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ORAL HISTORY INTERVIEW

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AUTHOR [Interviewee's Last Name] = GRAY

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SUBJECT OF DOCUMENT: [use relevant bold-face introductory terms]

Oral history interview with Wilbur H. Gray
[full name of interviewee]

about NASA Field Offices and Contractor Relationships
[main focus of interview]

Title: 1959 - NASA Representative, McDonnell Aircraft
[interviewee's current and/or former title and affiliation]
1970 - NASA Resident Manager, Downey Plant

Interview conducted by Robert B. Merrifield, Staff Historian
[interviewer's name/position]

at MSC ?
[location of interview]

Transcript and tape(s). [for inventory only: # pages 11; # tapes 1]

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CONTENTS:

Biographical - [date/place of birth; family background] _____

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Education - 1939 Graduated

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Career Path - 1939 Curtis Wright Co (St Louis); Dec 39- NACA, Langley Research Center, Virginia; 1959 STG (assigned to McDonnell Aircraft Corp - Mercury Contract) NASA Representative; 1966 - Resident Mgr, Downey, Apollo CSM

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Topics - Coordination between McDonnell & NASA on Mercury design & manufacture; need for on-going QA (preventive); Gemini phase; increased staff; McDonnell reps w/ sub contractors; 1966 move to Downey office on Apollo CSM; MSC-MSFC Overview team at Downey; improved Configuration management; NASA-NR relations; Gray's rel. w/ NASA superiors & colleagues; communications problems & technical status reviews; resident manager relations w/ home base; work w/ NR Tulsa Division; re-working spacecraft after 1967 fire; problem w/ personnel discipline & union rules at Downey; 2% Skilled Worker protection. cut backs at Downey (27,000 in 1967; 6500 in 1970); Potential minority hiring & union issues.

1829

August 24, 1970

Dear Bill,

The transcript of your interview is attached. I have edited it lightly to remove extraneous material.

If you will, please make whatever changes in it you deem necessary, adding anything you left out or altering information where it does not reflect what you meant to say. Also, please mark those sentences with brackets [ ] that you would not want cited in a Center history for reasons of embarrassment to an individual or the Center. Don't be concerned about possible lapses in diction or sentences that may not be as polished as would be desirable were they to receive public scrutiny. As I mentioned during our recording session, this interview is to be part of the source material for the history, and it is doubtful that I wi l quote from it verbatim.

After you return the transcript to me, I'll send you a copy for your personal file.

Thanks,

Bob Merrifield
BE4

Bob -
Facts are OK - I can fill in more details if desired
Bill D.

Interview with Wilbur H. Gray
6/16/70

I graduated from school in 1939 and accepted a position with Curtis Wright Co., in StLouis and shortly thereafter was encouraged by a fellow alumnus to get a job with LRC with NACA at Langley Field, Virginia. Arriving there in December 1939, I worked with the propeller research tunnel on propeller research for quite a few years, then moved to the Langley 16' tunnel which subsequently became transonic tunnel. There work was in progress on propellers, vibrations, and transonic stability and control problems. Around January 1959, I felt I wasn't satisfactorily busy and asked for an interview and transfer to the STG. After an interview with Max Faget and Charlie Zimmerman, I was hired and asked to report almost immediately to St Louis to the McDonnell Aircraft Corp., with whom we had just signed a contract for the Mercury spacecraft.

I was the sole person in the office with a title of NASA Representative. STG felt it had to have somebody in residence there to help with the coordination between the contractor and the home office. The STG, being relatively newly formed, had never functioned with a contractor on that sizeable contract before, so neither my home office nor I really knew what the job was going to amount to or how it should be accomplished. I made the usual initial mistakes on any new job. (I reviewed all the drawings myself to start with until I found that was too much of a chore; I reviewed all the purchase orders to start with and found out that was too much a chore.) Finally work began to evolve into a pattern whereby the home office had the design review function

and set the policy with the contractor and it was my job to see that the policies were translated into action such as setting up the mock-up reviews what we were just getting started on in Mercury. This was prior to any significant manufacturing effort. This was late 1959 or early 1960. I had borrowed a few inspectors, quality control people from the Navy, BUWEPS, who were the resident cognizant agency at McDonnell, St Louis. It became apparent that we needed a resident staff of our own to make deicsions on the spot on engineering and quality dispositions of hardware as we moved along in the manufacturing phase.

In the test phase, we relied heavily on our Cape operations for technicians and engineers, to help us with our test planning, review of the test documentation and also some inspection effort. This arrangement became unwieldy and impractical. The Cape people were engaged in their own business of getting the vehicle ready for flight, so we hired our own test engineers and technicians.

The people we borrowed from the Navy, BUWEPS, were classically flashlight inspector type people who followed the blueprints religiously and generally inspected after the fact. What we were seeking in our program, because schedules were extremely important, was ~~we were looking for~~ somebody who could look ahead and warn people of problems and do a quality assurance job rather than wait until after we built it, and then we would have to rebuild the hardware. We tried

to select the kind of people with this philosophy and this kind of vision. By and large, it's been very successful.

