

Mr. John Tribe

Oral History

Kennedy Space Center

Interviewed August 31, 2004

Interviewer:

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All Points Logistics

1 Gregg Buckingham: OK. This is Gregg Buckingham and we are here today with John  
2 Tribe at the KSC Press Site and it's August 31, 2004. John, can we start off and just say  
3 your full name and where you were born?

4

5 John Tribe: My full name is John Tribe. I was born in Portsmouth in England, 1936.

6

7 Buckingham: 1936. OK. And tell me a little bit about your growing up. Did you grow  
8 up in England or move over?

9

10 Tribe: Grew up in England. Didn't leave until 1961 when I was 25. But I grew up  
11 during the war. Vivid memories of the bombing in World War II and went to grammar  
12 school and college in England. Started work in 1954 in aerospace with the Avalon  
13 Aircraft Company.

14

15 Buckingham: OK.

16

17 Tribe: And did a college degree, part time evenings and part time release from work over  
18 a five year period. So by 1959, I had a college degree in engineering and completed an  
19 apprenticeship with the Avalons in the aircraft industry and was all set to charge off into  
20 a career in the missile industry in 1959. And started with the Avalons on the Blue Streak  
21 Program, which was a, about two thirds of an Atlas.

22

23 Buckingham: OK.

24

25 Tribe: But the very, they had an exchange agreement with Convair, so the Blue Streak  
26 was thin-skinned like an Atlas, balloon construction, two Rolls Royce engines that were  
27 built under license pretty much to RocketDyne, but it was very much a slightly smaller  
28 Atlas. And we were going great guns with that program until 1960, and the minister of  
29 defense canceled the program. We were going to go with Blue Steel instead of Blue  
30 Streak. And we were kind of left in a vacuum as to, you know, where we were going to  
31 go with Blue Streak. We could make into a space booster but that seemed so far down  
32 the road, I thought, "Gee, I'd like to go try the states." So, I wrote to B.G. McNab, who  
33 was the base manager of Convair Astronautics, who ran the Atlas program here. And so  
34 the only chance I can get over and get a job at the Cape. And a lot of, I think a lot of  
35 people over here at that time would've said, "Forget it. No way. It's an all secret  
36 program. Just too much trouble." But Mr. Mac was one of those guys that said, "Hey,  
37 I'll a... That's kind of a neat idea. I'd like to make that work." And he went through a lot  
38 of trouble and it took the best part of a year with paperwork going back and forth before I  
39 finally got an OK to come over here in January of 1961.

40

41 Buckingham: Wow. Now how did that work? That's a very interesting... with the Cold  
42 War is going on and Sputnik has, of course, has happened...

43

44 Tribe: Yep.

45

46 Buckingham: Do you think your... because you had a little bit of experience with Blue  
47 Streak that... there weren't a lot of rocket engineers around in 1960...

48

49 Tribe: No. No, it was a new business.

50

51 Buckingham: Do you think that experience contributed to him being interested?

52

53 Tribe: I think a little bit. Yes. In fact, he could obviously sell me on my technical  
54 background, you know. By that time I had seven years in aerospace. I was a degreed  
55 engineer, you know, with an engineering background. And I had a couple of years in  
56 rocketry. So, that he could sell to the United States government as being a legitimate  
57 reason for pulling me over here, you know, because when I got over here I had to take out  
58 first papers and spend six months at Patrick before I could even get cleared to work on  
59 the Cape.

60

61 Buckingham: Oh, OK.

62

63 Tribe: And so, it was August of '61 before I finally got out onto Complex 12 and started  
64 being a real rocket engineer.

65

66 Buckingham: OK.

67

68 Tribe: So it took a while.

69

70 Buckingham: OK. And just to follow up on that, how about the citizenship angle? Did  
71 you...

72

73 Tribe: Yah. As I said, I had to take out first papers, which is a declaration of intent to  
74 become a citizen...

75

76 Buckingham: Ok, OK.

77

78 Tribe: ...just to get a secret clearance. And I was on a green card then, of course. You  
79 know you have to have five years residency before you can apply for citizenship. But the  
80 natural fact, once you're here and once your green card is established there's really no  
81 forcing factor to make you become a citizen or make you want to become a citizen, other  
82 than voting. So you know, I just (???) along for almost twenty years before I finally  
83 became a citizen. 1980 when I finally...

84

85 Buckingham: 1980. OK. Let's go back to your childhood just a little. You mentioned  
86 World War II. Did you have siblings? Was your father in the... you know...

87

88 Tribe: My brother and my father were both in the Navy. My brother was eighteen years  
89 older than me, so he was in the Navy before I was born.

90

91 Buckingham: OK.

92

93 Tribe: And both he and my Dad were both very active in combat. My Dad was torpedoed  
94 on the HMS Eagle in the Mediterranean on the convoy pedestal, which was trying to  
95 relieve mortar.

96

97 Buckingham: OK.

98

99 Tribe: And you know, I can remember that, sitting there hearing the Sunday news, the  
100 one o'clock news, and hearing that the Eagle had been torpedoed and sunk in the  
101 Mediterranean. My Mother screaming. The neighbors rushing in.

102

103 Buckingham: Yeah.

104

105 Tribe: And, it was, I think it was like three days before we heard that my Dad had been  
106 picked up and was OK. He'd been in the water for half a day and swallowed a lot of fuel  
107 oil, but he was OK.

108

109 Buckingham: Wow.

110

111 Tribe: And my brother was out in the Pacific and he was HMS King George the V and  
112 saw a lot of action out there. They both came through the war OK. I lost one uncle in  
113 Italy and I think that was about the only family member that was killed in the war. It was  
114 very vivid and a lot of memories.

115

116 Buckingham: OK. And do you remember when Sputnik happened? In the late fifties...

117

118 Tribe: 1958. '57, '58...

119

120 Buckingham: The reaction to that...

121

122 Tribe: The reaction was, it was more of just incredulous. You know I was in England at  
123 the time, of course. I can remember we would all go out and watch it fly over. And it  
124 was just, you know, a horrendously big step at that time. And I... some concern, you  
125 know, obviously because it was Russia that had put it up there. But I really didn't feel a  
126 lot of, not any sense of urgency at that time, maybe as much as they did over here. It  
127 was, I think there was a whole lot more concern in the states.

128

129 Buckingham: We've had people say, express that. Yes. OK. Ok, so you're here in '61  
130 and you're working with – is it General Dynamics?

131

132 Tribe: General Dynamics Astronautics. It used to be called, it was Convair right up until  
133 just before I came and then they switched over to become General Dynamics  
134 Astronautics.

135

136 Buckingham: OK. And just to kind of... for folks that might read this, the Cape today is  
137 a lot different then the Cape in 1961. You worked on the Cape side, the Kennedy Space  
138 Center...

139

140 Tribe: It wasn't even here at the time.

141

142 Buckingham: And Complex 12 was, by today's standards, I guess, rudimentary.

143

144 Tribe: Pretty basic. They had what they called ICBM Row. Intercontinental Ballistic  
145 Missile Row. And it's on the northeast side of the Cape. There were four major launch  
146 pads, five really with Centaur, for the Atlas and then four more for the Titan. So, as you  
147 went down the row, it was Pad 36, the first of the Centaur pads, and they didn't launch  
148 until after I got here, and then 11, 12, 13, 14 for Atlas; 15, 16, 19 and 20 for the Titan  
149 pads. So I was assigned to Complex 12, which was the Ranger Program. We were  
150 getting ready to launch the first of the American spacecraft to the Moon. That was the  
151 Ranger Program. And then on Complex 14 was the Mercury Program. Complex 11 was  
152 an Air Force training launch site and 13 was being rebuilt as an Atlas (??? 147) pad. So...

153

154 Buckingham: Now, had Alan Sheppard gone up yet?

155

156 Tribe: Yeah. Sheppard had launched... well no, he launched right after I got here.

157

• 158 Buckingham: OK.

159

160 Tribe: It was May of 1961 and at that time I was still at Patrick. I hadn't been cleared to  
161 work at the Cape.

162

163 Buckingham: OK.

164

165 Tribe: So, you know, I watched Sheppard go from the beach down at Patrick.

166

167 Buckingham: OK. And that was a public event. Everybody knew about that. I ...

168

169 Tribe: Yeah. Well advertised.

170

171 Buckingham: So, what were you actually doing at Complex 12 for Convair or General  
172 Dynamics?

173

174 Tribe: I went out there as a propulsion engineer. Propulsion, hydraulics, and airframe.

175 And there were three of us out there on that particular pad responsible for the Atlas

176 engine system, the Atlas structure, and the hydraulic system.

177

178 Buckingham: OK.

179

180 Tribe: And we had a lead engineer and there were two of us that were supporting him.

181 And, about the first, you know, crisis we had was the third Ranger launch where we went

182 out... one of the things that I had to do on second shift, you know we worked a lot of  
183 shifts in those days, I had to go out on second shift and do what's called an inner tank  
184 drain. That's basically right before you load fuel you... or right after you've loaded fuel,  
185 the kerosene, which is done a couple of days before a launch. You go out and verify that  
186 you didn't overfill the tank because between the, they had a common bulkhead between  
187 the liquid oxygen and the RP1, and there was an insulation bulkhead attached to the  
188 bottom side of that. And they wanted to make sure they hadn't overfilled and got up into  
189 that insulation bulkhead, because if they did, the weight would be too much for the  
190 structure to... during G load, you know during the first...

191

192 Buckingham: If that's soaked...

193

194 Tribe: It would pull it all down.

195

196 Buckingham: OK.

197

198 Tribe: So, we always went up there after fuel load as a courtesy, as a precautionary  
199 measure and just popped a fitting on the outside of the tank and verified no fuel comes  
200 out. And I went up there and did that on 121D, which was a Ranger launch, and water  
201 came up. And, you know, "Where are we getting water from?" Well it turned out that  
202 when they hydrostudied that tank after manufacture they overfilled it and they got water  
203 up in that bulkhead. And it's still there and the water had soaked up into the insulation

204 and there wasn't any way we could fly that, for the same reason we'd be concerned about  
205 the fuel being up there. The water...

