19 coming from the airplane industry. And the airplane industry is very focused on paper.
20 Of course when they brought Sam Phillips in in the Apollo Program he had just invented
21 a configuration control system for the Air Force which was great so he just plunked it
22 into NASA back then. We used to only work one shift until we got the SIV people. The
23 SIV people came in from Douglas and they had to work 3 shifts.

1

2 Dethloff: So that's what you had to do?

3

4 Greenfield: Yeah. The airplane people worked 3 shifts. So all of a sudden we had to
5 put support people in the 3 shift operation. And they used to. . . I remember George
6 Page came from that industry there and he used to tell us that we didn't have headlights
7 on our car. We couldn't drive home at night. {laughter} Say, ain't you got no headlights
8 on your car.

9

10 Snaples: Was that maybe a case of the tail wagging the dog?

11

12 Greenfield: Oh yeah. I think so. When Douglas came in with the SIV, which was in
13 the Saturn I area there, they were an autonomous company and they just came in. In
14 fact, for some reason, I don't know how we ever let them do it, but they had their own
15 equipment. They loaded their own stage. They did everything themselves, which we
16 didn't let that happen after that because it became a very difficult interface with NASA.

17

18 Dethloff: Over time have you also seen control, direction, authority shift away from
19 the Center itself to Headquarters, to DC?

20

21 Greenfield: Oh yes. I think the launch schedule.

22

1 Dethloff: Do you think that this is, I guess given the broad political context or
2 whatever, that this is good, bad, or indifferent? I don't know if that's a fair question
3 either. Events happened.

4

5 Greenfield: Yeah, well it's a . . .

6

7 Dethloff: Let's kind of shift gears and just ask you some personality questions I
8 guess. Primarily having to do with the Directors. Debus. You want to take a capsule
9 shot at him. What kind of man he was.

10

11 Greenfield: Debus was I guess one of the best managers I've ever worked for, with, or
12 whatever. He was very intelligent. He was . . .

13

14 Dethloff: Was he also a hands-on engineer? That's kind of where I see him. He
15 was a good manager. But then he would go out and put his hands into the chemical pot
16 it looked like to me sometimes.

17

18 Greenfield: Oh yeah, he was good. He did. He came around quite often and asked
19 what are you doing? He had the ability to when you went to give him a presentation or
20 there was a conflict, in a matter of the first 5-10 minutes of the meeting he knew who the
21 bad guys were and who the good guys were and what the issues were and so forth. He
22 could sort that out very well. And he made a decision. At the end, he said, "You may

1 not like this but this is what we're going to do." And isn't that great? No committees,
2 he just did it.

3

4 Dethloff: He was the boss.

5

6 Greenfield: He was the boss. And the people respected him for that. There really
7 hasn't been a good Center Director here since then in my view. I mean overall. He was
8 a professor back in _____. I forget where he went to college. But he would give his
9 doctorate folks who were there for their dissertation, he would give them a question
10 something like, "If you had a bicycle and a generator, how fast would you have to go to
11 provide power to the city of Leipzig?" or something like that. Which was an idiotic
12 question, but he would get so many answers of how fast he would have to go and he
13 would say, "Well you can't do that." It was one of his interesting things there.

14

15 Dethloff: What about other Center Leaders?

16

17 Greenfield: Dr. Gruene was a very, very, very compassionate person. He probably
18 had . . . I guess the Germans have a little bit of arrogance there as a nation. He was
19 the most compassionate there. Sendler, Karl Sendler was probably the most
20 unpredictable. He was very, very unpredictable there. Zeiler wasn't the brightest one
21 there. I think he got his job because he helped them get out of Germany. They kind of
22 owed him something to get out of there. I think you will find that somewhere probably.
23 But they all worked together and of course the Americans right under them all worked

1 together, Bob Gorman and Ike Rigell. Ike Rigell was a top-notch fellow there. And I
2 hope you have him and really Andy Pickett. You have Andy Pickett on there
3 somewhere? Are you doing that, are you?

4

5 Elaine Liston: He's under consideration. We've only got a certain amount of time.

6

7 Dethloff: We'll get him. Do you think Debus, the Germans, Von Braun, whomever,
8 Sendler, Zeiler and all of the rest of them, imprinted KSC in a way that is unique among
9 all NASA Centers? And if so . . .

10

11 Greenfield: Oh absolutely.

12

13 Dethloff: . . . what kind of imprint? How would you describe Kennedy Space
14 Center in terms of its character, its quality? Any of that.

15

16 Greenfield: In those days . . .

17

18 Dethloff: Well, OK, or those days. The dominant character over time and of course
19 I know you say, and I would agree with you, it's fading. But if KSC has a character what
20 is it?

21

22 Greenfield: I guess in the days of the Germans here . . .

23

1 Dethloff: Which is a dominant part of the whole experience.

2

3 Greenfield: . . . the dominant part. It was technical more than business. In other
4 words, technical performance was more important than business performance. And to
5 do the right thing the right way the first time, whatever, was more important than how
6 much it cost. Today I think it's the schedule and the dollars. In other words, I think it's
7 up-heaved there a little bit from technical, schedule, cost. I think it's now cost,
8 schedule, technical. I think that's inverted.