We were then a comparatively small office. After Jim Chamberlin and Walter Burke of McDonnell conceived the Gemini concept of a 2-man vehicle and were able to convince the powers that be that it would be a fruitful program. We launched into an overlapping effort; as Mercury tailed off, we started on Gemini design which was going along concurrently with the Apollo effort. It was intended to be a short term program and accomplish some of the astronaut training and qualification effort we knew would be needed for Apollo. It would also accomplish some of the space zero g evaluations we knew we would need for Apollo.

At this point we required another buildup in staff but the functions were essentially as stated previously with the addition of a contract officer. We took advantage of some of the things we learned in Mercury in the design and also in our method of dealing with the contractor. We endeavored to simplify the hardware design so that during assembly we could manload it with many more people than we were able to with Mercury. With Mercury we had to work inside the vehicle to install hardware. On Gemini, we installed the hardware around a pressure vessel where many people could work for installations, test, and checkout. This paid off in the speed with which we were able to build and check it out.

We knew we had to have a better relationship with the subcontractor, so we insisted that McDonnell place representatives in the field at their various subcontractors to monitor the quality and technical aspects of work just like NASA did at MCD's main plant in St Louis. This approach was better than relying on the DOD people that classically had the function at various subcontractors, because we were able to have the prime contractor's people provide the information, communications, corrections in the design and accept deviations as necessary. My small NASA office in StLouis put quality people and engineers in the field as necessary to work with prime contractor people and obtain the rapid flow of information and shipment of the hardware. That effort paid off in the Gemini Program.

I moved from St Louis in December 1966, to accept the position of Resident Manager at Downey, California, on the Apollo CSM. I organized that office very much as I had the one in St Louis. My Deputy Manager was also my Chief of Engineering. I got much more useful work out of the Deputy that way. The head of my Quality Office in St Louis was also my Assistant Manager, Terry Spence. At Downey, I asked Terry Spence to join me and he was also my Assistant Manager for Quality. Even after the January 1967, fire at the Cape and the reorganization which made the Downey quality assurance organization immediately responsive to the home quality office in Houston, we had a very tight, well-organized group at Downey.

The Downey Office was much larger than the St Louis Office, and with the support of people like Kleinknecht and George Low, the resident office gained considerable stature and became responsible for many of the functions previously carried out at the home office. They relied on us heavily for many engineering and quality decisions. Naturally, we tried to be careful to coordinate with the home office to make sure they were aware of decisions we made.

Eberhard Rees who was deputy director of Marshall organized a team composed of MSC and MSFC people and provided an overview in residence with us at Downey. It was really a two-part overview--they attempted to review the funct ons of the contractor (line functions engineering and configuration management) as well as providing a detailed review of some of the subsystems such as environmental control system and the deep space antenna with both of which we had trouble and I feel that this gave us additional manpower at the time we really needed it to purge some of the operations and some of the engineering design pitfalls.

Between the Rees effort and my going out there, we had the Borman redefinition effort right after the fire. Borman had a sizeable organization of the design engineering people staffed in residence at Downey in order to redefine the requirements that followed the aftermath of the fire. I think this type coordination with the contractor certainly

paid off in making decisions. The NASA resident office was not directly assigned to Borman's team however, we supported him as required. They had enough manpower onboard so they could function by themselves and with the contractor.

In the process back at St Louis, we recognized during Mercury that we hadn't done a bang-up job of configuration management on the spacecraft. Starting with Gemini and even more so on Apollo, we made a determined effort to do a true configuration management and control function. I staffed my office in that fashion. I think this paid off in being able to define, approve and incorporate changes as required in the spacecraft and also to be able to define exactly the configuration of the spacecraft as it was launched so we knew exactly what hardware was onboard and what the history of that hardware was. It couldn't have been accomplished solely with the NASA staff. We did have excellent support from our support contractors, Boeing in the configuration management tests and general engineering and GE in the quality effort.

My relationships with the home office and also with the contractor involved personalities to a major degree. The relations were excellent because of the people who were finally assigned to the high level positions. For instance at NR, Harrison Storms who was the President when I first went out there. He was an excellent engineer and recognized as such on the X-15 Program, but was just not the kind of

person that we at the Center nor I as an individual could work well with. This was recognized by the company and by NASA not too long after I went to Downey and Bill Bergen from Martin Company accepted the position with NR as president of the Space Division. My relations with Bill Bergen and his responsiveness have always been excellent. His ability to organize and management capability were excellent. Also he is willing to ask for help or comments or suggestions from the customer and did many times, with me, George Low, and Kleinknecht. The whole top management of NR finally became that kind of a responsive relationship. Bill Bergen as President, Joe McNamara who came from the Rocketdyne Division was Executive Vice-President, and Dale Mayers, Program Manager. My relations with all of them was excellent and their responsiveness was excellent. They exercised the right to reason with me and that's proper. I found myself dealing primarily with Joe McNamara, mainly because I found I could get to him more readily than I could to Bill Bergen or to Dale Mayers, but this didn't hamper the relation at all. Whether it was an organizational problem, I felt NR ought to work on to improve or whether it was a detailed personnel problem, I found Mr. McNamara ~~to give~~ gave me the kind of support I needed. I can say the same thing of the home office 2000 miles away with Kleinknecht and George Low I never had a minutes' problem. Again, I dealt mainly with Kleinknecht because I found him more available than Low, and

actually he was my immediate boss. Having worked with Kleinknecht on three programs, I had no problems there. Anytime I felt we needed to make an organizational change or I needed some support, Kenney was most responsive.