206

207 Buckingham: The weight.

208

209 Tribe: ...would be too much weight. So we went into a crash exercise where we actually  
210 took the sustainer engine out through the flame bucket off the bottom of the Atlas. Took  
211 all the associated piping out of the way and took the cap off the bottom of the fuel tank,  
212 climbed up into the tank, built a structure 2 x 44's and stuffed it up inside the fuel tank  
213 and cut the, that insulation bulkhead out. It wasn't required, in actual fact. You know, it  
214 was an early design requirement, but it turned out it wasn't necessary to have that  
215 insulation there.

216

217 Buckingham: OK.

218

219 Tribe: So we could take it out without any problem. And we cut all that out, cleaned it all  
220 up, wiped all the tank down, took the scaffolding back out, closed it all up, and then  
221 inspected it, closed it, put all the plumbing back, put the engine back, in a total of three  
222 days.

223

224 Buckingham: Wow.

225

226 Tribe: And this involved taking that sustainer engine out through the flame bucket, you  
227 know, which was a pretty tight fit to start with.

228

229 Buckingham: Oh.

230

231 Tribe: And we launched on time. And that was, that was... really off to a thundering  
232 start in the business. And then about two weeks later, we had to go do the same thing on  
233 109D on Complex 14, John Glenn's booster.

234

235 Buckingham: Right.

236

237 Tribe: Same thing had happened to it.

238

239 Buckingham: Oh, OK.

240

241 Tribe: And that's where one of the first, one of the first times I noticed the difference  
242 between an Air Force operation and a NASA operation.

243

244 Buckingham: OK. Talk about that a little bit.

245

246 Tribe: The Air Force, we went over there and we did it. Did the job. We wrote the  
247 papers. We went, we'd take a line out of the vehicle, take it down, read the part number,  
248 write it up on the test preparation sheet, and the work and the paper went along together.

249 When you went over to the NASA operation, everything had to be written ahead of time.  
250 There was Convair quality or General Dynamics quality, there was Air Force quality, and  
251 there was NASA quality. So there were three quality buys on every step. And it took  
252 about three times as much paper to take, to do the same thing on Pad 14 as it did on 12  
253 because of the additional government layer. And plus, it was a manned flight.

254

255 Buckingham: I was going to say...

256

257 Tribe: It's a lot more...

258

259 Buckingham: To the government or the manned aspect?

260

261 Tribe: They are one in the same. One in the same. But I did notice, like we'd have a  
262 simple step on Complex 12, remove flame bucket covers, which was just a technician  
263 buy. Over on 14 that was remove flame bucket covers, technician bought it, then quality  
264 bought it, the Air Force quality bought it, the NASA quality bought it, you know there  
265 were all these stamps, all these people involved in what was basically lift up a grating and  
266 move it out of the way.

267

268 Buckingham: OK.

269

270 Tribe: So yeah, there was, that was to me the first really involvement with a totally  
271 NASA run operation.

272

273 Buckingham: OK. That's an interesting observation. Let's talk about the Air Force side  
274 a minute. You guys were supplying the engines and the actual vehicle, Convair.

275

276 Tribe: Yup.

277

278 Buckingham: And then...

279

280 Tribe: We sold the vehicle to the Air Force.

281

282 Buckingham: OK. And the Ranger payload was?

283

284 Tribe: Was JPL.

285

286 Buckingham: Was JPL.

287

288 Tribe: So we had, NASA managed the launch, the Air Force provided the booster, and we  
289 provided all the grunt work to make it all happen.

290

291 Buckingham: OK. And in the... is it safe to say that there were... I think this is what you  
292 just said, that there wasn't as much Air Force oversight or supervision as on the NASA.  
293 You had more quality. You stepped...

294

295 Tribe: Over on 14 they had a lot more day to day involvement by NASA. The Air Force  
296 on 12 was basically, I think there was a major, Major Albert. And he was responsible for  
297 all the Air Force launches. And then we had one captain, Captain Steelman was on 12.  
298 Was lead senior officer there and then we had, I'd say just two or three Air Force quality  
299 people providing oversight. The whole, just above all the operation on 12 was a  
300 contractor.

301

302 Buckingham: Was a contractor.

303

304 Tribe: Yep. And the NASA involvement on 12 was management, you know, program  
305 manager oversight, launch director. That sort of thing.

306

307 Buckingham: OK. OK... and so. And the Ranger spacecraft was just to get set up but  
308 they were going to the Moon to help that.

309

310 Tribe: They were going to go. It was a...it would crash onto the Moon but it would  
311 photograph the surface of the Moon as it came in.

312

313 Buckingham: Looking for possible landing sites.

314

315 Tribe: Yep. Just an early, it was the first phase of going to the Moon. Ranger, then after  
316 Ranger was Surveyor, lunar orbiter, you know, those programs. Each one got a little

317 more definition on what the lunar surface looked like, where the potential landing site  
318 would be. So they, each one fed on the other.

319

320 Buckingham: OK.

321

322 Tribe: Ranger was the first.

323

324 Buckingham: And then, I have in my notes here, about '65 you left General Dynamics  
325 and went to the Apollo...

326

327 Tribe: What happened is, you see, I came to the... my original intent was to come to the  
328 states for two years.

329

330 Buckingham: OK.

331

332 Tribe: And, of course, I got totally involved and entranced with the program and I stayed  
333 three and half and my English wife was fussing to go back. We'd had a son by that time  
334 and she wanted to go back to England. So in '64 we went back to England. And B.J.  
335 McMahon bet me right before we left, he said, "I bet you five dollars to an English pound  
336 that you'll be back within a year." And I think about six weeks after I got back from  
337 England I sent him his money. I got back and the job was just, you know, after I'd been  
338 working on, I worked on the Mercury Program, worked on John Glenn's first launch, on

339 these Ranger Programs, worked on the first Mariner to Venus. You know it was exciting.

340 You had to think what we were doing. It was headlines.

341

342 Buckingham: It was new.

343

344 Tribe: But it was, I had a lot of responsibility. I enjoyed the work. I was good at it.

345 And I went back over there and I was just like a fish out of water. We couldn't get a nice

346 house. The weather was abysmal. Even my wife, who was very much an anglophile,

347 was ready to come back too.

348

349 Buckingham: Really? OK.

350

351 Tribe: I wrote back to, by this time McMahon had moved on and T.J. O'Malley was the

352 new base manager. And I wrote to Tom and he said, "Yep. Yeah, we can get you a job.

353 Come on back." And it said more to follow and then nothing happened, you know. Like

354 a month went by and nothing happened, and I said, "What's going on?" He said, "Well,

355 we are having a big cutback. I am going to have to say I can't offer anything right now

356 because we are laying off. I can't bring somebody back. So what I've done, I've given

357 all your paperwork to North American Aviation. They're picking up people." And that

358 was the Apollo program. And they wrote to me and said, "Yeah, we'd love to have you.

359 Come on back." So, I came back in March of '65 on the Apollo program with North

360 American.

361

362 Buckingham: OK. And let me back one second. You said that you helped out with the  
363 John Glenn launch. What kind of...

364

365 Tribe: There was a, it was minus a port, you know, because each of the complexes, the  
366 Atlas complexes had the same compliment of people doing the same jobs. You know,  
367 propulsion engineer on 12 could do a propulsion job on 14 or visa versa. And I, we did  
368 the change, in fact, I worked on 36 for awhile on Centaur, too. But for the Mercury, for  
369 John Glenn's launch, I was the periscope observer in Complex 13 blockhouse. And the  
370 reason, they had periscope observers in 14's blockhouse but 13's blockhouse looked at  
371 the back side of the vehicle. So they wanted, you know, another set of eyes looking at  
372 the back side. And that's what I was doing.

373

374 Buckingham: And that's a new term that I haven't heard. Periscope observer.

375

376 Tribe: Periscope observer. Yep. We used top watch for, during ignition, you know, and  
377 a good main stage and going back to that, one of the, George Paige, I don't know whether  
378 you've got the chance to interview him...

379

380 Buckingham: We did. Before.

381

382 Tribe: He was the assistant test conductor on 14 at the time. So, I was reporting to him.

383 And one of the launch attempts, I don't know which one it was, we went through about

384 10 launch attempts with Glenn before we finally got him off. But, I overslept and I was

385 late getting out there. And the roadblocks were up and I couldn't get to the pad. And I  
386 had to call George from the guard shack there and tell him I was stuck. I couldn't get to  
387 the blockhouse at 13. And that was the first time I was chewed out by George Paige. It  
388 wasn't the last. It was the first.

389

390 Buckingham: OK. So you come back over and you're working for North American  
391 Rockwell now on the Apollo program. Now exactly where, again keeping in mind KSC  
392 was, the facilities were under construction at that time.

393

394 Tribe: Right.

395

396 Buckingham: But the VAB was not done.

397

398 Tribe: I started in the E&A building over on the Cape.

399

400 Buckingham: OK.

401

402 Tribe: And I worked on Complex 15 for awhile on the STS. We were activating that for  
403 STS engine firing.

404

405 Buckingham: OK.

406

407 Tribe: And then they moved me over to support the propulsion system on the command  
408 service module, which meant I moved back over to the MSO, which is now the O&C  
409 building. And I had an office there, well a cubicle, not a cubicle even, just a desk up on  
410 the third floor of the MSO. So, that's where I really started. That was about mid-1965  
411 and I was the lead RCS, Reaction Control Systems engineer for the command service  
412 module.