9

10 Dethloff: Do you think that's true all through NASA or primarily here at KSC?

11

12 Greenfield: I think it's all through NASA.

13

14 Dethloff: All through NASA.

15

16 Greenfield: I think that's the Dan Goldin thing of "cheaper, better, faster." It has
17 probably done more damage to the people. But you know most of the people, people
18 aren't, it's almost like today, it's almost like an us and them. Where us are the working
19 guys. And them are the managers. I use the word conference room mentality often
20 when I'm talking to different people. Because that doesn't necessarily capture the real
21 essence of things in the conference room because they are remote. The people are
22 remote. The "theys" are remote from the "us(s)".

23

1 Dethloff: If you were going to point to a significant accomplishment historically let's
2 say, if you were going to write your history of Kennedy Space Center, what would be the
3 most dominant theme or idea or moment or event that you would probably point to?
4 Something or accomplishment of Kennedy Space Center in your time here. You've
5 been here 30 years or so.

6
7 Greenfield: More than that.

8
9 Dethloff: What has been the highlight of your experience, the high-point of your
10 experience?

11
12 Greenfield: Well, I think Explorer I was the high-point. The waiting for it. At that time
13 we didn't have a World-Wide Net and you know the waiting for the word that hey we got
14 it.

15
16 Dethloff: I noticed after that thing went up, then they called back and said
17 incidentally that's Explorer I you just fired. They already had the name picked in
18 Washington (by) Bruckner or whoever his secretary was or somebody.

19
20 Greenfield: Yeah. That's right. The General, Secretary of the Army. You read that.
21 There's a little bit of history there too of how they did that. Of course, I wasn't really
22 here during Apollo 11 so I can't really talk about that. Probably the next one was the
23 first Shuttle launch because that was really an emotional moment because of all the

1 new stuff that was flying up there and 2 guys. They had to land you know. That was
2 something different. You had to come back.

3

4 Dethloff: What do you think about the engineering of the Shuttle? Those craft are
5 what 20 years old or something now. Where are we going with that?

6

7 Greenfield: They go back to Palmdale and get rebuilt just about.

8

9 Dethloff: Refurbished. Do you think that's going to go on and on?

10

11 Greenfield: I think so. That's all we've got.

12

13 Dethloff: We don't have any new ones.

14

15 Greenfield: No. X-33 they canceled. Although I hear the Air Force may want to buy it,
16 pick it up there maybe.

17

18 Dethloff: As far as Explorer I and the first Shuttle launch are your high-points.

19

20 Snaples: I've got a two-part question, but you may not want to answer the second
21 part. So we'll see. If you were going to pick somebody in your history of KSC who you
22 think has perhaps been under-appreciated or the most under-appreciated person who

1 would you say? Somebody that you think, wow that person really did wonderful things
2 out here and never got nearly enough credit for.

3

4 Greenfield: Are you taking about a working person, a manager, or . . .

5

6 Snaples: It doesn't matter.

7

8 Greenfield: I would probably say Frank Byrne. Frank Byrne died last year or so. He
9 probably did more; he built the first tracking station here. He did the antenna site over
10 there, the tracking site. He was instrumental in developing the LPS System, as far as
11 the architecture, the computer architecture. I would say he has probably contributed the
12 most out here in my view and probably got some credit but probably not the credit he
13 deserved.

14

15 Snaples: And then I guess the second one is who do you think maybe has gotten
16 far too much credit? Who is kind of over-valued.

17

18 Greenfield: Oh, is that . . . {laughter} well, let's see . . . let me think a minute here . . .

19

20 Snaples: You don't want to answer . . .

21

22 Greenfield: No, I'll answer it. I just need to think about it a minute, that's all.

23

1 Snaples: Well, I can give you another question while you are thinking on it, if you
2 like. Did you notice any changes with the presidential administrations? I mean was
3 there sort of a direct correlation here at KSC to what was going on here versus who was
4 in the White House or was there none?

5

6 Greenfield: I didn't notice any there. We thought George Bush would get rid of Dan
7 Goldin, but he hasn't done it.

8

9 {laughter}

10

11 Snaples: I heard that too.

12

13 Greenfield: He didn't know who to put in there I guess. Let's see . . . probably, I have
14 to pick on probably one of the spacecraft folks there probably. At the Center, now you
15 want somebody at the Center?

16

17 Snaples: We can go off-Center if you want. I mean maybe there was somebody at
18 Headquarters you thought got too much credit for what went on here.

19

20 Greenfield: Well I think probably Chris Craft got more credit than he deserved. I think
21 his book is atrocious.

22

23 Dethloff: He kind of nailed it there. He starts right off . . .

1
2 Greenfield: Well it's a shame that he missed what was going on really. It was his little
3 world of Mission Control. We didn't even know they existed hardly. You know when
4 our world, I mean there was, get the phone lines out to JSC there because they've got
5 to do something after it goes, but . . .