The same thing happened with Mercury in St Louis. We started out on the wrong foot dealing with too junior a manager in the company and NASA recognized that. Walter Burke was moved in as Vice-President and General Manager of the Mercury Program and ultimately to the same position on Gemini and we enjoyed the same responsiveness there. Walter was available for discussion practically any time I wanter to see him and generally responded very favorably. I felt our relations were excellent.

My one difficulty with both the contractors and the home office was the tendency, and I think it's an occupational hazard of being a resident manager, is that the high echelon of the program back at the home office and the high echelon at the contractors will discuss and make decisions on the telephone and the information doesn't get disseminated properly. This is a communications problem that hampers all of our programs and one which I wish there was a good solution to. A partial solution is frequent technical status reviews such as we held on Apollo. This permitted everyone in an important function to be in the same room to discuss the common problems, get resolutions on them, and everyone was informed at the same time. This I feel is the proper way to do it. I realize there are occasional panic situations

that require independent telephone usage, and this is where ~~your~~ one find ~~yourself~~ oneself in the cleanup spot without all the information.

It is extremely important for the resident manager of a field office operating many miles away from home base to be sure that he gets to the home base frequently enough to circulate and discuss problems on a face-to-face basis with his managers and with his peers on that program effort. This is the only way ~~you~~ one can keep the whole program in tune and keep the home office realizing what ~~you~~ one can and should do and to make sure one is following the "party-line."

The Tulsa Division of NR was responsible for building the structure of the SM and for building the complete SLA (launch adapter assembly). The SLA was shipped directly to the Cape, the Service Module Structure came to Downey for completion of installation and test. Our relations with Tulsa were pretty detached when I arrived on the scene so I personally made some visits and attempted to improve the relationship. In addition, McAllister, Oklahoma, where a small division of the company is located which made electrical and electronic components, required some of our attention because it seemed there was a relatively poor communications link between the prime contractor plant at Downey and members of the same company at McAllister and Tulsa.

We worked on this very diligently both NR and NASA to improve the communications and tell them exactly what we wanted in the way of welding and in the way of crimp joints, wiring, and many other fabrication and quality problems. That matter was straightened out pretty well in 1968. By the middle of 1968, we had re-established our communications link. I had a man in residence for awhile at Tulsa reporting to me. After matters straightened out, we understood each other, and were able to rely completely on the resident AF inspection staff at Tulsa and a resident Marshall representative at Tulsa.

Shortly after the fire at the Cape, we had a vigorous buildup of NR people at Downey in order to rework the spacecraft to the design that we concluded was necessary as a result of our fire findings. This buildup of contractor personnel was hampered by union rules that dictated who could be hired, the bumping rights and seniority privileges. It seriously interfered with our efforts to establish a level and stable work force of knowledgeable people. This in turn created its own training and quality problems, because we had to train and retrain people In 1968, a new contract was signed by NR with = the machinists union. Prior to that time, bumping was permitted between all elements at NR, but the new contract restricted bumping only to the space division. The limitation on the bumping area helped maintain a more stable work force. We were also able to get some skills protection. We could define 2% of the workforce as being critical skilled. We used up all of the 2% on our parachute effort,

on our so-called top deck buildup, because we thought this was without doubt the most critical technical area. Up to 6 months ago, we retained the same trained personnel by name on the top deck buildup. Our turnover in contractor personnel was zero in this parachute area but ranged elsewhere in the company to over 100% a year in some departments, such as wiring. With the new union arrangements, we were able to get overall turnover down to somewhere around 30%. These union restrictions still, however, make it very difficult to keep a group of trained people.

A very fluid work force such as we had on the west coast is very hard to maintain and manage. The main support I had was from the support contractor: Boeing and GE. I did not have to tremendously enlarge the NASA staff as the contractor enlarged. In the phase-down portion we are going through after out lunar landings, the NASA force still remains stable and it's good fly wheel machinery because we are able to negotiate with the support contractors: GE and Boeing to remove people as necessary as the workload is cut. The contractor is now faced with a different problem with personnel. They have let their lower level people go and are cutting back to their senior experienced people with 20 years training with the company and it is a very difficult period for the contractor to come down from the 27,000 level we had at Downey in 1967, to the 6500 level we expect to have late this year. In the technician area, black insistance on job retention and supervisory level assignments has complicated the employee labor relation picture to the point where there will have to be new agreements with the union and black organizations in the not too distant future.