413

414 Buckingham: OK.

415

416 Tribe: So I had all the reaction control jets on the spacecraft.

417

418 Buckingham: OK. All the Apollo spacecraft came through the O&C for processing at  
419 that time.

420

421 Tribe: Right.

422

423 Buckingham: What about the lunar module, did it also?

424

425 Tribe: Lunar module wasn't even around at that time. It didn't show up for a couple of  
426 years and then it also went through the O&C.

427

428 Buckingham: O&C when it came in.

429

430 Tribe: Yep.

431

432 Buckingham: OK.

433

434 Tribe: What we were also doing at that time was activating the high maintenance facility.

435 South of the O&C...

436

437 Buckingham: Yes.

438

439 Tribe: There's a little industrial area.

440

441 Buckingham: Yes.

442

443 Tribe: And because we were working with hypergolic systems, you know, we had to get

444 them away from exposure to the general population, so we built these facilities down

445 south. And that's where we would do all of our engine firing down there at the HMF.

446 We were activating that facility, we were active at 15, 34, 37, 39, A&B, the VAB, the

447 O&C, you know, it was hectic. We had people everywhere. Just busy, busy days.

448

449 Buckingham: Yes. And who was the head of North American Rockwell here at the, on

450 the spacecraft side activity at the Cape?

451

452 Tribe: When I first started it was a guy called Jack Hazat, and his deputy was Wally Ford.

453 But the chief, the director of the operations was a guy called Jim Pierce.

454

455 Buckingham: OK.

456

457 Tribe: And his manager, who I reported to, was John Moore. And they were both ex-test

458 pilots from North American. John Moore passed away about 2 years ago. He used to live

459 on Cocoa Beach, in fact, he was mayor of Cocoa Beach. Subject (??? 331). But that

460 whole layer of management changed after the fire, after the Apollo fire in 1967. But

461 when I first started that was, those were the people I worked for. And my immediate

462 boss was a guy called Chuck Stephens, who is also passed away now.

463

464 Buckingham: OK. And again, looking, we talked about the Air Force and the NASA,

465 sort of the different structures. On the Cape side, where you came in, talk a little bit

466 about the relationship between North American Rockwell and NASA. Was it more

467 like...

468

469 Tribe: It was much different. When you, when I was on 12, we would write a procedure,

470 you know, to do a test and we'd write it. Period. And that was it. There was no

471 question. No oversight except from your immediate management, who would verify you

472 were doing the right work. When I started with North American, NASA was involved

473 almost on a one-to-one basis.

474

475 Buckingham: OK.

476

477 Tribe: So, you know, we had a group of NASA propulsion engineers that I worked with,  
478 whom I know to this day. You know, we became very close. One of the first guys that I  
479 worked with was Horace Lumberst.

480

481 Buckingham: Oh, OK.

482

483 Tribe: And Horace and I, we still talk every week and we're still close. Our paths went  
484 together for 30-40 years. But back in those days, you know, you'd write your procedure  
485 and you'd sit down with your NASA counterpart and you'd go through that and he'd  
486 make changes and recommendations and then you'd polish it and then you'd go publish  
487 it. But it was a very much a joint effort. It wasn't a unilateral contract anymore. Now it  
488 was contractor-NASA relationship, which was very important.

489

490 Buckingham: OK. So, one of the things we have got some other folks working on history  
491 and this NASA Hands On activity is kind of one of the topics they've been interested in  
492 and the role of NASA, in terms of all of the Saturn and subsequent programs.

493

494 Tribe: And of course, just because of personalities and people, it differed in a lot of  
495 respects by who you were working with. There were some NASA engineers, like  
496 Horace, who made very good inputs, technically you felt like it was an asset to you to  
497 have that support. And others were there because that was their job and they just gave a

498 cursory look at what you did and you really felt like it was a waste of time. I mean, some  
499 cases of just run your paperwork through there, it was a necessary evil, but you didn't  
500 feel like it added much to the process.

501

502 Buckingham: OK. So it was kind of a, like you said, a personality-individual thing.

503

504 Tribe: Pretty much.

505

506 Buckingham: Who took the lead and who was really involved. Now this is a JSC  
507 activity, the development of the space capsule. So talk about your relationship with,  
508 when you worked here, Horace was a KSC person, did you also have JSC?

509

510 Tribe: We had a JSC counterpart, Dwayne Weary was the guy's name. He was the  
511 subsystem manager for RCS at JSC. And he did not get involved in the day-to-day  
512 activities. But he was involved in the sort of the management of that system, overview of  
513 the system.

514

515 Buckingham: OK.

516

517 Tribe: So if we were going to do anything that was out of the norm, we would always run  
518 it by Dwayne at JSC and also our counterpart back down at Downy. You know, because  
519 we had the design managers at Downy who were responsible for the design vehicle,  
520 obviously they were very much involved. And they designed what we should do. You

521 know, they set up the basically the specifications that said this is the testing that you will  
522 do at Kennedy Space Center. And then we took that as the outline and put the meat on it.  
523 You know, made the procedures.

524

525 Buckingham: The step-by-step procedures.

526

527 Tribe: Yep.

528

529 Buckingham: But Dwayne, did you see subsystem manager here on site?

530

531 Tribe: No, no.

532

533 Buckingham: He wasn't.

534

535 Tribe: He was at JSC and he would come down fairly frequently, as with the Downy  
536 people. You know, we'd meet down here quite often, especially if we were establishing  
537 test requirements, we would sit a team...You know, JSC, Downy, KSC NASA, and KSC  
538 contractor, and beat it out exactly what we were going to do and what the requirements  
539 and specifications ought to be.

540

541 Buckingham: OK. And did you have a, in order to prepare for the spacecraft coming, did  
542 you have a mock up or something that you could begin to...

543

544 Tribe: What we had on the first of the Apollo program, you know, I said I started in the  
545 summer of '65, and the first space... We'd been launching boiler plates which were  
546 nothing more than structural dummy.

547

548 Buckingham: OK.

549

550 Tribe: You know, there was really no systems on those boiler plates, so I wasn't very  
551 involved in those particular launches. But, we did get the first of the quads sent down.  
552 Now the service module, which is the, you know, cylindrical section under the command  
553 module...

554

555 Buckingham: Right, right.

556

557 Tribe: ...had four panels on it that contained the reaction control systems for each of  
558 those quadrants.

559

560 Buckingham: OK.

561

562 Tribe: And they were called quads. They had quad A, B, and C, and D.

563

564 Buckingham: They pointed in 90 degree angles.

565

566 Tribe: 90 degrees. They were 90 degrees around the circumference of the service  
567 module. And the first thing we had sent down for us to cut our teeth on was an Air  
568 Frame 1, quad C....quad D. Air Frame 1 quad D. And that was a quad that had been  
569 built up in Downy for some testing. It was never planned to fly, but they sent it down to  
570 us as a pretty much an all out piece of flight hardware so that we could start (??? 397) our  
571 test procedures on it and actually doing a test firing of one of the thrusters. So we had no  
572 facilities, initially, when I started in '65 to do this, so we went to the warehouse behind  
573 the MSO and we set up a corner of the warehouse with some shields and dragged in some  
574 test equipment and set up that quad there in the corner. And we proceeded to do all our  
575 testing right there behind this shield, because we were working with 4,000 PSI. You  
576 know, we were working with high pressures. We didn't have any fluids over there. Just,  
577 this was all the pneumatic testing.

578

579 Buckingham: OK.

580

581 Tribe: And, I got photos of that and I look back on those days, you know, and it was  
582 really... Everything we had to make ourselves. We needed a test unit and some cycle  
583 valves. We had to go out and get it built. You know, grab a designer, sketch up what we  
584 needed, and get it built in the back shop. There was a lot of 'can do' then. There really  
585 was.

586

587 Buckingham: Tooling and everything else.

588

589 Tribe: Yup. Yup. And then once we checked out that quad and verified that  
590 functionally it was in good shape, we took it on down. By this time, the hyper facility  
591 had been pretty much finished so we could get into one of the cells down there, and we  
592 set that single quad down there and plumbed out the fluid systems so that we could  
593 actually load the tanks with nitrogen tetroxide and monomethyl hydrazine and do a  
594 static fire.

595

596 Buckingham: Now this was the service module?

597

598 Tribe: This is the quad, still. Just the quad.

599

600 Buckingham: Just the quad. OK.

601

602 Tribe: The quad was self-contained. It had its own tanks.

603

604 Buckingham: OK.

605

606 Tribe: And you could literally take it off the service module, just pull the two hinge pins  
607 and take it right off. It was all one piece.

608

609 Buckingham: Got you.

610

611 Tribe: So we could fire that quad down there, which we did. And we did a two second  
612 firing on the down firing engine. And it was such, it was a lot of work to get ready to do  
613 this and it was a real let down. It was just all over in – BANG! It was done. I was like,  
614 “Wow, is that all there is?” So, we say, “Well, we proved a lot of things. We’re ready to  
615 move on to the flight hardware.” But we had one more step to take. And that was the  
616 command module reaction control system. They had a thing called a FWDT which was  
617 Flight Worthiness Demonstration Test. FWD2. And it was a space frame of a command  
618 module with the RCS, one half of an RCS system built around the port shop area around  
619 the bottom of the capsule.

620

621 Buckingham: OK.

622

623 Tribe: And we got this down here and put that in another cell at the HMF and did the  
624 same thing with it that we did with the quad. You know, run it through all the pneumatic  
625 tests and then we decided to load up the propellants and do a static firing. And, it had six  
626 engines, six thrusters that were scattered around the base of the frame, and this time we  
627 said, “Well, you know, two seconds wasn’t long enough. We need to get a little more of  
628 a run for our money. Let’s do 20 seconds and fire each of the thrusters one after another.  
629 That will be much more impressive.” So we got this set up and we had some really bad  
630 spills back there initially with oxidizers - big clouds of great, fuming nitrous oxide going  
631 down the road. And we got all those straightened out and the safety world was happy  
632 with us, so we set up to do this firing. And the little service module thruster was a little  
633 tiny, very clean firing Mach 1 engine, for a space application. The command module

634 was, the thrusters were required more for atmospheric entry, so they were sort of different  
635 construction. They were also ablator engines and the fire that came out of that command  
636 module thruster was about 15 feet longer than the little 1-foot fire out of the service  
637 module. So anyway, we fire these FWDT thrusters and I'm down there in the little  
638 control cell, right next to the (??? 440), and it's just sheets of fire coming out all over the  
639 place. Cables are all catching fire.