6
7 {laughter}

8
9 Greenfield: I'd say Chris, if I may jump out of the Center and say Chris Craft or Max
10 Faget or any of those guys out there. I never did like them. They were . . .

11
12 Dethloff: They had a lot of ego.

13
14 Greenfield: Oh it was ego, it was spilled over everybody.

15
16 Dethloff: If you were going to write your history of KSC what is it you would really
17 want people to know about this outfit that probably may not be in the books or if it's in
18 the book that you think needs to be flagged?

19
20 Greenfield: Well, I guess there is a core of people here that if you got rid of all of the
21 managers they'd probably be able to continue the work. They would be able to
22 produce. I mean . . .

23

1 Dethloff: That there is a lot of integrity, a lot of technological expertise, and
2 dedication.

3

4 Greenfield: . . . There's a lot of integrity, a lot of personal . . . right. . . and dedication.

5

6 Dethloff: OK. That's good.

7

8 Greenfield: And it's waning, it is waning. Every year there is less. And you know I like
9 to use the example that the most stable geometric shape is a tetrahedron where there is
10 a point at the top and that's how we used to work. If you wanted to know something,
11 you asked the boss. Today it's upside down. If you want to know something, you go
12 down and ask the people working for you.

13

14 Dethloff: Yeah. Everywhere. It's in Academia even more so. I promise you.

15

16 {laughter}

17

18 Dethloff: And it's tough.

19

20 Greenfield: OK. I think in all the time I've been here, I can always find a group of
21 people that will go get something done and to hell with all the other stuff.

22

23 Dethloff: And that essence goes right back to the beginning. You could say.

1

2 Greenfield: Right. It does.

3

4 Dethloff: There is a continuum . . .

5

6 Greenfield: It does. There's a thread. There's a thread.

7

8 Dethloff: All right. That's what I want to know.

9

10 Greenfield: There you go.

11

12 Dethloff: That's good. All right. And that's what we want to follow.

13

14 Snaples: And you could still do it cheaper?

15

16 Greenfield: Oh yeah. You could do it a lot cheaper.

17

18 Dethloff: Well, we appreciate it very much sir.

19

20 Greenfield: OK. I hope . . .

21

22 Snaples: Well actually I was going to see if there was anything else you wanted to
23 tell us or that we forgot to ask about.

1

2 Liston: NASA has always been hands-on engineers. They are turning the Shuttle
3 Operations over to a contractor to run everyday operations. Do you think that NASA will
4 actually have a hands-off for Shuttle Processing to a commercial company like USA?

5

6 Greenfield: I don't think you should let that happen. I think that the Government is still
7 responsible. But again that's the Air Force. The Air Force philosophy would answer
8 your question yes that we would just need a couple of people to write the checks and so
9 forth. But we have always penetrated the organization at a much lower level than we
10 are today. And it's come up to a higher level. But the Government is still responsible.

11

12 Liston: Do they think they will get into research and development with the new lab
13 that's coming up and it'll be an actually NASA engineer hands-on?

14

15 Greenfield: Uh-uh.

16

17 Liston: No?

18

19 Greenfield: No.

20

21 Liston: So we will never go back to NASA engineers hands-on, basically?

22

1 Greenfield: This whole thing, this Complex 20, they have the new thing called ATDC.
2 It's Advanced Technology and Development Center. In my view, all it is is one of these
3 partnership things where we're going over to Complex 20, which is owned by the Air
4 Force. The Spaceport Florida leases the area, and then we're going to put our future in
5 a third tier organization to go over there and work. It just doesn't make any sense. And
6 the people working on it today are all project management people and there are not that
7 many people involved on really how do you want to load . . . the first test over there is to
8 check the LOX pump for Shuttle. All they really had to do was to tear up the asphalt
9 over at the Launch Equipment Test Facility and pour concrete and do it right there. But
10 because of the partnership thing they want to be able to build this thing over on the Air
11 Force side, which I think is ludicrous. And I've made my speech, but nobody is
12 interested in hearing it. You know so. But I think to answer your question it's going to
13 dwindle. I think they are going to be lower and lower and lower until something
14 happens. Until something happens. And then it will come back up again. Let's see . . .
15 do I have anything else to say. I don't think so. I think we probably hit it.

16

17 Dethloff: But it's been exciting. Right? Or you wouldn't still be here.

18

19 Greenfield: Oh yeah. That's right. Yeah. They can do without me I guess but I still
20 feel like I make a contribution.

21

22 Dethloff: I can imagine. It's been an exciting place to be for these years since 1956

23 . .

1

2 Greenfield: . . . 56 here. 1956 here yeah.

3

4 Dethloff: 1956, really. Yeah.

5

6 Greenfield: That's a long time.

7

8 Snaples: Yeah, but growing up in the Depression, you never imagined this would be
9 your future.

10

11 Greenfield: No.

12

13 Dethloff: Well thank you very much.

14

15 Greenfield: All right. Thank you. It's a pleasure.

16

17 Dethloff: We're not going to get rid of you. We're just turning off the machines.

18

19 Greenfield: Oh yeah, right. OK.

20

21 Dethloff: Thanks.