640

641 Buckingham: Goodness.

642

643 Tribe: We're trying to get it shut down and there is a communication problem back to  
644 the aid station and the MSO, where we were controlling this particular firing from, trying  
645 to get them and they have to dial in a complicated 8 digit number into a C-start to try and  
646 get it to start and it just took time. By the time they finally stopped it, it was just about  
647 run through the whole program. Anyway, the whole cell was filled with smoke and fire  
648 and we got it all poured out. But, these were just some of the teething (446) pains in the  
649 early days.

650

651 Buckingham: Yeah.

652

653 Tribe: And it gave us all a real good lesson and a respect for the hardware, so that when  
654 the first spacecraft came down, which arrived that fall, which was spacecraft 9, you  
655 know, we were ready to work with the flight hardware.

656

657 Buckingham: And you kind of knew what you had at that time?  
658  
659 Tribe: Yeah. Yeah. We were a whole lot smarter.  
660  
661 Buckingham: Now these had already been fired, I assume, out at Downy.  
662  
663 Tribe: Yes.  
664  
665 Buckingham: And so they're...  
666  
667 Tribe: We weren't firing it for the first time.  
668  
669 Buckingham: Yeah.  
670  
671 Tribe: OK.  
672  
673 Buckingham: OK. Let's see. Let's talk for a minute about some of the names we know  
674 from KSC history - maybe Dr. Debus or Mr. Petrone, did you see these people coming  
675 through? Were they hands on? Not hands on, but interested?  
676  
677 Tribe: Dr. Debus I never met.  
678  
679 Buckingham: OK.

680

681 Tribe: You know, when you're a junior engineer like I was then, you know, fist line  
682 engineer, it's people like him are almost gods. They lived up on the fourth floor of the  
683 headquarters building and I knew his background. In fact, the last B-1 to hit England fell  
684 on my road.

685

686 Buckingham: Oh, it did?

687

688 Tribe: So you know, I had a personal interest in his background.

689

690 Buckingham: Yes, that's kind of ironic.

691

692 Tribe: Just like Gunther Wendt. Because Gunther and I worked together for a long time,  
693 too, and we always cranking each other on war events.

694

695 Buckingham: Gunther is another one I would be interested in your observations.

696

697 Tribe: Yeah, OK. We'll get to him. OK. Now the first of the really senior people I met  
698 was Rocko, Petrone, and that occurred in 1967. We progressed through, jump ahead a  
699 little bit here, we progressed through spacecrafts 9 and 11, which were two, the first two  
700 flight article of the Apollo. And then we came to spacecraft 12, which was going to be  
701 the first manned launch which of course was going to be Apollo 1. We didn't call it  
702 Apollo 1 at the time.

703

704 Buckingham: It was 204 I think.

705

706 Tribe: Yep. Right. And of course, the fire was traumatic. You know, I was deeply  
707 involved with that. I was on station when it happened and listened to the crew and  
708 finished up being out here all night. And we were all taken over to Pad 34 and went  
709 through all the depositions over there. That was really a bad time.

710

711 Buckingham: Yes.

712

713 Tribe: And of course, for the next year we were knee deep in how do we fix it and which  
714 we did... and as we came out of that phase and we started back into the manned, first  
715 manned flight, we were doing loading tests, hyper loading tests over on 34. And the way  
716 we had loaded 9 and 11, because the ground support equipment which was going to pump  
717 the fluid up through the top of the tower wasn't ready. We again had to (??? 478) up a  
718 system to load the vehicle for the first two flights. And basically it was very simple, it  
719 was 50 gallon drums on hand carts that we took up in the elevator that gravity fed into the  
720 vehicle. And it worked very well. But, by Apollo 7 which was going to be the first  
721 manned...

722

723 Buckingham: Excuse me one moment. These were the hypergauls that you were...

724

725 Tribe: This is, yes, nitrogen tetroxide and mono-ethyl hydrogen and we're wheeling it  
726 around in a hand cart up an elevator.

727

728 Buckingham: Just wanted to make sure.

729

730 Tribe: Anyway, by the time we got to Apollo 7, we were, you know, the GSC was here  
731 and we were going to pump it all the way up the tower and do it all remotely with safe  
732 operators up there, you know, like the way it was supposed to be done.

733

734 Buckingham: Right.

735

736 Tribe: And we were going through some tests. The vehicle was out there. The spacecraft  
737 was there but it hadn't been, we weren't loading the spacecraft. We had test tanks that  
738 were up on the same platform and we were going to verify the GSC by loading these test  
739 tanks up on the A7 and A8 levels of 34. And it was a Sunday, I remember, and I came in  
740 and the guys, by that time I was a supervisor and the guys were loading and as I walked  
741 into the aid station they, there was a big red cloud – it wasn't red – it was a big cloud  
742 anyway. On the TV I looked up and I say, "What are you doing?" He said, "I don't  
743 know. We're getting oxidizer coming out of the vacuum pump." Well, what had  
744 happened, they had already done a couple of loading tests and they should have, the  
745 bladders, inside these tanks was a bladder because in 0G got have to have some way to  
746 get that fluid out in a 0G environment. So you would pressurize the bladder and push it  
747 out like a balloon.

748

749 Buckingham: OK.

750

751 Tribe: Well they hadn't totally, apparently they hadn't totally collapsed that bladder and  
752 got all the oxidizer out and they were getting ready to do another loading test and to do  
753 that they had to pull a vacuum inside the tank and then backfill so that you didn't get any  
754 air inside that bladder.

755

756 Buckingham: OK.

757

758 Tribe: And when they started pulling that vacuum, they started pulling oxidizer out that  
759 they had left in the bladder. And it came into the vacuum pump and out through the vent  
760 and was just flowing across the deck. And, the standard procedure for an oxidizer leak is  
761 just to wash it down. You know, copious amounts of water. You just take the fire hose  
762 and when you're down on a concrete pad on the ground that was fine. You just hosed it  
763 all away and really diluted it and got rid of it. Now when you're up a couple hundred feet  
764 in the air and you start hosing oxidizer down, what you're doing is, you're washing nitric  
765 acid all down the side of the vehicle. Which is what they did. They washed about 400  
766 gallons of nitric acid right down the side of that first Saturn booster.

767

768 Buckingham: Wooh.

769

770 Buckingham: And it went into every vein, junction, down into the IBM ring, and into the  
771 aluminum module adapter area, right down the booster. And that's when I met Rocko for  
772 the first time. I sat over in his office and explained to him what we were doing and how  
773 we were doing it. The guy was intimidating. He was... I don't know if you ever met  
774 him...

775

776 Buckingham: I did not.

777

778 Tribe: He was great big guy. He played football for West Point.

779

780 Buckingham: Oh, OK.

781

782 Tribe: And he was a barrel-chested guy, very stern, dark, and he had this great big desk.  
783 And sat behind that in a great big straight back... and you sat there on a chair. And all  
784 your bosses would all sit around the wall and push you forward until you're sitting there  
785 in the inquisition chair. And I learned very rapidly, you tell Walker exactly what  
786 happened. You don't try to embellish it. You don't try to weasel out of anything. You  
787 don't try and fabricate stories. You just be frank with him. Be honest with him. Tell  
788 him what happened, why it happened and he'll treat you fairly. Got a lot of respect for  
789 him. And over the years, you know, that was the first time I met him, and I met him lots  
790 of times after that with different things until, finally, I worked for him. You know, he  
791 finally became the president of Rockwell in the 70s and 80s and I was real close to him.  
792 In fact, I still talk to him every now and again. I'll give him a call and we'll chat. But, he

793 was to my mind, one of the most unsung heroes of the Apollo program. He pulled so  
794 much together down here at KSC, incredibly.

795

796 Buckingham: And correct me if I'm wrong, but he not only did the vehicle side, meaning  
797 the vehicle and the spacecraft, but the facilities themselves.

798

799 Tribe: Yeah.

800

801 Buckingham: Everything...

802

803 Tribe: He was launch operations, director of launch operations. So he had to make sure  
804 everything worked. And his role before he more vehicle oriented was the facility. And  
805 he was, he had an incredible responsibility down here and he did a fantastic job.

806

807 Buckingham: What was the result of that meeting?

808

809 Tribe: The result was that we finished up with a thermal sophisticated, improved way of  
810 loading the vehicle. We had better protection up on the levels. We had better protection  
811 for the vehicle. We had better (??? 530). We had a lot of hardware improvements come  
812 out of it. Better visibility, more engineering involvement, and SCAPE. You know  
813 SCAPE is self contained atmospheric protective ensemble. A big old rubber suit with an  
814 air pack on your back – it was measurably uncomfortable. But we would put engineers  
815 up there for the whole operation. – one hour on, one hour off. And we finished up with a

816 much safer, much smoother operation. Every accident we had, like the fires, like the  
817 spills, it improved the way we did business.

818

819 Buckingham: OK. I was just going to ask you, you've mentioned two cases now where  
820 things didn't go exactly as planned. I assume there were a lot of those, but the managers  
821 were really interested in learning from that...

822

823 Tribe: That's right.

824

825 Buckingham: ..and figuring out a better way to do it.

826

827 Tribe: Absolutely.

828

829 Buckingham: OK. Talk about Gunther.

830

831 Tribe: Gunther. I first met Gunther, I guess, right after the fire. They brought him over  
832 from McDonnell Douglas. There was a lot of people changes after the fire. Like I said,  
833 the whole upper level of management in North American disappeared.

834

835 Buckingham: OK.

836

837 Tribe: And they brought in all new people. One of the guys they brought in was Tom  
838 O'Malley, who became director of space vehicle operations for North American. We

839 were in the process of becoming North American Rockwell right about the same time.  
840 They brought in Buzz Helot to be vice president down here from (??? 546). They  
841 brought Gunther over from Macdac to be pad leader. And so my interface with Gunther  
842 was during test phases. We'd be on the headset together and we got to know each other.  
843 I remember one night we were, there was Gunther and I, and I had an electrical engineer  
844 with me named Jose Valin, who was a Mexican. So you had this thick German accent,  
845 the English accent, and this Hispanic accent and one American technician, he says,  
846 "Doesn't anyone in this program speak real English?" But, yeah, I got to know Gunther  
847 there and we worked together for, right through the end of the Apollo program and then  
848 he went out to Palmdale for a couple of years and then he came back and worked together  
849 during the Shuttle Program. Went up to SPC and then after SPC, he came over and  
850 worked directly for me. I headed up a group – I'm jumping ahead a long way now to  
851 1984 – Launch Support Services, which was the design authority for the Shuttle. And I  
852 was the director of that operation and Gunther was my safety engineer. And Gunther  
853 worked for me then for, I don't know, I think about four years, five years, until he retired.  
854

855 Buckingham: OK.

856

857 Tribe: So he and I have been together, we were all together over 20 years.

858

859 Buckingham: Wow. OK. OK. The first, you mentioned capsules 9 and 11 that came...

860

861 Tribe: 9 and 11 were the first two command modules.

862

863 Buckingham: Were those, those were going to be actual, for test flights or...

864

865 Tribe: They were test flights, unmanned test flights.

866

867 Buckingham: And they went off of...

868

869 Tribe: 34.

870

871 Buckingham: 34 on a 1B, a Saturn 1B.

872

873 Tribe: 1B.

874

875 Buckingham: 1B. OK. And then you begin, I assume, the fire happens...

876

877 Tribe: Fire happened. Yep.

878

879 Buckingham: There's been a lot written about the fire. I don't know if you have anything

880 you want to say about it.

881

882 Buckingham: As I said earlier, you know, I wasn't supposed to work that night. Because

883 it happened 6:30 at night, so that the second shift was normally there, but the, again I said

884 I was a lead engineer by that time. And my second shift guy couldn't get in until late, so

885 I stayed over to cover for him. So I was up on station in the MSOA station and we'd  
886 been struggling with the plugs out test all day with lousy communication. And I was  
887 sitting there writing the test preparation sheet for something we wanted to do the  
888 following day because we were in another hold. And I had a technician up on that level,  
889 the same command module level, and he'd been giving me some information off some  
890 valves in the panel on the side of the command module and he had his head actually  
891 inside the port shop area just before the fire.

892

893 Buckingham: Wow.

894

895 Tribe: And I relieved him and he stepped back. And then I just suddenly heard, you  
896 know, with my headset on, "Fire!" And I turned around to the (??? 584) next to me, who  
897 was a stabilization and control engineer next to me, and I said, "Did he say fire?" He  
898 said, "It sounded like it." And I said, "Well, what's he talking about?" And then, right  
899 after that they said, "Fire in the cockpit." And I looked up and you could see nothing on  
900 the TV. We didn't have a very good coverage at the aid station, especially not for the  
901 command module. And right after that it was something like, "Get us out! We're  
902 burning up!" Then there was like a scream and that was that. So, I said, "Boy, this  
903 doesn't sound good." So I leapt up and I went around to one of the phones in the aid  
904 station, the phones in the consoles right there. I grabbed the phone and called my wife  
905 and said, "Hey, there's been an accident out here." And I said, "But I'm fine, but I'm  
906 probably going to be late. Don't worry about me."

907

908 Buckingham: Right.

909

910 Tribe: And I hung it up and the same guy that I talked to was right behind me. He picked  
911 the phone up and said, "This phone's dead." I said, "No, I just used it." And he said,  
912 "No, it's dead." About that time I turned around, the guy was locking the door in the aid  
913 station. I have never seen this place respond like it did. It cut all the phones, it locked all  
914 the doors, they came in, they collected all our paperwork... by this time the Tuscan  
915 doctor who was in the aid station with us had got hold of the pad leader and they were  
916 trying to figure out what to do and what the status was. And, "Do they got the hatch off  
917 yet? No, no, they're still working on it. It's too hot." And they responded, they finally  
918 got the hatch off. And he said, "You don't want to know."

919

920 Buckingham: And following this was obviously a tough time here at Kennedy and in the  
921 Space Program. Was there a sense over the next few months that the manned program  
922 may stop, or was there always a sense we were going to figure it out and come back and  
923 move on?

924

925 Tribe: I never thought we'd stop. You know, by this time we had already been working  
926 like over two years on the program and there was tremendous progress. It was, there was  
927 a real drive. This was just one hell of a big set back. This wasn't anything we couldn't  
928 work around. We'd fix it and we'd go on.

929

930 Buckingham: OK.

931

932 Tribe: And I think I felt that immediately and felt it all the way through. This was a bad  
933 time.

934

935 Buckingham: Yes.

936

937 Tribe: You know it's [END OF TAPE HERE]

938

---

939

940 Tribe: ..coming to a dead stop. I never felt that after Apollo.

941

942 Buckingham: OK.

943

944 Tribe: Even as bad as it was, it just seemed like we didn't stop. We just kept going.

945

946 Buckingham: OK. There was enough momentum.

947

948 Tribe: Yep. Yep. Again, it might be because of where I sat in the chain of command,  
949 too. You know, when you're a lot farther down the line, maybe you see things differently  
950 than you do when you're up in senior management.

951

952 Buckingham: Yes. Yes. Sometimes you have less information, also.

953

954 Tribe: Yep. Yep.

955

956 Buckingham: Well, let's talk about some of the changes that resulted from that that  
957 eventually will help us get to the Moon. There was an investigation, obviously, and what  
958 did it find?

959

960 Tribe: Oh, you know, there was a lot of major changes.

961

962 Buckingham: But, talk a little bit about the changes you saw here at Kennedy and even  
963 any that you might have seen working down here from JSC during that time.

964

965 Tribe; You know, there was a lot of obviously major technical changes in the way the  
966 hatch worked, the way the environment was contained, and fire control, you know, the  
967 flammability of the hardware and software inside the command module. And, you know,  
968 many, many technical changes that came out that made the Apollo spacecraft a better  
969 vehicle. You know, there is one school of thought that said if we hadn't had an Apollo  
970 fire, we might not have got to the Moon because we may have had a serious accident in  
971 orbit that would've killed the program. The fact that it occurred on the ground and that  
972 we pretty much, we never did know exactly what caused it but we had a pretty good idea  
973 and we sure could see all the contributing factors that needed to be fixed. As far as we  
974 were concerned on the ground, it changed the way we wrote paper, the way we processed  
975 paper, the way we scheduled work.

976

977 Buckingham: Were their more signatures now?

978

979 Tribe: More signature, more government involvement, more detail.

980

981 Buckingham: OK.

982

983 Tribe: Less, the pressure was still there but it was not chaotic pressure. You know,  
984 before spacecraft 12, before the fire, you know, we literally were just, we were running  
985 faster than our legs could handle and that did slow down.

986

987 Buckingham: OK.

988

989 Tribe: And the scheduling and the control of the work we did and the way it was laid out  
990 was much better.

991

992 Buckingham: OK. You were pacing...

993

994 Tribe: Yeah. It was paced properly.

995

996 Buckingham: Was there more interaction with Johnson Space Center folks or about the  
997 same, and the same with Downey?

998

999 Tribe: About the same. I didn't see any big hiccup in the way we were doing business in  
1000 that respect.

1001

1002 Buckingham: OK. So it took, I don't know exactly how long, a year and a half or what  
1003 amount of time to get a new spacecraft here that you could work with?

1004

1005 Tribe: You know, we had spacecraft...

1006

1007 Buckingham: The fire was in January of '67...

1008

1009 Tribe: Yeah, 12 came in here, 12 was the fire, and then they brought in 14, as well. Right  
1010 after the fire, we used 14 as the sort of the clean version because as we took 12 apart, you  
1011 know, it was indescribably burned and damaged. And 14 we would take apart at the  
1012 same time and we'd compare parts.

1013

1014 Buckingham: OK. OK.

1015

1016 Tribe: And we did all this over at the PIB with the old polytechnic installation building  
1017 over on the sort of east side of the industrial area behind the HMF. We had, you know,  
1018 just tables all laid out with all this hardware.

1019

1020 Buckingham: So, as you were taking apart the burnt spacecraft you were taking apart the  
1021 good one...

1022

1023 Tribe: ...The good one as well. Yep. And then, you know, there were all sorts of  
1024 technical changes being implemented as we were doing this that were like the hatch  
1025 redesign and the environmental atmosphere in the vehicle was being changed. All those  
1026 changes were going on back in Downey for what we called the first block 2 vehicle.  
1027 Block 2 was 101 which was the, it ultimately became Apollo 7, the Sherraw flight.

1028

1029 Buckingham: OK.

1030

1031 Tribe: But in the meantime, we still had some Block 1 vehicles that were still coming  
1032 down the line, like spacecraft 17 and spacecraft 20. These were unmanned and we put  
1033 them on a Saturn V and flew them with minor changes.

1034

1035 Buckingham: OK.

1036

1037 Tribe: And those were a couple of the major accomplishments. You know, in the past,  
1038 every vehicle we had ever flown, we'd do it step by step. We'd take the first stage, we'd  
1039 take the second stage, and we'd fire one at a time and we'd go through this whole, very  
1040 long process of trying to get all these pieces working before we stack them.

1041

1042 Buckingham: Right.

1043

1044 Tribe: Then we come along and we put a Saturn 5 together, all three stages, and throw a  
1045 spacecraft on top of it and fire it.

1046

1047 Buckingham: Now this decision is a landmark decision in the space program. As I  
1048 understand it, and please correct me, but the German approach was a very step by step...

1049

1050 Tribe: Yeah, this was the American approach over the German objections. Again, I was  
1051 way down the line, but what I understood that Huntsville, you know the Marshall German  
1052 guys wanted to do a much more slow process and it was... I'm trying to think who it was  
1053 now that really got... I guess it was George Miller was the man that really pushed that.

1054

1055 Buckingham: OK.

1056

1057 Tribe: So there's a character for you to talk to.

1058

1059 Buckingham: OK.

1060

1061 Tribe: He's still...

1062

1063 Buckingham: Headquarters person.

1064

1065 Tribe: Yep. He was the one that said, "We're not going to make it if we don't start  
1066 leapfrogging some of these intermediate steps."

1067

1068 Buckingham: OK.

1069

1070 Tribe: And Apollo 8 was another one of those that was made, you know where we went

1071 straight to the Moon after one successful manned flight. We put men on a Saturn V and

1072 go to the Moon.

1073

1074 Buckingham: ..go to the Moon...

1075

1076 Tribe: But George is one of these amazing people from that program still going strong.

1077

1078 Buckingham: Now, were those folks down here or in, of course again I know that you

1079 might not have interfaced with them, but did you get a sense the headquarter folks were

1080 here periodically?

1081

1082 Tribe: I'd see them in the firing room once in awhile.

1083

1084 Buckingham: OK.

1085

1086 Tribe: I'd see them at flight readiness reviews.

1087

1088 Buckingham: OK.

1089

1090 Tribe: And hear them talk but, the first person I met of that sort of ilk was Gis Graft. And  
1091 he came down and some of the senior JSC people...

1092

1093 Buckingham: JSC...

1094

1095 Tribe: Yeah. Once in awhile, you know, we'd have a problem right before launch in our  
1096 system, but we'd be knee-deep trying to solve a leak on, you know, the day before launch  
1097 and then suddenly all those people are down here for the launch and they are involved  
1098 and helping you. You know, that's when you get to meet some of these people for the  
1099 first time.

1100

1101 Buckingham: OK. Not necessarily the best...

1102

1103 Tribe: No. Not the greatest help.

1104

1105 Buckingham: OK. So you've torn apart the two vehicles, you used two of the block one  
1106 designs, I guess, for test launches, unmanned launches, and now, I guess you received the  
1107 Sherraw – what became the Apollo 7 capsule – and you rode through tests for that and I  
1108 guess you got improved procedures and let's talk about the pad a little bit. The vehicle is  
1109 being built up in the VAB and then the capsule...

1110

1111 Tribe: No, we're 34 now. Don't forget.

1112

1113 Buckingham: Oh 34, ah, yes.

1114

1115 Tribe: Apollo 7 is at 34.

1116

1117 Buckingham: 34.

1118

1119 Tribe: The vehicle is stacked up there, you know, the S1B...

1120

1121 Buckingham: At the pad.

1122

1123 Tribe: Yes. The S4B.

1124

1125 Buckingham: Yes.

1126

1127 Tribe: And then we come back and we stack in the high bay of the O&C building, the

1128 what we call the "slaw", SLA, you know we have acronym soup. But it's Spacecraft

1129 Lunar Module Adaptor.

1130

1131 Buckingham: OK.

1132

1133 Tribe: And it was a big Dixie-cup-shaped structure where the lunar module would sit

1134 inside. Now on Apollo 7, we didn't have a lunar module, so this was just an empty shell.

1135 But we stacked the shell command module service module on top of that adaptor and

1136 then we'd be on a flatbed and we'd take that whole assembly out to Pad 34 and lift it as a  
1137 unit and put it on the S4, on top of the IU, which was on top of S4B, on top of the S1B.

1138

1139 Buckingham: The IU is the instrument unit.

1140

1141 Tribe: Right. That's the IBM unit.

1142

1143 Buckingham: OK. And so the vehicle is ready to go and where you as the countdown  
1144 activity took place?

1145

1146 Tribe: We always worked out of the aid station. Some tests we run from the blockhouse  
1147 at 34 when we were doing local test, but for an all up vehicle test we'd be back and all  
1148 the spacecraft checkout is done from the aid station in the MSO.

1149

1150 Buckingham: OK.

1151

1152 Tribe: And ACE means Automatic Check Out Equipment.

1153

1154 Buckingham: That's right.

1155

1156 Tribe: That what that stood for. And we had, you know, our displays there and our  
1157 controls for the hardware on the vehicle and that's where we... all the Apollo flights were  
1158 from that aid station.

1159

1160 Buckingham: OK.

1161

1162 Tribe: I was just a little disappointed in a way because we were not in the firing room.

1163

1164 Buckingham: Not at the location.

1165

1166 Tribe: And after a launch, of course, they'd come in and they'd thank all the people in the

1167 firing room and all us spacecraft guys, including the lunar module, lunar module and the

1168 command service module, we were all over there in aid station and we'd all have to

1169 watch on TV or listen on the headsets to what was going on in the firing room. You

1170 know, I'm glad I complimented everybody on what a great job we did out there. You

1171 know, I mean, that's just the launch vehicle people, that's just a truck. The "real" people

1172 are over here.

1173

1174 Buckingham: And I gather there was a little friendly competition...

1175

1176 Tribe: Oh yeah. In fact, there still is, you know. Some of my best friends were launch

1177 vehicle people back in those days and I always crack on them, "You didn't even need

1178 headlights on your cars because you only worked one shift on the stupid launch vehicle

1179 while we guys were working around the clock seven days a week."

1180

1181 Buckingham: Talk about that comment because I've heard that before. I guess the  
1182 vehicle people like to work everybody there at once as long as it took, whereas the  
1183 spacecraft people worked shifts.

1184

1185 Tribe: I really can't answer why that was the case because, you know, even though we  
1186 had one company down here, North American, that had the S2 stage on the Saturn V and  
1187 the command service module, they were like two totally different companies.

1188

1189 Buckingham: Except for...

1190

1191 Tribe: Never did you meet anybody from the other side. You had no interface with them  
1192 whatsoever until the end of the program, when we were forced to start transferring skills  
1193 and doing retention lists and trying to figure out who we were going to keep for the  
1194 Shuttle program.

1195

1196 Buckingham: OK.

1197

1198 Tribe: But, no, the launch vehicle people were another entity so I really don't know why  
1199 they worked the way they did. I've heard lots of stories since from people, but all I know  
1200 is that we had our hands full. There was just continuous work. We never stopped.

1201

1202 Buckingham: OK.

1203

1204 Tribe: 24 hours a day. 7 days a week.

1205

1206 Buckingham: OK. So we launch Apollo 7 and it's a success. It comes back. I imagine  
1207 that was a moral boost.

1208

1209 Tribe: Yeah. That was very necessary. But again, you see, we are already overlapping  
1210 into Apollo 8. You know, when the 7 flew, we were already building 8 up to fly and 8 is  
1211 going to the Moon. So 7 is already starting to be. "Well, that was great, but now we're  
1212 going to the Moon." You know, so now all the emphasis moves from 34 to 39. So, now  
1213 you know, we are out in the VAB. You know, one of the many offices we had over the  
1214 years, but now we're up on the 26<sup>th</sup> floor of the VAB.

1215

1216 Buckingham: For testing?

1217

1218 Tribe: For testing for Apollo 8.

1219

1220 Buckingham: Good. Now spacecraft still came into the O&C.

1221

1222 Tribe: Right. But then...

1223

1224 Buckingham: ...and then when it's ready...

1225

1226 Tribe: ... we stuck it in the VAB, just like we stuck it on the pad at 34. We stuck it in the  
1227 VAB and then we continue to do integrated testing, you know, out there in the VAB.  
1228  
1229 Buckingham: OK. Now Ike Cordial you may know.  
1230  
1231 Tribe: I know him. I never knew him to talk to much. Again, he was...  
1232  
1233 Buckingham: Launch vehicle. But he was saying the different segments came into the  
1234 low bay of the VAB and the different contractors continued to work on them there and  
1235 then when they stacked, when stacking was taking place, NASA got a little more  
1236 involved. Is that, is that...  
1237  
1238 Tribe: I can't really speak to what they did over there. I didn't notice any difference with  
1239 my NASA interface from working over there to working out here. Much the same.  
1240  
1241 Buckingham: OK. And do you remember when you first heard we had decided that,  
1242 "Well, we're going to send Apollo 8 to the Moon." Did that...  
1243  
1244 Tribe: I don't remember when I first heard it. I know, you know, thinking back to Apollo  
1245 8 to me was, I think, more impressive than Apollo 11.  
1246  
1247 Buckingham: Wooh.  
1248

1249 Tribe: That's the way I felt at the time. I knew we were going to walk on the Moon  
1250 eventually, but I just couldn't believe that we were going to go put men on a Saturn V  
1251 after, you know, I come from the Atlas program where we had thousands and thousands  
1252 of launches before we finally put John Glenn on top of it. And even then we were scared  
1253 as blazes, you know, on the condition of the vehicle. But you know, Saturn had flown  
1254 twice and the second flight hadn't been error free. There had been problems with it and  
1255 here we were and we were going to put three men on it and send them to the Moon. And  
1256 that to me was just... I wrote a story on it at the time for my high school. They asked me  
1257 to write a story and I wrote it up while it was still fresh in my mind and I could still look  
1258 back at that now and think, "Gee, I really was impressed."

1259

1260 Buckingham: OK.

1261

1262 Tribe: Yeah. I don't remember when I first heard it or when I first appreciated what we  
1263 were doing, but it sunk in. That was really an incredible start.

1264

1265 Buckingham: OK. And then the vehicles keep coming and the spacecraft keep coming  
1266 and, of course, Apollo 11 happens. Now did you, you were not on a console in the LCC,  
1267 or were you?

1268

1269 Tribe: No I was back in the aid station.

1270

1271 Buckingham: Still back in the aid station. OK. And Apollo 11, of course, is a great day.  
1272 So the Apollo program begins to wind down and we come up with the Skylab program.  
1273 Same command module used there.  
1274  
1275 Tribe: Yep.  
1276  
1277 Buckingham: Any major changes?  
1278  
1279 Tribe: Well, you know, I think the biggie for me was, you know, you worked this four  
1280 years of just intense hard work and we came to Apollo 11 and we went out and brought  
1281 the crew back and everything wonderful and two weeks after landing we are told we have  
1282 to start laying people off. At that time, I had almost a 40-man group and I picked the  
1283 service propulsion system by this time, as well as the reaction control supply. I had all the  
1284 propulsion on the spacecraft and I had to lay 20 people off. And it... absolutely, you  
1285 know, unprepared for it. You know, it wasn't even or hadn't even thought prior to 11  
1286 that if it's successful we are going to have to do this. You know, I just assumed that  
1287 work, we would continue along into 12 and 13 and it would just be...  
1288  
1289 Buckingham: Right.  
1290  
1291 Tribe: And that was a very distressing time. Very traumatic for me as a supervisor to  
1292 bring these people in, one after another, and tell them we're going to have to let them go.  
1293 And reactions varied from "So what" to, you know, absolute guy just collapsed – crashed

1294 his head on the table in front of me, you know, “No, what am I going to do?” It was  
1295 really, you know, really a bad time and then we kind of settled down into 12, Apollo 12,  
1296 13, right through the rest, right through Apollo 17. And we had some, right before we get  
1297 to Skylab there was one really bad time. Apollo 16.

1298

1299 Buckingham: 16.

1300

1301 Tribe: From my viewpoint.

1302

1303 Buckingham: OK.

1304

1305 Tribe: You know, things were chugging along pretty smoothly by this time, and we... I  
1306 don't know whether we were complacent or what, but the procedures were pretty stable,  
1307 we were turning the vehicles around, we were testing at a pretty good lick and the guys  
1308 were all experienced. And 16 we had a event that again occurred in the middle of the  
1309 night, they always seem to occur in the middle of the night on third shift when I'm at  
1310 home and asleep, and I came in in the morning and the guys, third shift driver, they were  
1311 briefing me on where they were and they said, “We're really getting some funny data  
1312 back from the vehicle.” And they were showing me this peculiar pressure measurements  
1313 from the command module pneumatic system and I looked at that and I was evaluating it  
1314 and I said, “The only way you can get this data like this is you got a busted bladder.”  
1315 Well, to cut a long story short, what had happened in the night, they done a flow test and  
1316 the bladder always have to have the same pressure on both sides of it. You can't have

1317 more than a 10 pound belt across your bladder because it was a fairly stiff Teflon. It  
1318 wasn't very forgiving. They'd, you call it a quick disconnect, had failed to mate properly.  
1319 They weren't getting make up pressure going into the tank, and again, because the  
1320 instrumentation on the vehicle was so sparse, you know, one of the big weight drivers to  
1321 cut the weight down was cut the instrumentation. So, you know, we did not have good  
1322 visibility on where we were with vehicle. So, you have to use a lot of ground  
1323 measurements to look at what you think you've got on the vehicle and if a QD isn't open,  
1324 you can't tell then.

1325

1326 Buckingham: OK.

1327

1328 Tribe: You know it's just a mechanical feel thing. Anyway, they had lost this pressure on  
1329 one side of the bladder and the pressure in the tank caused a stand pipe to rupture. The  
1330 bladder expanded, pushed down into the end of the tank and snapped the stand pipe. And  
1331 when that snapped, the bladder failed. And they didn't realize that in the middle of the  
1332 night, but we did when we looked up the data the next morning. You know, I had to go  
1333 down and tell my boss, at the time was Bob Weaver and Tom O'Malley, you know, that,  
1334 "I think that we've got a busted bladder in the command module." Now, this is out on  
1335 the stack.

1336

1337 Buckingham: OK. You're at the pad.

1338

1339 Tribe: This tank is in the pork chop area around the base of the command module.  
1340 Totally inaccessible. You can't get to it. So, we establish, yep, it is the tank and it is bad.  
1341 And, you know, go down, we had a brief waffle, again, explained it. What happened and  
1342 what we got to do. And he says, "Well, how are we going to fix it? What are you going  
1343 to do." "We're going to take the heat shield off the command module." Which had  
1344 never been done before. But to get the heat shield off the command module we had to  
1345 roll the Saturn V back to the VAB, de-stack the lunar module, LEM adaptor, command  
1346 service module assembly, roll that back to the high bay of the O&C, take the command  
1347 service module off the lunar module, take the command module off the service module,  
1348 each stacking them in their own little stands, and then take the heat shield off the  
1349 command module for the first time to get to that tank and then replace the tank. And we  
1350 did this in like a two-week period.

1351

1352 Buckingham: Wow.

1353

1354 Tribe: And that was probably the most work we'd ever done, you know, we just worked  
1355 almost full time.

1356

1357 Buckingham: I imagine you had to write a new procedure...

1358

1359 Tribe: Everything had to be written from scratch. They were beating, pardon the word,  
1360 beating the crap out of us at the time because we had let this happen. We were defensive  
1361 because it was not an error as much as lack of visibility, and maybe one of the guys had

1362 not used good judgment there in the middle of the night. But they really beat up on us  
1363 and morale was down, you know, and yet we were being forced to work these long hours  
1364 and all this new stuff. But, you know, we did all this. And that to me was the, sort of,  
1365 probably the major moment of the Apollo program for me because of what it meant to us.

1366

1367 Buckingham: Well, by this time you have, of course, a lot of expertise and knowledge.  
1368 Had that happened earlier on, it might have been a different story of how we would have  
1369 fixed it.

1370

1371 Tribe: Yeah.

1372

1373 Buckingham: Because you had so much of your experience at this point.

1374

1375 Tribe: Yeah, but it was the only way it could be fixed. What we did was the only  
1376 solution.

1377

1378 Buckingham: OK.

1379

1380 Tribe: You couldn't fly with it and you couldn't fix it any other way. You know, so it all  
1381 had to be, you had to take this whole house of cards apart and put it back together again.

1382

1383 Buckingham: OK.

1384

1385 Tribe: And we still made schedule.

1386

1387 Buckingham: Well, how about something like, did you see the 16 astronauts at all?

1388

1389 Tribe: We saw, we would see the astronauts... in the earlier days, we saw them quite a  
1390 lot. As we moved on up into the lunar landing phase I'd see them for the sortee, we have  
1391 now about an hour minus 2 day briefing where we'd go up and brief them on specific  
1392 issues or significant items concerning our systems. So, I'd meet all of them at a  
1393 roundtable over in the crew quarters a couple of days before launch, but other than that  
1394 you didn't see much of them.

1395

1396 Buckingham: OK.

1397

1398 Tribe: You'd see them running around in the lunar rover and things like that, you know,  
1399 training and stuff, but not to speak to.

1400

1401 Buckingham: Right. OK. We go through the Apollo-Soyuz activity and that sort of  
1402 concludes the...

1403

1404 Tribe: Yeah, well, you know, we got to Skylab and right up until the time we launched,  
1405 after Apollo 17, I moved over to the Shuttle Program.

1406

1407 Buckingham: OK. That early. OK.

1408

1409 Tribe: 1972 I started on Shuttle with just some initial, in fact it didn't even look like the  
1410 Shuttle vehicle you have got today at that time, but started working on that for two years.

1411

1412 Buckingham: Now, was that still down here or was that at...

1413

1414 Tribe: That was here. That was still here. There were five of us formed the core of the  
1415 North American Rockwell Shuttle program down here at that time.

1416

1417 Buckingham: OK.

1418

1419 Tribe: And then in 1975, they called me back onto the Apollo program because they  
1420 needed, they were running out of people. And ASTP, I went back over there and the 40-  
1421 man group I had for Apollo 11 was now down to about 8 men. And I went back and  
1422 worked as an RCS engineer on ASTP.

1423

1424 Buckingham: Oh, really.

1425

1426 Tribe: And it was probably the most satisfying launch I ever worked on. We were down  
1427 to one shift and all the techs and engineers knew each other by first name. There was the  
1428 highest morale. The most fun. Most satisfying flow I'd ever worked on.

1429

1430 Buckingham: Interesting.

1431

1432 Tribe: Yep. It was.

1433

1434 Buckingham: Now, you may have some insight that could be useful with the president

1435 talking about the exploration vision, the Shuttle program may come to an end here in a

1436 few years in 2010, and another vehicle of some kind is going to start. How do you

1437 maintain morale, or what did you all do with the folks that didn't get laid off and they're

1438 still there working and yet they know the program is going to wind down eventually to

1439 close out. Did you take any specific steps?

1440

1441 Tribe: I don't remember steps being taking either in '69 at the end of Apollo, you know,

1442 after Apollo 11, or '72 when there was another...

1443

1444 Buckingham: After 17...

1445

1446 Tribe: After 17 or after '75, we went down to 95 people at Rockwell.

1447

1448 Buckingham: Wow.

1449

1450 Tribe: From 2,500.

1451

1452 Buckingham: From 2,500.

1453

1454 Tribe: So yeah, the company really made a lot of effort to place people.

1455

1456 Buckingham: OK.

1457

1458 Tribe: And at that time, you know, Rockwell had a lot of other operations going all  
1459 around the country and people were spread out all over.

1460

1461 Buckingham: OK. So there was a good effort to...

1462

1463 Tribe: Yeah there was a big effort and then when we started to pick up again in about '75,  
1464 '76, you know, when we started to hire people back in again, then a lot of those same  
1465 people came back. Then, of course, the same thing happened in '84, when SBC contract  
1466 came into effect.

1467

1468 Buckingham: Right.

1469

1470 Tribe: And again Rockwell went down to about 100 people from 3,000.

1471

1472 Buckingham: Alright. We can just talk about that a little. The SBC was an attempt to  
1473 consolidate some contracts and then also it was open for bidding to the developer  
1474 contractor but also other contractors.

1475

1476 Tribe: Yeah.

1477

1478 Buckingham: And Lockheed, I guess, was the eventual...

1479

1480 Tribe: I think that was one of the biggest mistakes NASA ever made was SBC.

1481

1482 Buckingham: Moving away from the developer contractor?

1483

1484 Tribe: I think you'd been streets ahead in the program if you'd stayed with the  
1485 development contractor. They had this grouping called the great partnership, which was  
1486 a combination of Rockwell, Martin, Firecone, you know, all the major contractors on the  
1487 Shuttle that bid for the SBC and they lost out to Lockheed. I think it was our arrogance  
1488 thinking, "How could anyone ever bid against us?" You know, we designed and built the  
1489 vehicle, how could anyone else operate it any better than we could. That put the tie bash  
1490 on it, you know, and I think we were so arrogant and so strong at that time that the  
1491 government felt like it was time for a change, and that was when they brought Lockheed  
1492 in. And it was shaky there for a long time

1493

1494 Buckingham: Yes. It was big change.

1495

1496 Tribe: It was huge change. Huge change.

1497

1498 Buckingham: Now, leading up to that, what was your role in the Shuttle Program here at  
1499 KSC?

1500

1501 Tribe: OK. Up to...

1502

1503 Buckingham: Say up to '95, from '84...

1504

1505 Tribe: Like from '75 on I was in the formulative phase in the design group of what  
1506 facilities do we need, and working as an interface between the launch site and the design  
1507 activity that was going on in Downey. And then in the late '70s, primarily at that time I  
1508 was working propulsion again. Fluid systems.

1509

1510 Buckingham: OK.

1511

1512 Tribe: I became a design designee, which is sort of a design representative down here for  
1513 the fluid propulsion system. And then I moved on up. I became a supervisor of design  
1514 designees. Then in 1982, we had already launched the first Shuttle, but in 1982 they had  
1515 a major spill on the, I think it was on the second Shuttle vehicle, an oxidizer spill.  
1516 Again, it was a disconnect malfunctioned up on the forward RCS and dumped oxidizer  
1517 down the side of the orbiter.

1518

1519 Buckingham: OK.

1520

1521 Tribe: All the tiles came off, you know, a big "schmozzle".

1522

1523 Buckingham: This is at the pad?

1524

1525 Tribe: At the pad, right. And after that, they asked me to go back and manage the OMS

1526 RCS group, which is Orbital Maneuvering System Reaction Control System, it's the

1527 propulsion systems of the Shuttle. So I went back into that role, which was like going

1528 home again, you know, after Apollo. And that was in '82. And then later that year, I

1529 picked up the environmental control systems and the fuel cells, canal reactant storage and

1530 distribution systems...

1531

1532 Buckingham: These are the major systems of ...

1533

1534 Tribe: Yeah, I had a bunch of fluid systems right up until the SBC contract. And then

1535 after Lockheed got the SBC contract, they asked me to be a director of engineering for

1536 the launch support systems. And this was, again, almost like the design designee role

1537 where, now Rockwell resorts back to being the design focus down here at KSC. We

1538 represent the design group at Downey who designed and built the Shuttle. Lockheed is

1539 the operator. We got to keep, we got to make sure they work to the specifications and

1540 guidelines.

1541

1542 Buckingham: Tell me a little bit about how that worked because I'm not familiar. But

1543 let's say that Lockheed was going to change a process, would that involve a Grumman

1544 support services loop where you guys...

1545

1546 Tribe: Yeah, we would have to approve anything. Yep. Yep.

1547

1548 Buckingham: OK.

1549

1550 Tribe: And we were really a great organization. You know, we cut right back to less than

1551 100 people but we kept all the very best people in all the subsystems. So, you know, we

1552 were a very, very strong engineering group. And I like to think that, you know, we were

1553 under a lot of pressure to be out – they wanted us out of there – because we were still left

1554 over from Rockwell and they wanted to give Lockheed a free hand. And there was a lot

1555 of pressure to get rid of the LSS bunch, but they couldn't.

1556

1557 Buckingham: Now, meanwhile, Rockwell at this time still has contracts with JSC for

1558 sustaining engineering.

1559

1560 Tribe: Right.

1561

1562 Buckingham: So there is a Rockwell. It's just not here at the Cape.

1563

1564 Tribe: We were the Rockwell.

1565

1566 Buckingham: Except for you.

1567

1568 Tribe: Except for us.

1569

1570 Buckingham: And I guess the logistics guys.

1571

1572 Tribe: I like to think that we really played a key role for probably at least, well we still  
1573 do, you know, I was going to say this lasted for 13 years before I retired. I knew we were  
1574 active in just about everything that was going on down here during that whole period, key  
1575 role.

1576

1577 Buckingham: And certainly, I would think, disappointed that it worked out the way it did,  
1578 but overriding that was a concern and a commitment to the program. To me, technically  
1579 stronger and to make sure...

1580

1581 Tribe: The disappointment lasted a little while and then, you know, you realize that's  
1582 history now and we're going to make due with the situation we've got and we're going to  
1583 make it work.

1584

1585 Buckingham: OK. And then let's go up about, I know you retired -- my notes say '97, but  
1586 let's, the USA contract came in about that time, which was a combination of Rockwell  
1587 and ...

1588

1589 Tribe: Rockwell

1590

1591 Buckingham: Rockwell and Lockheed and then Boeing.

1592

1593 Tribe: Back when, I think twelve years was the length of the contract for the original  
1594 SBC. So I think '96 that was probably came up, and at that time Lockheed knows they  
1595 are going to face a big challenge from Rockwell for that contract. And it's going to be a  
1596 knockdown, bloody bidding war and both companies are going to suffer. How about if  
1597 we get together and form a single company and nobody else will bid on it. I'm sure the  
1598 government and NASA were very unenthusiastic about it. But that's what they did. And  
1599 Kent Black formed USA. He was a Rockwell guy at the time.

1600

1601 Buckingham: OK.

1602

1603 Tribe: And headed up, he was the first president of USA and...

1604

1605 Buckingham: USA is a special company that, some of you might read this, their only  
1606 mission is to process the Shuttle.

1607

1608 Tribe: Only mission is to process the Shuttle.

1609

1610 Buckingham: OK.

1611

1612 Tribe: And people like Bob Lang, do you know Bob Lang?

1613

1614 Buckingham: Yes.

1615

1616 Tribe: He's the chief engineer for USA. You know, he was my -- at that time, at this

1617 time, you know, by the middle '90s he's my counterpart now in NASA.

1618

1619 Buckingham: Right.

1620

1621 Tribe: Horace has gone over to Lockheed, Horace Lamberst...

1622

1623 Buckingham: OK.

1624

1625 Tribe: So, Horace is now my counterpart in Lockheed and Bob Lang is my counterpart in

1626 NASA. And Bob went to be chief engineer of USA. And I had options to go over to

1627 USA, too. But you know, I was getting near the point I was thinking of hanging it up. I

1628 don't really want to start another career with another company. But, that all happened,

1629 what about, just about a year before my retirement.

1630

1631 Buckingham: OK. That kind of takes you through your career. Did you really retire in

1632 '97?

1633

1634 Tribe: Yeah... no. I did some consultant work during the '97 phase. Worked for Kissler

1635 for awhile, went back to work for George Mueller.

1636

1637 Buckingham: OK.

1638

1639 Tribe: Up on Kissler, which was really unique because the guy was in his eighties by now  
1640 and he was still going strong. I mean, he's great {rustling 470} ... and then after  
1641 Columbia... Well I did some work in Russia for Boeing on the sea launch. Then all the  
1642 time I was doing volunteer work for NASA. I still got a NASA badge.

1643

1644 Buckingham: Like public affairs?

1645

1646 Tribe: Public affairs. I do VIP tours and work out at the press site once in awhile. I  
1647 usually do lunch VIP escort or take groups on tours of the facility. This keeps me  
1648 badged, keeps me involved.

1649

1650 Buckingham: So there's not many launches that have occurred here at KSC, human  
1651 launches, that you haven't seen.

1652

1653 Tribe: No. I think I've been involved in every Shuttle launch, every Apollo launch. The  
1654 only ones that I wasn't involved was the Geminis. But worked Mercury, Apollo,  
1655 started...

1656

1657 Buckingham: But you were here and probably saw those even though you weren't  
1658 working them.

1659

1660 Tribe: I think I've seen just about every manned launch since '61.

1661

1662 Buckingham: Well, those are the main questions. Looking back, it seems like it was  
1663 really exciting to develop...

1664

1665 Tribe: Oh yeah. Fantastic period to have worked in this business. And you know, we  
1666 have these old retiree luncheons and breakfasts, and we all say the same thing. That we  
1667 were very, very fortunate to have worked in this business during this period.

1668

1669 Buckingham: And having the company behind you for the early activity...

1670

1671 Tribe: Yeah, that's... It's sad now, but you just don't get the support that you ought to  
1672 have in this business.

1673

1674 Buckingham: Is there anything else you would like to add or anything 50 years from now  
1675 what you'd like to see in the space program? The floor is yours for a knee.

1676

1677 Tribe: No. You know, I look at what the, where they are heading now with the Bush  
1678 initiative and the hardware they're going to have to use is really very little different than  
1679 what it was from 50 years ago. When you think that the rocket engine that the Germans  
1680 developed has been improved considerably, but it is still the only form of propulsion that  
1681 will get you into orbit and it's not terribly efficient and that is why it costs so much to put  
1682 a pound of mass into orbit. Until we come up with some better way to get it up there, I  
1683 don't know that it's not going to be a very expensive proposition. You know, that's what